Commodore
Letter Quality Printer

Technical Manual

Model 8300P

(⊂ commodore
COMPUTER

FCC NOTICE

<u>Warning</u>:   This equipment generates, uses and can radiate radio frequency energy and, if not installed in accordance with the instructions manual, may cause interference to radio communications.   Because the different versions of this device meet different emissions standards, and because the same instructions manual covers all versions, all of the different applicable warnings are set forth below with the appropriate FCC Label installed on each unit.

As temporarily permitted by regulation, this equipment has not been tested for compliance with the limits for Class A computing devices pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference.

This equipment has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of the FCC Rules, which are designed to provide reasonable protection against such interference when this device is operated in a commercial environment.

In either of the above cases, operation of this equipment in a residential area is likely to cause interference, in which case the user, at his own expense, will be required to take whatever measures are necessary to correct the interference.

This equipment has been type tested and found to comply with the limits for a Class B computing device in accordance with the specifications in subpart J of Part 15 of the FCC Rules, which are designed to provide reasonable protection against such interference in a residential installation.   This equipment generates and uses radio frequency energy, and if not installed and used properly in strict accordance with the manufacturer's instructions, may cause interference to radio and television reception.   There is, however no guarantee that interference will not occur in a particular installation.

If equipment certified to meet the Class B limits does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures: (a) Reorient the receiving antenna. (b) Relocate the computer with respect to the receiver.   (c) Move the computer away from the receiver.   (d) Plug the computer into a different outlet so that the computer and the receiver are on different branch circuits.

If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions.   In addition, an FCC booklet, "How to Identify and Resolve Radio-TV Interference Problems", Stock No. 004-000-00345-4, is available from the U.S. Government Printing Office, Washington, D.C., 20402.

In those versions of this equipment labeled Class A or B Compliant a shielded and grounded I/O cable is necessary to achieve compliance with the FCC Rules regarding radio emissions from computers.   Please consult your authorized Diablo sales representative for further details regarding the cable.

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PREFACE

This manual presents information pertaining to maintenance and repair of Diablo Model 630 Printers and Terminals. It is one of several manuals that describe various aspects of the Model 630. All of the these manuals, and other related publications, are listed in subsection 1.6 of this manual, along with instructions for ordering them.

The information in this manual is divided into six sections entitled:

1 - General Information
2 - Preventive Maintenance
3 - Corrective Maintenance
4 - Removal & Replacement Procedures
5 - Adjustment Procedures
6 - Major Subassembly Replacement Parts
7 - Circuit Diagrams & Wiring Lists

Comments on all Diablo publications or their use are invited. Please address your comments to:

Manager, Product Support Publications
Diablo Systems, Incorporated
P.O. Box 5003
Hayward, California 94545

Diablo Systems, Inc., reserves the right to make changes and/or improvements to its products without incurring any obligation to incorporate such changes or improvements in units previously sold or shipped.

WARRANTY

Diablo Model 630 Printers and Terminals are warranted against defects in materials and workmanship for 90 days from the date of shipment. Any questions regarding the warranty should be directed to your Diablo Sales Representative. All requests for repair should be directed to the Diablo Service Center in your area. This will assure you of the fastest possible service.

UL/CSA

UL recognized and listed under File No. E51242.
CSA certified as a component and printer under CSA File LR2196.

(See the Model 630 Product Description manual for a complete list of pertinent Standards and Regulations)

MODEL 630 MAINTENANCE MANUAL   -   PUBLICATION NO. 90443-01

NOTE: On revised pages of text, each area of new revision is marked by
a heavy vertical bar in the margin.

PAGE/REV	PAGE/REV	PAGE/REV	PAGE/REV	PAGE/REV	PAGE/REV
Cover A	3-16 A	5-1 A			
ii A	3-17 A	5-2 A			
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v A	3-20 A	5-5 A			
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3-6 A	4-11 A	7-4 A			
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3-8 A	4-13 A	7-6 A			
3-9 A	4-14 A	7-7 A			
3-10 A	4-15 A	7-8 A			
3-11 A	4-16 A	7-9 A			
3-12 A	4-17 A	7-10 A			
3-13 A	4-18 A	7-11 A			
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PPI/HPRO6 PRINTER

SPI RO TERMINAL

HPRO5 RO TERMINAL
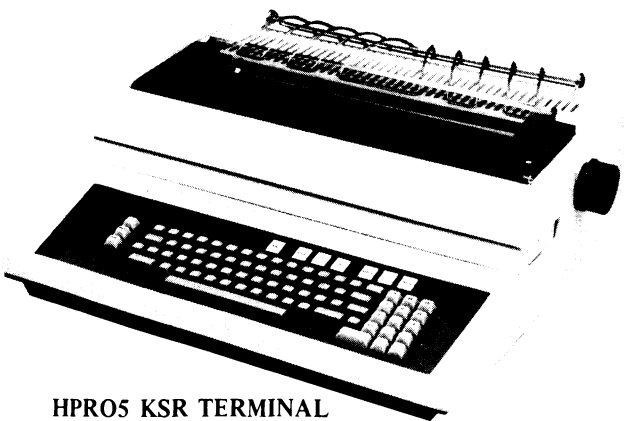
HPRO5 KSR TERMINAL

Figure 1-1.   MODEL 630 PRINTERS AND TERMINALS

SECTION 1

GENERAL INFORMATION

1.1   GENERAL

A high degree of reliability has been achieved in the Model 630 through the simplicity of its daisy wheel printer and the extensive use of microelectronics. The Model 630 is designed for fast, easy subassembly replacement and a minimum number of adjustments, greatly reducing the amount of downtime required for unscheduled repairs. An internal diagnostic self-test is a standard feature in the terminal configurations. The Model 630 HPRO5 Expanded and the Model 630 SPI also have remote diagnostics capability.

1.2   MAINTENANCE PHILOSOPHY

There are two types of maintenance for the Model 630—Preventive Maintenance, and Corrective Maintenance. Preventive maintenance consists of periodic cleaning and lubrication designed to minimize the need for unscheduled corrective maintenance. This preventive maintenance is relatively simple, and easily accomplished by the user. Corrective maintenance, on the other hand, requires certain minimum levels of technical expertise and facilities. Corrective maintenance capability will vary greatly from user to user.

Maintenance procedures for the Model 630 are categorized into three levels. The first level is primarily preventive maintenance, and may be accomplished by any user. The second level is corrective maintenance involving on-site exchange of subassemblies and printed circuit boards, and minor adjustments. The third level involves repair center and/or factory repair or refurbishment of assemblies and printed circuit boards.

> Level 1 -   Ribbon cartridge and print wheel changes; some lubrication; surface cleaning.

> Level 2 -   Includes Level 1 items, plus unit replacement, circuit board exchange, subassembly replacement, minor adjustments and alignments; minor assembly exchanges of platens and paper cradle.

> Level 3 -   Includes Level 1 and 2 items, plus major disassembly and refurbishment of subassemblies, and repair of circuit boards.

> NOTE: The user's service activity should be limited to only Level 1 procedures during the warranty period. The Diablo warranty is null and void when any Level 2 or Level 3 procedure has been unsuccessfully attempted. All time and material required to restore the printer to working order will be billed at prevailing rates. No adjustments should be attempted unless equipment malfunction indicates a specific need.

1.3 MAINTENANCE PRECAUTIONS

Observing the following precautions during service and maintenance activity will help prevent damage to the Model 630 and personal injury to the service technician.

1. Do Not remove or install circuit boards while the power is ON.
    Do Not connect or disconnect any plug or cable while the power ON.
    Do Not turn ON the power while the machine does not have its normal complement of circuit boards installed.

2. Before power is applied, make sure the carriage is free to move leftward. When power is applied, the printer executes a RESTORE sequence which includes leftward carriage movement.

3. Operating the Model 630 with its access cover removed and cover open interlock switch defeated is recommended only for qualified service technicians.
    (In some units the interlock switch can be defeated by pulling the switch plunger out to its extended position after the access cover has been removed. In other units, the switch must be actuated by other means.)

    WARNING:
    High velocity carriage movement occurs during normal operations of the Model 630, and unpredictable carriage movement can occur during certain types of malfunctions. The technician should be careful to stay clear of the carriage travel path while operating the machine with its access cover removed.

4. Do not use alcohol to clean the platen or the paper feed rollers. Alcohol hardens the rubber, resulting eventually in paper feed problems. Use Fedron Platen Cleaner or its equivalent.

    WARNING - Fedron Solvent

        Fedron solvent is flammable, its vapor is harmful, it is harmful if swallowed, and it is irritating to the eyes and skin.

        Keep away from heat, sparks and open flame.
        Use only with adequate ventilation, synthetic rubber gloves, goggles and side shields.
        Avoid prolonged breathing of vapors or contact with eyes or skin.
        Do not drink.

        In case of fire, use foam or CO_2.

        First Aid:

        In case of eye contact, flush with water and get medical attention.
        For skin contact wash thoroughly.
        If overcome by vapor, remove to fresh air.
        If swallowed, call physician immediately. Do not induce vomiting.

        Keep out of reach of children.
        Keep container closed when not in use.

5. Do not use platen cleaner to clean plastic parts. These products are usually harmful to plastics, and may cause damage. Either acetone or methyl ethyl ketone is recommended for cleaning the plastic parts of the Model 630.

Rev A (4/82)

6. Diablo provides a paper rack for holding paper away from the ventilation slots in the top cover. Use of the paper rack is required in all cases except:
    -   When using a sheet feeder accessory.
    -   When operating with bottom feed and a forms tractor.

    Except for these two cases, use of fan-fold paper without a paper rack will cause overheating of the printer's electronics. OPERATION OF THE PRINTER IN SUCH A MODE WILL VOID WARRENTY GUARANTEES.

1.4   TOOLS, EQUIPMENT AND SPARES

1.4.1   Level 1

The following listed items should be available to personnel providing Level 1 maintenance on the Model 630:

-   Fedron Platen Cleaner, or equivalent
-   Acetone or Methyl Ethyl Ketone (available in hardware stores)
-   Lint-free wipers
-   No. 70655 Light oil, 1/4 oz. *
-   No. 70654 Polyoil (light grease), 8cc *
-   No. 70825-01 Multipurpose grease, 2 oz tube *
-   No. 99000-01 Alcohol Pads (91% isopropyl alcohol) or equivalent
-   Clean, low-pressure compressed air (optional)

*   Included in Diablo Model 630 tool kits #90011-20 (basic) and 90011-21 (deluxe).

CAUTION:
1) Observe all OSHA safety rules for use of compressed air, including safety goggles.
2) Do not use alcohol on rubber items or plastic print wheels.
3) Do not use platen cleaners on plastic items.
4) Use platen cleaners and alcohol with care. Alcohol and most platen cleaners are VERY flammable (low flash point, volatile, etc.).

1.4.2   Level 2

The following items, plus those listed for Level 1 should be available to persons performing corrective maintenance and/or repair of the Model 630 at Level 2:

-   One set of circuit boards
-   One platen (appropriate type)
-   One platen knob
-   One carriage assembly
-   One paper feed motor
-   One paper feed idler gear
-   One carriage drive motor
-   One carriage drive cable
-   One snubber cable
-   One snubber spring
-   One DC power harness (appropriate type)
-   One cover open switch
-   One paper out switch
-   One ribbon base plate assembly
-   One forms tractor assembly, if appropriate
-   Assortment of appropriate size fuses

- Assortment of hand tools adequate for electronic/mechanical repair.
- TORX tools: Screwdriver #T15   Diablo No. 70826-03 *
                 Screwdriver #T9   Diablo No. 70826-04 *
- Print Wheel adjustment tools; Diablo No's. 40795 or 40795-01 or 40795-02 *; 40796 *, and 301445-01 *
- Thermal compound, Diablo No. 10549

* Included in Diablo Model 630 tool kits #90011-20 (basic) and 90011-21 (deluxe).

1.4.3   Level 3

The items listed below, plus those listed above for Levels 1 and 2 should be available to persons performing corrective maintenance and/or repair of the Model 630 at Level 3:

- One print wheel motor with hub assembly
- One flat cable assembly (main interconnect cable harness)
- One bottom pan (bottom cover)
- One PCB Extender Assembly Kit, Diablo No. 320048-02 *
- Oscilloscope, vbw 15 mHz, vds 100 mV/cm, sweep speed 50 ns/cm

1.4.4   Terminal Spares

For service support of the Model 630 Terminals, the following spares are recommended in addition to those items listed above for Levels 1, 2 and 3.

- One top cover assembly
- One access cover assembly
- One power supply regulator circuit board, or one complete power supply assembly
- One AC power cord
- One control panel assembly
- One control panel cable
- One keyboard assembly (without control panel) - (KSR units only)
- One keyboard-to-control panel cable assembly - (KSR units only)
- One carriage motor power cable
- One interconnect cable, HPRO5 to PCE
- One EIA interface connector assembly
- One side plate, left
- One side plate, right

1.4.5   Model 630 Tool Kits

The basic and deluxe tool kits for the Model 630 are the same except for the PCB Extender that is included in the deluxe tool kit.

Model 630 Basic Tool Kit No. 90011-20
Model 630 Deluxe Tool Kit No. 90011-21 *

Part No.	Description
40795-02	Combination Adjustment Tool
40796	Pin Gauge
70654	Polyoil
70655	Light Oil
70825-01	Multipurpose Grease
70826-03	Torx T15 Screwdriver

Rev A (4/82)

70826-04	Torx T9 Screwdriver
100398-01	Jumper, Socket Plug
301445-01	Print Wheel Adjustment Tool
302710-02	PCB Extender Kit* (Deluxe tool kit only)

1.5   MAINTENANCE TRAINING

Diablo offers regular scheduled classes, self-paced audio visual training programs and User Application Seminars. For further information, please call:

Diablo Product Support Training
(415) 786-5668 / 5085

1.6   RELATED PUBLICATIONS

Diablo publications that pertain to Model 630 Printers and Terminals are listed below, followed by ordering instructions and an order form.

Publication No.*	Title	List Price
90442-XX	Model 630 Product Description Manual	$ 8.00
90443-XX	Model 630 Maintenance Manual**	25.00
90444-XX	Model 630 Parts Catalog***	10.00
90445-XX	Model 630 Communications Terminal Operator's Guide	3.00
90446-XX	Model 630 Adjustment Guide (pocket-sized booklet of field adjustments)	3.00
90447-XX	Model 630 PCE Interface Manual	5.00
90448-XX	Model 630 PPI/HPRO6 Interface Manual	5.00
90449-XX	Model 630 SPI Interface Manual	8.00
90441-XX	Model 630 HPRO5 Interface Manual	8.00
Miscellaneous -		
90007-XX	Diablo Printer Supplies Catalog	1.50
90044-XX	Diablo Print Wheel Data Book	10.00
90070-XX	Xerox/Diablo Service Information Guide	2.00

   *   The -XX suffix in the publication number represents the latest edition and revision level of that publication.

  **   The Maintenance Manual includes an abbreviated list of commonly-ordered parts.

***   This is a fully-illustrated parts catalog.

In addition to the publications listed above, changes to a product which alter manual content are covered by publishing an Addenda to the affected manual. These Addenda are available to Diablo customers.

ORDERING INSTRUCTIONS

1) Fill out the order form on the other side of this sheet.

2) Mail the order form with remittance to:

    Diablo Systems, Inc.
    Retail Store
    1510 Trimble Road
    San Jose, CA   95131
    (408) 263-7704

3) Documents will be shipped via U.S. Mail at no extra charge.
    If other delivery means is desired, shipping charges are extra.

4) If a Purchase Order is used, the minimum order value is $35.00.

5) Brochures and Data Sheets are sold in lots of 100.

6) Mastercard and Visa are accepted. Include all information shown by raised
    characters on the card, and sign the order.

ORDER FORM

Diablo Systems Incorporated

Retail Store
1510 Trimble Road
San Jose, California, USA 95131

A Xerox Company

QUANTITY	PUBLICATION NUMBER	DESCRIPTION	DOMESTIC UNIT PRICE	TOTAL

PRICES SUBJECT TO CHANGE

Sub-Total

*Add State and Local Sales Tax when ordering from:

California	New York
Illinois	North Carolina
Massachusetts	Texas
New Jersey	Virginia

*Sales Tax

TOTAL

☐ Check or money order attached payable to: Diablo Systems, Incorporated

☐ Purchase Order No. _____ (attach copy).

☐ Mastercard/Visa No. _____

Exp Date _____

Inter Bank No. _____ (Mastercard)

Signed _____

THIS IS YOUR SHIPPING LABEL PLEASE PRINT CLEARLY.

Diablo Systems Incorporated
1510 Trimble Road
San Jose, California 95131

SHIP TO:

Name _____

Company _____

Address _____

City, State, Zip _____

PURCHASERS OUTSIDE DOMESTIC USA PLEASE WRITE FOR QUOTATION.

PREVENTIVE MAINTENANCE

2.1   PREVENTIVE MAINTENANCE SCHEDULE

The Model 630 does not require scheduled periodic preventive maintenance. The few lubrication requirements that exist can be accomplished as needed when unscheduled maintenance is required. Under certain circumstances the print wheel may need periodic cleaning, as described below.

2.2   CLEANING THE PRINT WHEEL AND PRINT HAMMER

When a metal print wheel is being used with a fabric ribbon, occasional cleaning of the print wheel is required. If excessive ink buildup on the print wheel is permitted, the ink will migrate onto the print hammer and subsequently cause sticking of the hammer in its guide, and possible print wheel damage.

2.2.1   The Print Wheel

1) Rock the carriage to the service (print wheel changing) position.
2) Remove the print wheel.
3) Clean the print wheel with methyl ethyl ketone (MEK) or acetone (available in hardware stores) and a soft brush or cotton swab. Avoid getting the solvent on the vibration damper (metal wheels) or cap of the print wheel.

   Caution

   - Do not use alcohol to clean print wheels.
   - Do not soak print wheels in either MEK or acetone. This can damage the vibration damper (on metal wheels) and the cap, or the petals on plastic wheels.
   - Clean the print wheel petals gently to prevent damage.

4) Dry the print wheel, replace it in the unit and rock the carriage to the operating position.

2.2.2   The Print Hammer

1) Rock the carriage to the service position.
2) Remove the print wheel and print wheel shield.
3) With your fingers, push the hammer out of the hammer guide to expose the top and sides.
4) Use 90% isopropyl alcohol and a cotton swab or tissue to dissolve and remove any ink.
5) Dry the hammer with a clean swab or tissue; then install the print wheel shield and print wheel, and rock the carriage to its operating position.

2.3   GENERAL CLEANING AND INSPECTION (Qualified Service Personnel Only)

1) Remove power from the unit. Open and remove covers as required to gain access to the printer mechanisms.
2) Thoroughly inspect the printer for signs of wear and loose or broken hardware. Check the platen for looseness or wobble. Check the carriage system for loose-

ness, wobble or accumulations of foreign material on the rails which might cause uneven carriage movement. Check the carriage drive cable system carefully for signs of wear.

3) Remove the platen, paper cradle, ribbon cartridge, and print wheel. Inspect these for signs of wear.

4) Clean the printer thoroughly, using alcohol saturated cleaning pads and wipers. Remove accumulations of paper residue, ink, dust, etc., with special attention to carriage rails and pulley grooves. Heavy deposits may be first removed by blowing with compressed air. Be sure to observe all safety precautions when using compressed air.

   NOTE: Use of compressed air is NOT recommended when the printer is located close to other equipment that is sensitive to dirt and dust.

5) Clean the platen, platen pressure rollers, and paper bail rollers with a good platen cleaner which is noninjurious to rubber products, such as Fedron platen cleaner (see safety note pertaining to Fedron platen cleaner on page 1-2). Do not use alcohol on these items.

2.4   LUBRICATION

Lubrication of the Model 630 printer mechanism is specified below. Lubricate the Model 630 only on an as-required basis. It is intended that such lubrication be applied no more frequently than every 500 usage hours or once per year, but at least every 1000 usage hours or once every two years.

Do not exceed the specified amounts of lubricant. Too much lubricant is often worse than none at all.

2.4.1   Carriage System

DO NOT lubricate the carriage drive cable.

Refer to Figures 2-1 and 2-2.

1. Carriage Rails (A) - Clean these with alcohol pads.
2. Carriage Rail Bearings (B) - Put 4 to 5 drops of light oil on each rail on each side of the carriage. Move the carriage back and forth slowly by hand, allowing the oil to saturate the lubrication felts inside each carriage bearing.
3. Carriage Pivots (C) - Apply one drop of light oil to the pivot on each side of the carriage frame.
4. Carriage Pivot Spring Loops (D) - Lightly grease the end loops and posts of the pivot spring on each side of the carriage frame with multipurpose grease.
5. Ribbon Base Plate Pivots (E) - Saturate the felt washer on each of the base plate pivots with light oil.
6. Ribbon Drive System (F) - Apply one drop of light oil to the drive and idler gear shafts, and to the drive key slot.
7. Hammer Armature Pivots (G) - Remove the rubber cap covering the upper grease chamber, and fill the cup 1/4 to 1/2 full with Polyoil. Replace the rubber cap.
8. Print Hammer (H) - DO NOT lubricate this item. If a cloth ribbon is being used, make sure the hammer is clean.
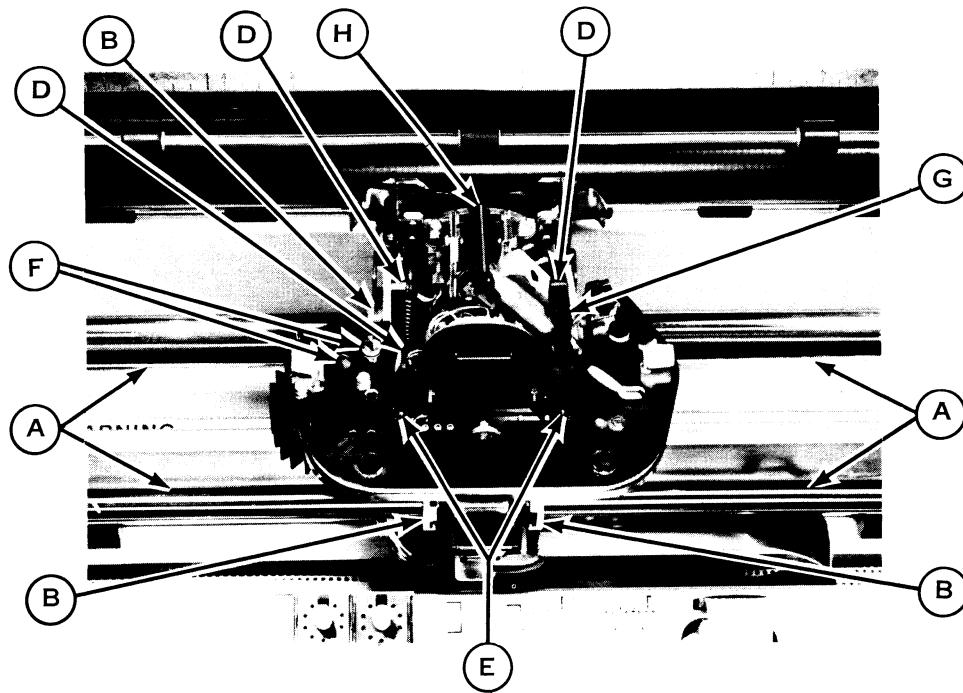
Figure 2-1.   CARRIAGE SYSTEM LUBRICATION POINTS
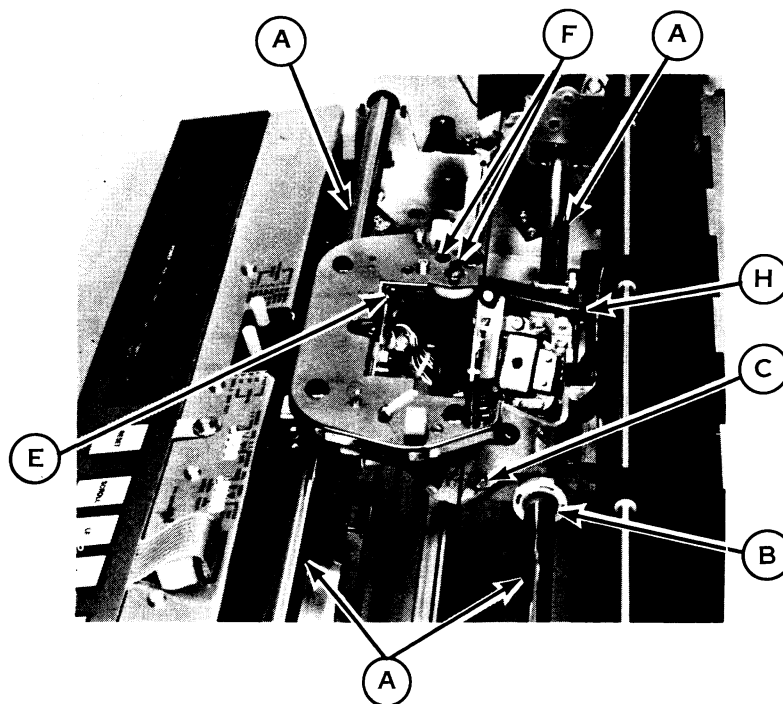
Figure 2-2.   CARRIAGE SYSTEM LUBRICATION POINTS

2.4.2 Carrier System

Refer to Figure 2-3.
1. Paper Feed Roller Shaft Pins (A) - Multipurpose grease (8 places).
2. Paper Release Lever Ramp (B) - Multipurpose grease.
3. Paper Feed Roller Assembly pivots (C) - <u>One</u> drop of light oil (4 places).
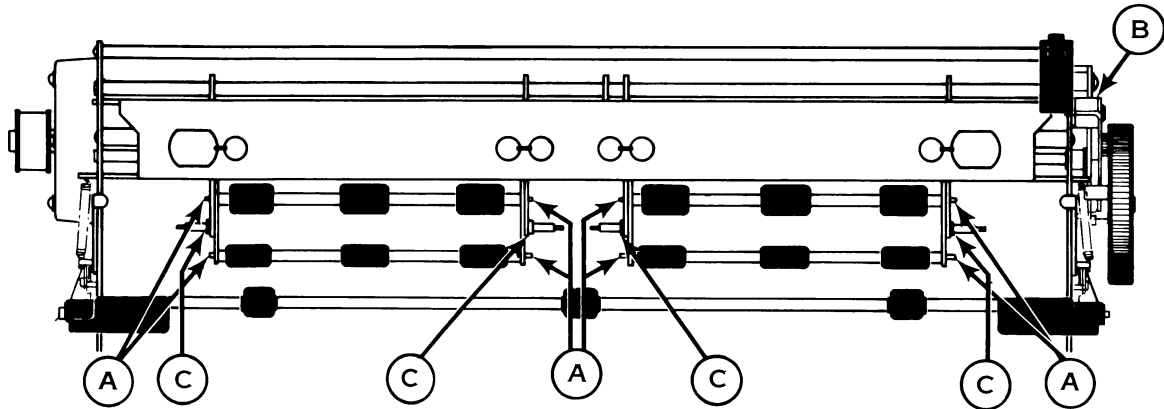
Figure 2-3. CARRIER SYSTEM LUBRICATION POINTS

2.4.3 Platen System

Refer to Figure 2-4.

Platen Hubs (A) - Apply <u>one</u> drop of light oil to the bore of the hub at each end of the platen.
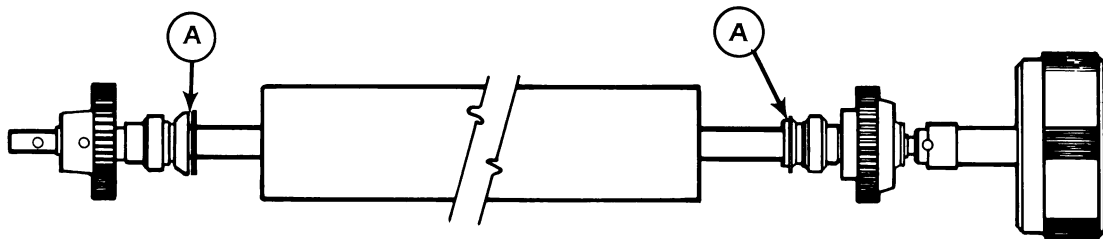
Figure 2-4. PLATEN SYSTEM LUBRICATION POINTS

2.4.4 Lubrication of Optional Items

Optional platen styles require only the lubrication of their hubs as outlined above. The pin feed sections of the pin feed platens are internally self-lubricating and do not require user attention. The optional Diablo forms tractors likewise do not require lubrication. Lubrication of the optional forms handling units is covered in their individual maintenance publications.

CORRECTIVE MAINTENANCE

3.1 TROUBLESHOOTING

The first major task in troubleshooting a Model 630 printer or terminal is to determine that the problem is indeed in the Model 630, and not in some other element of the system. The diagnostic features in the Model 630 are designed to help isolate the problem by verifying operation of the Model 630 either in a self-test mode or by remote test commands from the host system. The diagnostic capabilities vary between versions of the Model 630; ranging from a simple self-test printing routine in the PPI/HPRO6 version to multiple self-tests and remote diagnostic routines in the Expanded HPRO5 versions.

The following subsections describe the function and operation of the diagnostic features in each version of the Model 630. Pertinent reference data in the form of charts and tables is contained on the last few pages of this section.

3.2 DIAGNOSTICS - Models 630 PPI and HPRO6 Printers

The Models 630 PPI and HPRO6 are equipped with a Self-Test mode. In this mode, a properly operating unit prints continuous swirl text at 10 pitch character spacing, 132 columns per line, and 6 lines per inch.

To put the Model 630 PPI into self-test mode, turn off the AC power, and install jumper A3-5/7 on the PPI circuit board. At power-up the unit enters self-test and remains in that mode until power is removed.

> Caution: With later levels of firmware on the PPI board, 88-character print wheels should not be used for self-test printout. If the firmware at location B30 on the PPI board is at or above level 100506-06 (EROM) or 100510-05 (MROM), the 88-character wheels are addressed from a 96-character lookup table. Thus, the print hammer will strike the print wheel flag during self-test when the missing spokes are addressed. This will also happen during normal operation if the host addresses the missing spoke positions.

For self-test on the HPRO6, set switch 8 on the HPRO6 circuit board to ON. Self-test is entered at power-up, and continues until power is removed.

3.3 DIAGNOSTICS - Model 630 SPI Terminal

The Model 630 SPI has capability for both internal (self-test) and remote diagnostics as standard features.

3.3.1 SPI Self-Test

If the Self-Test switch on the control panel has been set to ON, the self-test begins execution immediately at power-up. The self-test comprises a ROM Test, a RAM Test and 96 lines of swirl text. The character spacing during self-test corresponds to the pitch selection made on the control panel. A sample of self-test printout is shown in Figure 3-1. The self-test repeats continuously until power is turned OFF.

If the ROM test fails, "ROM BAD" is printed, and the self-test stops; if the RAM test fails, "RAM BAD" prints, and the test stops. The tested ROM area includes: (1) the internal ROM of the UPI 8041A, and (2) either one or two EPROM's, or one masked ROM. The tested RAM includes the internal RAM of the UPI 8041A and the single RAM device on the SPI circuit board. All tested ROM and RAM is located on the SPI circuit board (specific locations are identified on the SPI circuit board schematic in Section 7 of this manual).

```
          selftest!
          romok
          ramok
96 LINES  ¢!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^
          !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
          "#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_a
          #$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_ab
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          %&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_abcd
          &'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_abcde
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          ()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_abcdefg
          )*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_abcdefgh
```
132 COLUMNS ──→

Figure 3-1. SPI SELF-TEST PRINTOUT

3.3.2 SPI Remote Diagnostics

The Remote Diagnostics feature allows the host computer to initiate diagnostic-type operations within the terminal by command through the serial interface. The diagnostic commands included in this feature are listed below, along with the ESC codes that initiate the commands. The commands are defined in the subsections that follow.

ESC SUB I	Initialize the terminal
ESC SUB R	Remote error reset
ESC SUB 1	Request status byte 1
ESC SUB SO	Perform self test

All diagnostic commands are executed immediately when received.

3.3.2.1 ESC SUB I

The ESC SUB I command causes the Model 630 SPI to unconditionally execute an initialize sequence, regardless of error conditions that may exist within the printer. This command is executed immediately when received over the interface, unlike the corresponding remote reset sequence, ESC CR P, which is queued along with other commands. Before sending this command, the host should send a nonprinting character so that the terminal will abort any multiple character sequence that may be in progress.

The Model 630 will be initialized to the same conditions produced by the remote reset command ESC CR P; specifically:

- Normal Print Mode (not Graphics)
- Forward Print Mode

- Print Head reset to print position 0
- Vertical Position cleared to 0 (paper does not move)
- VMI set to 8 (6 lines per inch)
- Lines per page set to 66 (11" page size) or 72 (12" page size) depending on whether Jumper #1 on control panel is OUT (11" page) or IN (12" page).
- Print in Black
- Auto backward printing enabled
- Left margin set to position 0
- Right margin set to position 1572
- Top margin set to position 0 (line 1)
- Bottom margin set to position 528 (line 66) for 11" page or position 576 (line 72) for 12" page.
- Send and Print buffers cleared

3.3.2.2   ESC SUB R

This command causes the Model 630 SPI to reset any error conditions. It produces essentially the same result as pressing the RESET switch on the control panel. If the unit is in check, it will execute a restore. Due to internal program latency, the minimum time necessary to reset all errors is 250 milliseconds.

In a situation where the terminal is being operated without a control panel (not typical), a series of up to eight automatic restores occurs if the terminal goes into a check condition. The ESC SUB R sequence has the effect of resetting the automatic restore counter to enable another series of automatic restore operations.

3.3.2.3   ESC SUB 1

This command will cause the terminal to send a status report byte (STATUS 1) thru the interface. The true-state bit definitions of this status byte are:

Bit	Status
0	End of Ribbon
1	10 Pitch (This bit false if any other pitch is selected)
2	Paper Out
3	Auto Line Feed enabled (by jumper on control panel)
4	Cover Open
5	Printer Idle (print buffer empty and all printer motion complete)
6	Printer in Check
7	Parity Bit *

* The state of bit 7 is defined by the PARITY ENABLE and PARITY EVEN/ODD switches on the control panel.

3.3.2.4   ESC SUB SO

This command causes the terminal to execute a self-test. This self-test consists of the RAM Test and ROM CRC Test that are a part of the basic self-test routine of the Model 630 SPI. This command should not be issued when the terminal is busy, since it may cause data loss in some situations. No indication of test pass or failure is printed by the

terminal. At the end of the self-test, the teminal sends a report byte to the host computer. The true-state bit definitions for this byte are:

Bit	Condition
0	Device 8041 internal RAM bad
1	Device 8041 internal ROM bad
2	6803 external RAM bad (location A65 on the SPI circuit board)
3	6803 external ROM #1 (4K) bad — upper half of 8K ROM memory *
4	6803 external ROM #2 (4K) bad — lower half of 8K ROM memory *
5	(unassigned)
6	(unassigned)
7	UART Parity Bit

* The 8K of external ROM memory associated with the 6803 processor consists of either two 4K EPROMS or one 8K masked ROM. The locations of these devices on the SPI circuit board can be determined from the SPI schematic in Section 7 of this manual.

3.4   DIAGNOSTICS - Model 630 HPRO5 Terminals

3.4.1   General Discussion

The HPRO5 circuit board provides internal diagnostic (Self-Test) capability and makes the Remote Diagnostics feature available as an option. All variations of the Self-Test mode are described in the subsections that follow. The Remote Diagnostics option is described in subsection 3.4.4. There are a few differences in the self-test between units equipped with -03 or later base firmware and those with earlier levels of the base firmware. Any diagnostic tests or features that are unique to the pre-03 firmware are denoted as such in the descriptions which follow.

The features of the self-test mode vary according to whether the unit has a control panel, and whether the jumper plug is present at position A60-1/2 on the HPRO5 circuit board. In its most comprehensive form, the Self-Test mode allows the operator to initiate individual tests on specific elements of the Model 630, or to select a single "Confidence Test" that combines several of the individual tests. (See Table 3-1.)

Table 3-1
DIAGNOSTICS CAPABILITIES
OF THE HPRO5 TERMINALS

			1	2	3	
HPRO5 Basic	- with Control Panel		X	X*		1=Confidence Test
	- w/o Control Panel		X			2=Individual Tests
HPRO5 Expanded	- with Control Panel		X	X*	X	3=Remote Diagnostics
	- w/o Control Panel		X		X	

* Requires Jumper A60-1/2 on HPRO5 circuit board

The Confidence Test is simple to use by even a nontechnical operator on units equipped with a control panel. Its purpose is to quickly test several major elements of the Model 630 and give a printed report of the results. This enables the operator to verbally relay the test results to a trained service technician to determine if a malfunction is occurring

in the Model 630; and if so, the nature of the malfunction. The Confidence Test can be executed by all Model 630 configurations that include the HPRO5 circuit board.

The Individual Tests permit more extensive testing, and the test results are reported in greater detail than those of the Confidence Test. To enable individual test selection, the unit must be equipped with a control panel, and the jumper must be installed at location A60-1/2 on the HPRO5 circuit board (see Fig. 3-2). The individual tests are described in subsection 3.4.3.

In all cases, the test printout character spacing is 10 pitch.
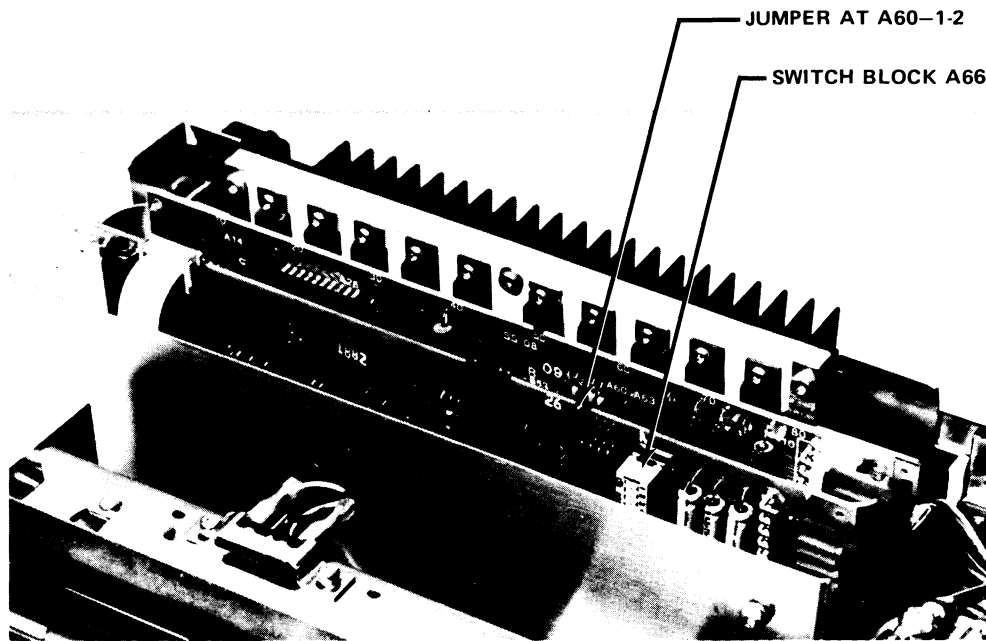
Figure 3-2. HPRO5 CIRCUIT BOARD SELF-TEST JUMPER AND SWITCH

3.4.2 Confidence Test

This test is composed of several of the individual tests executed in sequence. The printed test results from a properly functioning unit are shown in Figure 3-3. Note that the shaded lines of the printout are present only when the HPRO5 board is equipped with pre-03 base firmware. The significance of each line in the printout is as follows:

Line 1	-	Announces the Self-Test mode.
Line 2	-	HPRO5 ROM Test result
Line 3	-	HPRO5 RAM Test result
Line 4	-	PCE ROM Test result
Line 5	-	Carriage Servo Test (132 columns)
Line 6	-	Result of Carriage Servo Test and subsequent Carriage Restore Test.
Line 7	-	Result of Print Wheel Servo Test (all spoke positions) and subsequent Print Wheel Restore Test.
96 Lines	-	Swirl Text Printout

```
selftest
hpro5 rom ok
hpro5 ram ok
pce rom ok
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
carr ok
pw ok
```

96 LINES
```
¢!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^ˉ
"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^ ˉ
#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^ ˉal
$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^ ˉab
%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^ ˉabc
&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_ˉabcd
```

132 COLUMNS ⟶

Figure 3-3. CONFIDENCE TEST PRINTOUT

3.4.2.1 Confidence Test On Model 630 Without Control Panel

1) With the AC power OFF, and the top cover removed from the Model 630, select Self-Test on switch 1 at location A66 on the HPRO5 circuit board. (See Fig. 3-2.)

2) Defeat the Cover Open interlock switch.

3) Turn ON the AC power.

Test Activity:

At power-on, the Model 630 enters the Self-Test mode and immediately starts the test. A properly functioning unit will print the test results as shown in Figure 3-3. After the test has started, the Self-Test switch becomes ineffective and the test repeats continuously until AC power is switched OFF.

3.4.2.2 Confidence Test On Model 630 With Control Panel – Without Jumper A60-1/2 On HPRO5 PCB

1) With the AC power switched OFF, set the SPACING switch on the control panel to the SELF TEST position.

2) Turn ON the AC power.

Test Activity:

At power-on, the Model 630 enters the Self-Test mode and immediately begins test execution. A properly functioning unit will print the test results as shown in Figure 3-3. In the Self-Test mode, the BREAK, PAUSE and RESET switches function as described below.

BREAK Switch – Serves as an alternate-action Stop/Start switch. Successive operations of the BREAK switch alternately stop and start the test. The test resumes each time from the point where it was stopped.

PAUSE Switch - After the test has been stopped by the BREAK switch, this switch may be used to single-step through the test. Each time the switch is pressed, the test advances one step.

RESET Switch - When this switch is pressed, the test is interrupted and immediately starts again from the beginning.

3.4.2.3   Confidence Test On Model 630 With Control Panel - <u>With</u> Jumper A60-1/2 on HPRO5 Circuit Board

1) With the AC power switched OFF, set the SPACING switch on the control panel to position 7.

2) Turn ON the AC power. At power-up, the buzzer will sound briefly and the word "test" will be printed. The Model 630 is now in the Self-Test mode.

3) Press the RESET switch. This selects the Confidence Test (see Test X7 in subsection 3.4.3).

4) Press the BREAK switch to start the test.

<u>Test Activity:</u>

A properly functioning unit will print the test results as shown in Figure 3-3. In the Self-Test mode, the BREAK, PAUSE and RESET switches function as described below.

BREAK Switch - Serves as an alternate-action Start/Stop switch. After the test is first selected, the BREAK switch must be pressed to start test execution. Thereafter, successive actuations of the BREAK switch alternately stop and start the test. The test resumes each time from the point where it was stopped.

PAUSE Switch (see Fig. 3-4) - After the test has been stopped by the BREAK switch, this switch may be used to single-step through the test. Each time the switch is pressed, the test advances one step.

RESET Switch - When this switch is pressed, the test stops immediately. The test will then restart from the beginning when the BREAK switch is pressed.

3.4.3   <u>Individual Tests</u>

NOTE: The individual tests are accessible only on units equipped <u>with a control panel and with jumper A60-1/2 installed</u> on the HPRO5 circuit board.

The Self-Test mode for individual test selection is activated at power-up if the SPACING select switch on the control panel is set to the SELF TEST position. In this mode, the functions of all the control panel lights and switches are redefined. Individual diagnostic routines are selected by dialing in the proper test number on the two rotary switches (PRINT WHEEL SELECT and SPACING), and then pressing the RESET switch. The redefinition of all the remaining control panel switches and the control panel indicator lights is described below.

3.4.3.1 Redefinition Of Control Panel Lights and Switches

Figure 3-4 shows the standard designations, and in parentheses ( ) the self-test designations, for the lights and switches on the Model 630 control paneL. Figure 3-4 is followed by a list of control panel redefinitions that apply during the self-test mode.

The definition of the individual lights and switches is dependent on the individual test that is being executed. Three 16-bit data values are maintained by the self-test routine; one each for carriage motion, paper feed motion and print wheel data. These are used in various combinations by the individual test routines. Since there are only 8 data switches available (see list below), both the high data byte and the low data byte of each 16-bit value must be entered separately by pressing the appropriate "SELECT ... DATA ENTRY" switch, followed immediately by the "ENTER HIGH DATA BYTE" or the "ENTER LOW DATA BYTE" switch, respectively. If the ENTER LOW DATA BYTE switch is not preceded immediately by the SELECT ... DATA ENTRY switch, it becomes a test single-step switch when a test is not in the run mode.
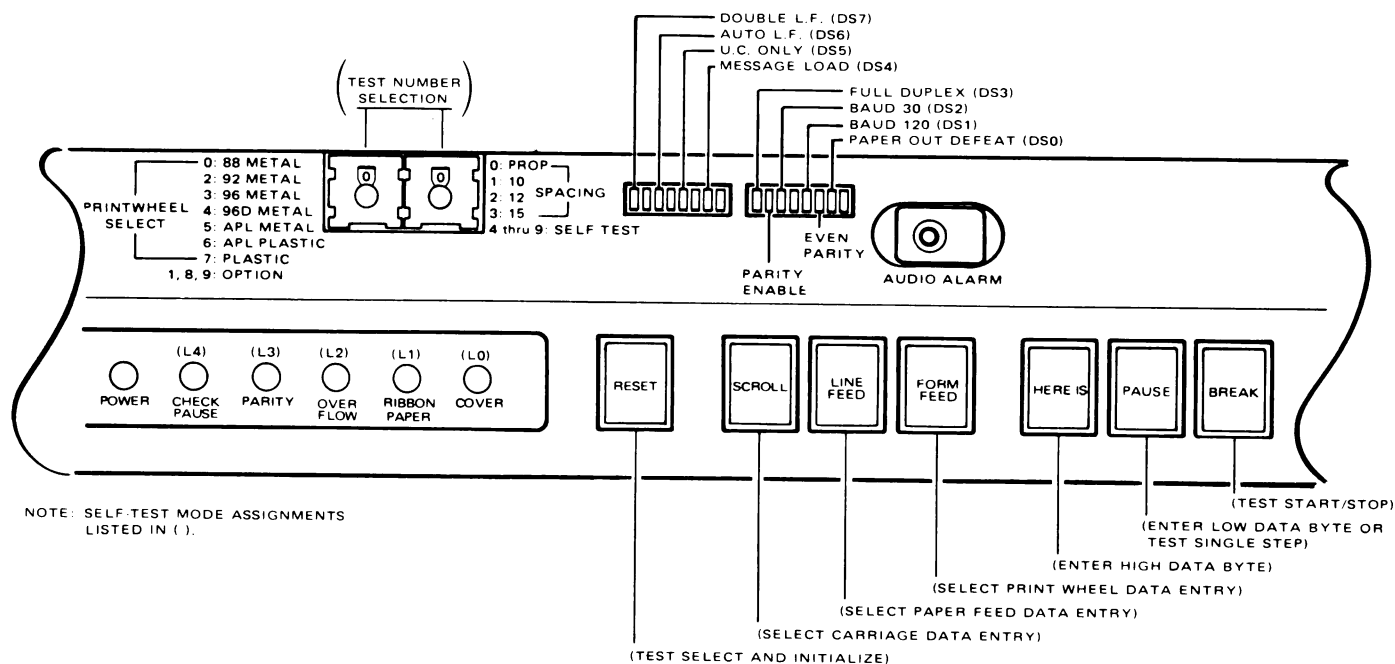
Figure 3-4. OPERATOR CONTROL PANEL - SELF-TEST MODE

LIGHTS	REDEFINED
COVER OPEN	L0
RIBBON/PAPER OUT	L1
OVERFLOW	L2
PARITY	L3
CHECK/PAUSE	L4

DATA SWITCHES

PAPER OUT DEFEAT	DS0
SPEED 120	DS1
SPEED 30	DS2
FULL DUPLEX	DS3
MESSAGE LOAD	DS4
UPPERCASE ONLY	DS5
AUTO LINE FEED	DS6
DOUBLE LINE FEED	DS7

FUNCTION SWITCHES

RESET	TEST SELECT AND INITIALIZE
SCROLL	SELECT CARRIAGE DATA ENTRY
LINE FEED	SELECT PAPER FEED DATA ENTRY **
FORM FEED	SELECT PRINT WHEEL DATA ENTRY
HERE IS	ENTER HIGH DATA BYTE
PAUSE *	ENTER LOW DATA BYTE (Acts as single-step switch if not preceded by "SELECT DATA ENTRY")
BREAK	TEST START/STOP (alternate action)

*   The Pause function is not present in some units, and this switch may or may not be labeled. The switch is always present, however, and during the self-test mode it functions the same regardless of its labeling.

** In Test 31, the Line Feed switch serves to input the alternate Print Wheel Data Entry.

3.4.3.2   Individual Test Selection and Operation

The general procedure to select and initiate each test is given below, followed by a list giving the test number and title of each individual test available in the self-test mode. A complete explanation of each test is given in subsection 3.4.3.3, Individual Test Definitions.

Test Procedure:

1) With the AC power switched OFF, set the SPACING switch on the control panel to the Self-Test position (any position 4 - 9).

2) Turn ON the AC power. At power-up, the buzzer will sound briefly and the word "test" will be printed. The Model 630 is now in the Self-Test mode.

3) Use the two rotary switches on the control panel to select the test number desired. The left-hand switch selects the left digit of the test number and the right-hand switch selects the right digit.

4) Press the RESET switch. This loads the test selected by the two rotary switches.

5) Press the BREAK switch to start the test. The BREAK switch functions as an alternate-action start/stop switch; pressing this switch a second time will stop the test. When the test has been stopped, the PAUSE switch can be used to single step the test. Each time the PAUSE switch is pressed, the test will advance one step.

Tests of HPRO5 and Associated Components
This series of tests is designed to verify the basic operation of the HPRO5 board, the serial interface, the control panel and the keyboard.

Test   00 - ROM TEST
       01 - RAM TEST
       03 - SERIAL INTERFACE WRAPAROUND TEST

PCE and SCE Tests
In this series of tests the PCE circuit board is tested first by verifying the functional capability of both 8041's. Once the PCE board has been verified, the SCE circuit board may be tested by exercising the print wheel and carriage servos to check for proper operation and alignment. Printer hardware status may also be read from the print wheel 8041. The automatic print wheel retry capability of the PCE board is inhibited during self-test to maximize the detection of any servo errors.

Test   20 - 8041 ROM TEST
       22 - PCE PRINTER STATUS TEST

       30 - PRINT WHEEL RESTORE TEST
       31 - PRINT WHEEL SERVO TEST

       40 - CARRIAGE RESTORE TEST
       41 - CARRIAGE SERVO TEST

       50 - SERVO DISABLE and DISPLAY CHECK STATUS
       51 - PAPER FEED TEST

Overall Printer Verification Tests
These are high level tests that require the correct print wheel to be selected on the control panel switch for proper printout. In all of these tests, both the carriage servo and the print wheel servo will be restored when the RESET switch is pressed. If any errors are detected, the test will halt and the error status will be displayed.

Note: "X" denotes an unspecified setting of the PRINTWHEEL SELECT switch on the control panel, but the setting must match the print wheel being used.

Test   X4 - Combined HORIZONTAL MOTION TEST, VERTICAL MOTION TEST and
                 PRINT TEST
       X5 - SWIRL TEXT PRINTOUT
       X7 - CONFIDENCE TEST

3.4.3.3   Individual Test Definitions

Test 00 - ROM Test

This test verifies the integrity of the data contained in the program ROMs by calculating a 16-bit checksum using the standard CRC-16 algorithm which has a specified high accuracy of error detection.   All ROMs are checked individually.   If an error is found, the test will halt and the number of the ROM that does not check correct will be displayed on the control panel lights.   (See the HPRO5 schematic in Section 7 for ROM locations.)   The definitions of the error lights are:

L4	L3	L2	L1	L0		
0	0	0	0	1	=	ROM 1
0	0	0	1	0	=	ROM 2
0	0	0	1	1	=	ROM 3
0	0	1	0	0	=	ROM 4

Note: 1 = ON
       0 = OFF

Test 01 - RAM Test

This test verifies the ability of all RAM, including expanded RAM, to be written to and read from without any bit errors.   A random bit pattern is generated by a pseudo-random number generator and written to each RAM location.   The random number generator is reset and then used to verify that each RAM location contains the correct pattern.   The number of passes will be displayed as the test executes.   If an error is found, the test will halt and the number of the RAM that does not check correct will be displayed by the control panel lights.   (See the HPRO5 schematic in Section 7 for RAM locations.)   The definitions of the error lights are:

L4	L3	L2	L1	L0		
0	0	0	0	1	=	SCRATCH RAM (resides in the 8155 IC)
0	0	0	1	0	=	RAM 1
0	0	0	1	1	=	RAM 2
0	0	1	0	0	=	RAM 3

Note: 1 = ON
       0 = OFF

Test 03 - Serial Interface Wraparound Test

This test checks operation of the USART, serial interface drivers and receivers, interface cabling and rear panel interface connector.   This test requires that a special wraparound plug be installed in the 25-pin interface connector on the rear panel.   The wraparound plug enables testing of the serial interface control lines by connecting the output lines directly to the appropriate input lines.   An 8-bit data pattern is generated and sent out on the TRANSMIT DATA interface line.   This data is received back in through the RECEIVE DATA interface line via the wraparound plug.   The received data is then verified.   During the test, the status of the USART on the HPRO5 circuit board is displayed by the control panel lights as defined below.   Prior to selecting the test by pressing the RESET switch,

the desired baud rate and parity checking must be selected on the control panel. (At 1200 baud, control panel lights L3 and L4 give a good, rapid display of bits 6 and 7 of the test data being received.)

Definitions of the Control Panel lights while the test is in progress

L0 - indicates state of the DSO control panel switch via the DATA TERMINAL READY (DTR) and DATA SET READY (DSR) interface lines.
L1 - indicates state of the DS1 switch via the REQUEST TO SEND and CLEAR TO SEND interface lines.
L2 - indicates state of the DS2 switch via the OPTION 1 (PRINTER READY) and CARRIER DETECT interface lines.
L3 - RECEIVED DATA LIGHT BIT 6
L4 - RECEIVED DATA LIGHT BIT 7 - MSB - (ALWAYS 0 IF PARITY ENABLED)

Note: L0, L1 and L2 are always ON if the current loop option is installed.

During the test, both firmware and hardware (the wraparound plug) serve to connect lights L0, L1 and L2 to their respective control panel switches, DS0, DS1 and DS2, via the control interface lines listed above. The condition of each of these interface loops can be verified by manipulating the switches and observing the response of the associated indicator lights.

Definitions of the Control Panel lights if an error is detected (test stops)

L0 - PARITY ERROR (USART DETECTED)
L1 - OVERRUN ERROR (USART DETECTED)
L2 - FRAMING ERROR (USART DETECTED)
L3 - BREAK ERROR (USART DETECTED)
L4 - ERROR FOUND BY PROGRAM BUT NOT DETECTED BY USART

The Wraparound Plug

The wraparound plug can be assembled using a standard 25-pin EIA interface plug with its pins interconnected as listed below:

Signal	Pin	connects to	Pin	Signal
+DATA TERMINAL READY	20		6	+DATA SET READY
+REQUEST TO SEND	4		5	+CLEAR TO SEND
+PRINTER READY	11		8	+CARRIER DETECT
-XMIT DATA	2		3	-DATA RECEIVED
(Current Loop only):				
RECEIVE SOURCE	23		10	RECEIVE DATA
+XMIT DATA	18		21	-RECEIVE DATA
-XMIT DATA	19		7	XMIT SINK

Test 20 - 8041 ROM Test

This test verifies the checksum for each 8041 UPI by using the 8041's built-in checksum routine. The number of passes through the test will be displayed by the control panel lights. If an error is found, the test will halt and the failing 8041 will be identified by the control panel lights. The error light definitions are:

    L0 - CARRIAGE 8041 ROM
    L1 - PRINT WHEEL 8041 ROM
    L2 - ALWAYS OFF DURING ERROR DISPLAY
    L3 - ALWAYS OFF DURING ERROR DISPLAY
    L4 - ALWAYS OFF DURING ERROR DISPLAY

Test 22 - PCE Printer Status Test

This test checks the hardware status sensors by reading printer status from the PW 8041 UPI and displaying it on the control panel lights. The Ribbon Out, Paper Out, Cover Open and Multicopy switches are checked. Actuating these switches during the test should cause a response by the corresponding indicator light on the control panel. The light definitions during this test are:

    L0 - Multicopy Lever Down (4-6 copies)
    L1 - Ribbon Out
    L2 - Paper Out
    L3 - Cover Open
    L4 - Always OFF

Test 30 - Print Wheel Restore Test

This test allows the print wheel to be restored alone. The carriage servo must not be in Check for this test to function properly. The PW 8041 automatic error retry function is inhibited.

Test 31 - Print Wheel Servo Test

This test allows exercising of the print wheel without affecting the other servos. The print wheel will alternately seek to the two spoke positions specified by the control panel switches. The hammer will fire with the energy specified by the control panel switches; if the specified hammer energy is zero, the hammer will not fire. The ribbon will advance the number of steps specified by the control panel switches; if the specified number of steps is zero, the ribbon will not advance. The ribbon lift position will be controlled by the MSB of the Low Byte, as defined below. The print wheel servo will be restored when the RESET switch is pressed. This test will not function if the carriage servo is in a Check condition.

The command bits are defined below, followed by the procedure for loading the commands. The eight bits of each command byte are set by use of the eight slide switches on the control panel. Each bit is controlled by the switch that occupies the same relative position in the row of switches.

PRINT WHEEL COMMAND

DS SWITCHES

```
          ┌─────────────────┐  ┌─────────────────┐
          │ ▯ ▯ ▯ ▯ ▯ ▯ ▯ ▯ │  │ ▯ ▯ ▯ ▯ ▯ ▯ ▯ ▯ │
          └─────────────────┘  └─────────────────┘
            7   6   5   4        3   2   1   0    STEP    TO LOAD, PRESS:*

High Byte =   X   H   H   H      R   R   R   R     2)     FORM FEED - HERE IS
                                                   4)     LINE FEED - HERE IS
Low Byte  = U   S   S   S      S   S   S   S     3)     FORM FEED - PAUSE
                                                   5)     LINE FEED - PAUSE
```

    X - DON'T CARE
    H - HAMMER ENERGY (0 - 7)
    R - RIBBON ADVANCE STEPS (0 - 15)
    U - RIBBON UP (1) / RIBBON DOWN (0)
    S - ABSOLUTE ELECTRICAL SPOKE # (0 - 95)

*   Follow steps 1 thru 6 below for the proper sequence of loading this test.

1) With the Model 630 in the self-test mode, set the rotary switches for Test 31, and press the RESET switch to input the test selection.

2) Set the control panel switches as desired for the high byte of the first alternate print wheel command. Press the FORM FEED switch on the control panel, followed by the HERE IS switch.

3) Set the control panel switches as desired for the low byte of the first alternate print wheel command. Press the FORM FEED switch and then the PAUSE switch.

4) Set the control panel switches as desired for the high byte of the second alternate print wheel command. Press the LINE FEED switch and then the HERE IS switch.

5) Set the control panel switches for the low byte of the second print wheel command. Press the LINE FEED switch and then the PAUSE switch.

6) Press the BREAK switch to start the test.

Test 40 - Carriage Restore Test

This test allows the carriage to be restored alone. The test is not affected by the print wheel being in a Check condition.

Test 41 - Carriage Servo Test

This test allows exercising the carriage without affecting the other servos. The carriage will seek in the forward direction (rightward), in the reverse direction (leftward) or alternately as specified by the two bytes of the Carriage Data Command. The Carriage Data Command is entered in two stages (High Byte and Low Byte) similar to the procedure

used in Test 31. When alternate carriage movement is selected, the carriage will move back and forth between the carriage starting position and the carriage position specified in the carriage command.

Note: There are some subtle characteristics of this test that the operator must keep in mind in order to avoid confusion:
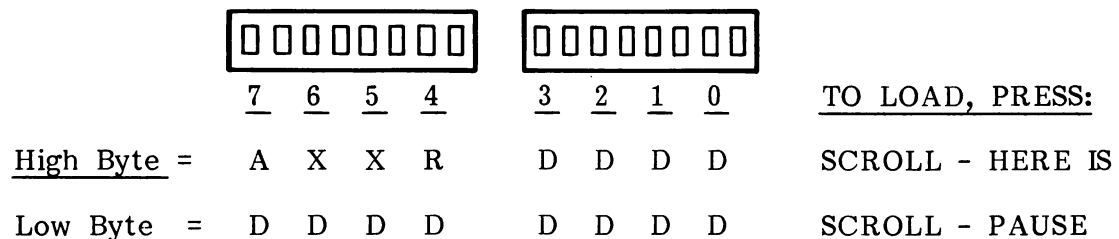
1. If the test parameters are changed by altering one or more switch settings and loading a new Carriage Command while the test is in progress, there is a lag of one step between loading of the new command and a corresponding change in carriage motion.

2. The present position of the carriage must be such that the next commanded movement does not exceed the available distance for carriage travel, other-wise a Check condition will occur. For example, if the carriage is at its left limit and reverse (leftward) motion is commanded, the carriage contacts the left carriage stop, and a Check condition occurs.

3. When forward, alternate carriage movement is specified the carriage motion will be displaced rightward from the starting position of the carriage. When reverse, alternate carriage movement is specified, the carriage will be displaced leftward.

CAUTION: There is NO protection against a carriage crash during this test. Care must be used to avoid specifying a seek distance that exceeds the distance avail-able for the carriage to move. Although the Carriage Command can generate a dis-placement of up to 4095 increments, the largest displacement that the carriage can ever safely move is 1572 increments (the distance from left-hand to right-hand limits of carriage travel).

The carriage servo will be restored when the RESET switch is pressed. The command bit definitions are listed below, followed by the procedure for loading the commands.

CARRIAGE COMMAND

DS SWITCHES

										TO LOAD, PRESS:
		7	6	5	4	3	2	1	0	
High Byte =		A	X	X	R	D	D	D	D	SCROLL - HERE IS
Low Byte =		D	D	D	D	D	D	D	D	SCROLL - PAUSE

A - ALTERNATE DIRECTION
X - DON'T CARE
R - REVERSE DIRECTION (0 = RIGHT, 1 = LEFT)
D - CARRIAGE DISPLACEMENT (0 - 4095, 1572 MAXIMUM PERMISSABLE!)

1) With the Model 630 in the self-test mode, set the rotary switches for Test 41. Press the RESET switch to input the test selection.

2) Set the control panel switches as desired for the high byte of the carriage command. Press the SCROLL switch on the control panel, followed by the HERE IS switch.

3) Set the control panel switches as desired for the low byte of the carriage command. Press the SCROLL switch and then the PAUSE switch.

4) Press the BREAK switch to start the test.

Test 50 - Disable Servo and Display Check Status

In this test, the servos are disabled and a motion command is sent to both the print wheel servo and carriage servo to force a Check condition. This verifies that both servos can be disabled, and that a Check condition can be detected (indicated by lights L0 and L1). Upon being selected, this test will execute immediately when the RESET switch is pressed.

Both servos must be restored after this test to enable proper operation. This can be done in the self-test mode by executing a carriage restore (Test 40) and a print wheel restore (Test 30). The carriage servo must be restored first since the print wheel servo cannot be restored while the carriage servo is in Check.

In a properly operating unit, the test will execute as described above. This test can also be used to read and display the status of an existing Check condition. When the RESET switch is pressed for test selection, the existing Check condition will be detected by the presence of a status flag from the affected 8041 UPI. This causes the status byte to be read from the 8041, and the status displayed per the bit definitions given below. It is important to note that when the status byte is read, the status flag resets as in normal operation; however, the unit has not executed a normal restore operation, and thus the Check condition still exists. This Check condition must be cleared before normal operation or testing can be resumed.

The Check status definitions are:

L0 - CARRIAGE
L1 - PRINT WHEEL
L2 - PRINT WHEEL AUXILIARY STATUS BIT*
L3 - PRINT WHEEL AUXILIARY STATUS BIT*
L4 - ALWAYS 0

* AUXILIARY STATUS BIT DEFINITIONS:

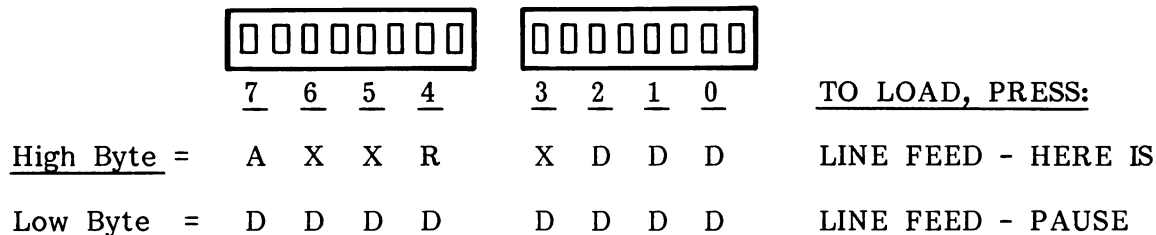| L3	L2		
0	0	-	No Print Wheel Home Signal
0	1	-	More Than 8 Retries Required
1	0	-	Check With Auto Retry Inhibited
1	1	-	Excessive Time Between +XING Signal

Note: 1 = ON
       0 = OFF

Test 51 - Paper Feed Test

This test allows exercising of the paper feed drive without affecting the other servos. The paper feed will seek in the forward direction, in the reverse direction, or alternately as specified by the two bytes of the Paper Feed Command. The largest distance that the paper feed can move is 2047 increments. The definitions of the command bits are as follows:

PAPER FEED COMMAND

DS SWITCHES

	7	6	5	4	3	2	1	0	TO LOAD, PRESS:
High Byte =	A	X	X	R	X	D	D	D	LINE FEED - HERE IS
Low Byte =	D	D	D	D	D	D	D	D	LINE FEED - PAUSE

A - ALTERNATE DIRECTION
X - DON'T CARE
R - REVERSE DIRECTION (0 = UP, 1 = DOWN)
D - PAPER FEED DISTANCE (2047 MAXIMUM)

1) With the Model 630 in the self-test mode, set the rotary switches for Test 51. Press the RESET switch to input the test selection.

2) Set the control panel switches as desired for the high byte of the Paper Feed Command. Press the LINE FEED switch and then the HERE IS switch.

3) Set the control panel switches as desired for the low byte of the Paper Feed Command. Press the LINE FEED switch and then the PAUSE switch.

4) Press the BREAK switch to start the test.

Test X4 - Combined Horizontal and Vertical Motion and Print Test

This test enables printing any two-character pattern in any direction at any resolution or pitch setting desired. The horizontal motion is controlled by the 16-bit value of the Carriage Command as described for Test 41. For this test, however, the carriage is "crash proof". Carriage motion is executed with left and right wraparound at either end of a line.

The vertical motion is controlled by the 16-bit value of the Paper Feed Command as described for Test 51. Paper feed motion is executed whenever horizontal motion wraps around at either end of a line.

The two printable characters are defined by the Low Byte (CHARACTER 1) and the High Byte (CHARACTER 2) of the Print Wheel Command. The procedure for print wheel character selection is similar to that in Test 31, however, the bit definitions given below for the Print Wheel Command reveal several differences. Most notable is the fact that in this test a single Print Wheel Data Entry specifies both print wheel characters, with the Low

Byte selecting the first character, and the High Byte selecting the second character. Another difference is that the print wheel characters are specified by their assigned $\underline{ASCII}$ code instead of by absolute addressing to a print wheel spoke. CHARACTER 1 will $\overline{always}$ be the first character printed after any paper motion. If CHARACTER 2 is a null (all zeros), then CHARACTER 1 will be repeated. If either character is nonprintable, a space will be substituted. The correct character font must be selected by the PRINT WHEEL SELECT switch.

The procedure for executing this test is given below, following the bit definitions for the associated command bytes.
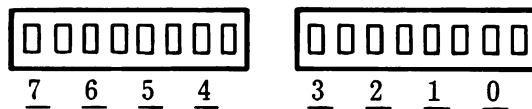
PRINT WHEEL COMMAND

DS SWITCHES
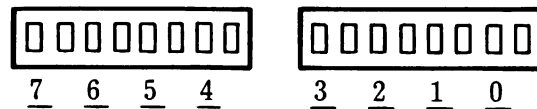
	7	6	5	4		3	2	1	0	TO LOAD, PRESS:
High Byte =	R_2	D_2	D_2	D_2		D_2	D_2	D_2	D_2	FORM FEED - HERE IS
Low Byte =	R_1	D_1	D_1	D_1		D_1	D_1	D_1	D_1	FORM FEED - PAUSE

R_1 - RIBBON LIFT FOR CHARACTER 1 (1 = UP, 0 = DOWN)
D_1 - ASCII CODE FOR CHARACTER 1
R_2 - RIBBON LIFT FOR CHARACTER 2 (1 = UP, 0 = DOWN)
D_2 - ASCII CODE FOR CHARACTER 2

CARRIAGE COMMAND

DS SWITCHES

	7	6	5	4		3	2	1	0	TO LOAD, PRESS:
High Byte =	A	X	X	R		D	D	D	D	SCROLL - HERE IS
Low Byte =	D	D	D	D		D	D	D	D	SCROLL - PAUSE

A - ALTERNATE DIRECTION
X - DON'T CARE
R - REVERSE DIRECTION (0 = RIGHT, 1 = LEFT)
D - CARRIAGE DISPLACEMENT (0 - 4095)

PAPER FEED COMMAND

DS SWITCHES

	7	6	5	4	3	2	1	0	TO LOAD, PRESS:
High Byte =	A	X	X	R	X	D	D	D	LINE FEED - HERE IS
Low Byte =	D	D	D	D	D	D	D	D	LINE FEED - PAUSE

A - ALTERNATE DIRECTION
X - DON'T CARE
R - REVERSE DIRECTION (0 = UP, 1 = DOWN)
D - PAPER FEED DISTANCE (2047 MAXIMUM)

Note: The loading of the Print Wheel, Carriage and Paper Feed commands for this test are independent operations, and thus can be performed in any order desired.   It is not necessary that they be loaded in the same order described below.

1) With the Model 630 in the self-test mode, set the rotary switches for Test X4. Press the RESET switch to input the test selection.

2) Set the control panel switches as desired for the high byte of the print wheel command defined above. Press the FORM FEED switch, followed by the HERE IS switch.

3) Set the switches as desired for the low byte of the print wheel command. Press the FORM FEED switch, followed by the PAUSE switch.

4) Load the carriage command according to steps 2 thru 4 of the procedure given under Test 41.

5) Load the paper feed command according to steps 2 thru 4 of the procedure given under Test 51.

6) Press the BREAK switch to start the test.

Test X5 - Swirl Text Printout

This pattern is an incrementing ASCII character string that is printed for a total of 132 characters followed by a carriage return - line feed. The first character of each succeeding line is incremented from the previous line. This generates the swirl or scrolling appearance. Thus each ASCII character is eventually printed at each character position.
The printout is continuous.

Test X7 - Overall Confidence Test

This test is a combination of all of the above tests, except Paper Feed, executed in sequence. The results of each test are printed out on the printer. The tests will halt with all lamps lit before the swirl text printout if any errors are discovered. The tests

are executed in the following order:

HPRO5 TESTS   - 8085 ROM TEST
               - 8085 RAM TEST

PCE-SCE TESTS - 8041 ROM TEST
               ⎛ - CARRIAGE SERVO TEST (132 character positions)
Only with -01 or -02 ⎜ - CARRIAGE RESTORE
base firmware ⎨ - PRINT WHEEL SERVO TEST (all spoke positions)
               ⎝ - PRINT WHEEL RESTORE

SWIRL TEXT PRINTOUT (96 lines)

After the 96 lines of swirl text, the test repeats.

3.4.4   Remote Diagnostics - HPRO5

The remote diagnostics option allows the interrogation of machine parameters and status through the serial interface.

3.4.4.1   Diagnostic Commands

The following diagnostic commands are included in this option:

ESC SUB I	Initialize the printer (standard in Basic HPRO5)
ESC SUB R	Remote error reset (standard in Basic HPRO5)
ESC SUB 1	Request status byte 1
ESC SUB 2	Request status byte 2
ESC SUB U	Enter user (programmable) test mode
ESC SUB W (n)	Enter wraparound (echo) test mode
ESC SUB X	Exit test mode
DEL	Error correct backspace (user test mode only)
STX	Print buffer once (user test mode only)
SOH	Print buffer repeatedly (user test mode only)

3.4.4.2   Diagnostics Interface Protocol

Status information is not supplied to the interface of any keyboard-equipped Model 630 while it is in LOCAL mode. All diagnostic commands are processed immediately when received and are not queued. This means all status reported will be the status present at the time the command was received. Only the low 7 bits (bits 0 thru 6) of a status byte are significant. Their equivalent value may range from 0 to 127. The MSB (bit 7) will be a parity bit as defined by the PARITY ENABLE and PARITY EVEN/ODD switches. All commands that generate a response from the Model 630 will result in a status byte being sent to the host computer preceded by an STX character. The STX identifies the next byte as a status byte. The rules for ETX/ACK and DC1/DC3 protocols are applicable and should be used for sending status requests to the Model 630.

3.4.4.3 Diagnostic Command Definitions

ESC SUB I

This command causes the Model 630 to unconditionally execute an initialize sequence regardless of any error conditions that may exist within the printer. This command is executed immediately when received over the interface, unlike the corresponding remote reset sequence ESC CR P which is queued along with other commands. The Model 630 will default to the same conditions that exist at power up. Prior to sending this command, the host should send a nonprinting character to cause the Model 630 to abort any multiple character sequence in progress.

ESC SUB R

This command causes the Model 630 to reset any error conditions. It produces essentially the same result as pressing the RESET switch on the control panel. If the unit is in check, it will execute a restore. Due to internal program latency, the minimum time necessary to reset all errors is 250 milliseconds.

In a situation where the terminal is being operated without a control panel (not typical), a series of up to eight automatic restores occurs if the terminal goes into a check condition. The ESC SUB R sequence has the effect of resetting the automatic restore counter to enable another series of automatic restore operations.

ESC SUB 1

This command will cause the Model 630 to send a status report byte (STATUS 1) thru the interface. The true-state bit definitions for this status byte are:

Bit	Status
0	End of Ribbon
1	10 Pitch (This bit false if any other pitch is selected)
2	Paper Out
3	Auto Line Feed enabled (set by switch on control panel, or by ESC sequence if no control panel.)
4	Cover Open
5*	Printer Idle (no motion, and print queue empty)
6	Printer In Check
7	Parity Bit **

* Bit 5 represents "Buffer Full" if Options ROM at location F32 on HPRO5 board is at design level earlier than 302839-03 (EROM 100524-02).
** The state of bit 7 is defined by the PARITY ENABLE and PARITY EVEN/ODD switches on the control panel.

ESC SUB 2

This command will cause the Model 630 to send a status report byte (STATUS 2) thru the interface. The true-state bit definitions for this status byte are:

0	Control Panel Option present	4	Reverse Print Mode enabled (inverted horizontal motion)
1	Diablo Keyboard Option present		
2	Auto Carriage Return enabled	5	Paper Out Defeat enabled (always 0 if no control panel)
3	Double Line Feed enabled (always 0 if no control panel)	6	Full-Duplex enabled
		7	Parity Bit *

* The state of bit 7 is defined by the PARITY ENABLE and PARITY EVEN/ODD switches on the control panel.

ESC SUB U

This command will cause the Model 630 HPRO5 to enter the USER (programmable) test mode. In this mode the user can enter any command sequence to the Model 630 up to within 5 characters from the end of the buffer. The Model 630 can then be commanded to execute the contents of the print buffer either once or repeatedly. All standard and optional ESC sequences are valid except REMOTE DIAGNOSTIC commands. Any REMOTE DIAGNOSTIC commands in the buffer will be ignored. Both ETX/ACK and DC1/DC3 protocols function normally when entering data into the buffer. During buffer execution an ACK will be sent thru the serial interface for each ETX encountered in the buffer, if enabled. DC1/DC3 does not function during buffer execution. USER test mode can be exited by issuing either ESC SUB X or ESC SUB I sequence. All other incoming commands will be ignored during buffer execution.

ESC SUB W (n)

This command will cause the Model 630 to enter the WRAPAROUND (echo) test mode. In this mode, the Model 630 sends back to the host computer each byte (n) that it receives, using the same protocol as status commands. The echoing starts with the first byte following the ESC SUB W sequence. The Model 630 will automatically exit WRAPAROUND mode when in LOCAL mode. WRAPAROUND mode may be exited by issuing either ESC SUB X or ESC SUB I sequence. The ESC SUB X sequence will be echoed back to the host computer.

ESC SUB X

This command will cause the Model 630 to exit both WRAPAROUND and USER test modes immediately. When in USER test mode, the Model 630 will finish the execution of the buffer if in progress when the ESC SUB X was received, and will simultaneously accept new data from the interface.

DEL

The DEL or RUBOUT character is used for error correction when entering data into the buffer in USER test mode. The buffer pointer will be backed up one position, and the previous character echoed on the printer for each DEL received. All control characters except SPACE, BACKSPACE, CARRIAGE RETURN and LINE FEED will be echoed as the uppercase ASCII equivalent preceded by an exclamation mark (!). An ESCAPE character will be echoed as a dollar sign ($). The DEL character is ignored during an ESCAPE sequence, to prevent invalid ESC sequences. If the incoming data is received faster than the speed of the print mechanism, the entire RUBOUT and ECHO sequence will be transparent; that is, the buffer pointer will be backed up but the deleted character(s) may not be echoed on the printer.

STX

The STX character will cause the content of the print buffer to be executed one time only, when in USER test mode. If the buffer is being executed repeatedly (SOH character), receiving an STX character will cause the Model 630 to return to single cycle execution mode at the end of the buffer. The SOH and STX characters may still be used as the third character of a three character sequence in USER test mode. They will not cause the buffer to be executed when included within a valid ESCAPE sequence. Data may no longer be entered into or deleted from the buffer after receiving an SOH or STX execution character without first exiting and then reentering USER test mode. A BREAK in USER test mode will cause the Model 630 to go back to buffer entry mode which allows entering new test data without exiting USER test mode.

SOH

The SOH character will cause the content of the print buffer to be executed repeatedly. The Model 630 will continue buffer execution until being returned to single cycle execution mode (STX character), or exiting USER test mode (ESC SUB X or ESC SUB I).

3.5   TEST OPERATING REFERENCES

The following charts contain reference data that is useful when implementing some of the diagnostic tests presented in the first part of this section.

3.5.1   ASCII Coding System

The ASCII Coding System is based on the American National Standard Code for Information Interchange, Standard No. X3.4-1977 of the American National Standards Institute.

Bits $b_7 \rightarrow$ $b_6 \rightarrow$ $b_5 \rightarrow$		0 0 0	0 0 1	0 1 0	0 1 1	1 0 0	1 0 1	1 1 0	1 1 1
$b_4\ b_3\ b_2\ b_1 \downarrow \downarrow \downarrow \downarrow$	COLUMN→ ↓ROW↓	0	1	2	3	4	5	6	7
0 0 0 0	0	NUL	DLE	SP	0	@	P	`	p
0 0 0 1	1	SOH	DC1	!	1	A	Q	a	q
0 0 1 0	2	STX	DC2	"	2	B	R	b	r
0 0 1 1	3	ETX	DC3	#	3	C	S	c	s
0 1 0 0	4	EOT	DC4	$	4	D	T	d	t
0 1 0 1	5	ENQ	NAK	%	5	E	U	e	u
0 1 1 0	6	ACK	SYN	&	6	F	V	f	v
0 1 1 1	7	BEL	ETB	'	7	G	W	g	w
1 0 0 0	8	BS	CAN	(	8	H	X	h	x
1 0 0 1	9	HT	EM	)	9	I	Y	i	y
1 0 1 0	10	LF	SUB	*	:	J	Z	j	z
1 0 1 1	11	VT	ESC	+	;	K	[	k	{
1 1 0 0	12	FF	FS	,	<	L	\	l	:
1 1 0 1	13	CR	GS	-	=	M	]	m	}
1 1 1 0	14	SO	RS	.	>	N	^	n	~
1 1 1 1	15	SI	US	/	?	O	_	o	DEL

All characters in these two columns and SP (Space) are nonprinting. DEL (Delete) does not print in Remote mode. However, when DEL is entered on keyboard in Local mode, it prints the print wheel character addressed by ASCII code 7F (HEX) when operating with plastic print wheels, or 3F (HEX) when operating with metal print wheels. (This character is also printed in place of characters received with parity or framing error.) When UPPERCASE ONLY is used, shaded lowercase characters (columns 6 & 7) from keyboard are converted to their uppercase equivalents (columns 4 & 5) before being printed or transmitted.

Figure 3-5.   ASCII CODE CHART
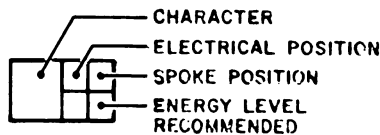
3.5.2 Print Wheel Code Charts (Typical)

These charts provide a general sample of technical data for the different types of print wheels. Specific technical data pertaining to each print wheel available from Diablo Systems is contained in the Diablo Print Wheel Data Book, Publication No. 90044-XX.

The codes 20 Hex and 7F Hex are interpreted as "space" and "delete" respectively by the Model 630 and thus are not available for print wheel addressing. In place of these two codes, the ESC sequences ESC Y and ESC Z are used to address certain characters and thus provide a complete set of 96 codes for print wheel addressing. ESC Y and/or ESC Z are listed on the following charts where applicable.

ESC Y: ¢ | 2 | 94 | 3

ESC Z: ¬ | 1 | 95 | 1

b4	b3	b2	b1	b7=0 b6=1 b5=0	b7=0 b6=1 b5=1	b7=1 b6=0 b5=0	b7=1 b6=0 b5=1	b7=1 b6=1 b5=0	b7=1 b6=1 b5=1
0	0	0	0	SP	0 37 59 / 3	@ 62 34 / 4	P 26 70 / 4	` 56 40 / 1	p 90 6 / 4
0	0	0	1	! 68 28 / 2	1 33 63 / 2	A 11 85 / 3	Q 27 69 / 4	a 84 12 / 2	q 92 4 / 4
0	0	1	0	" 70 26 / 2	2 34 62 / 3	B 8 88 / 4	R 13 83 / 4	b 78 18 / 4	r 81 15 / 2
0	0	1	1	# 46 50 / 3	3 35 61 / 2	C 10 86 / 3	S 14 82 / 3	c 79 17 / 2	s 88 8 / 3
0	1	0	0	$ 44 52 / 3	4 36 60 / 3	D 22 74 / 4	T 16 80 / 3	d 76 20 / 3	t 86 10 / 2
0	1	0	1	% 47 49 / 3	5 38 58 / 3	E 15 81 / 4	U 23 73 / 4	e 83 13 / 2	u 91 5 / 3
0	1	1	0	& 69 27 / 3	6 39 57 / 3	F 9 87 / 4	V 30 66 / 4	f 89 7 / 3	v 73 23 / 2
0	1	1	1	' 54 42 / 1	7 40 56 / 2	G 24 72 / 4	W 4 92 / 4	g 74 22 / 4	w 0 0 / 3
1	0	0	0	(60 36 / 2	8 41 55 / 3	H 17 79 / 4	X 32 64 / 4	h 87 9 / 3	x 75 21 / 3
1	0	0	1	) 58 38 / 2	9 42 54 / -3	I 20 76 / 2	Y 25 71 / 4	i 85 11 / 2	y 94 2 / 4
1	0	1	0	* 61 35 / 3	: 12 84 / 1	J 29 67 / 3	Z 7 89 / 3	j 72 24 / 3	z 95 1 / 3
1	0	1	1	+ 45 51 / 2	; 31 65 / 2	K 28 68 / 4	[53 43 / 2	k 93 3 / 3	{ 49 47 / 2
1	1	0	0	, 3 93 / 1	< 57 39 / 2	L 21 75 / 4	\ 63 33 / 2	l 77 19 / 2	| 59 37 / 2
1	1	0	1	− 43 53 / 1	= 48 48 / 3	M 6 90 / 4	] 51 45 / 2	m 71 25 / 4	} 67 29 / 2
1	1	1	0	. 5 91 / 1	> 50 46 / 2	N 19 77 / 4	^ 64 32 / 1	n 82 14 / 3	~ 52 44 / 1
1	1	1	1	/ 66 30 / 2	? 65 31 / 2	O 18 78 / 3	_ 55 41 / 2	o 80 16 / 3	DEL

Legend:
- CHARACTER
- ELECTRICAL POSITION
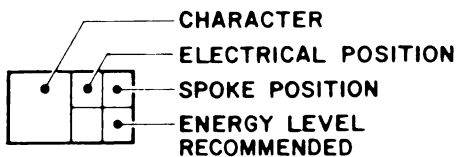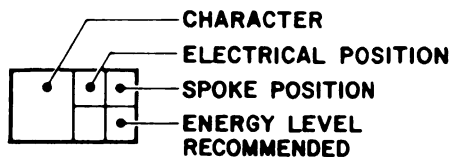- SPOKE POSITION
- ENERGY LEVEL RECOMMENDED

NOTES:

1. USE ENERGY SWITCH POSITION M FOR NORMAL USE, FOR MULTISTACK

2. ■ DESIGNATES RECOMMENDED LEVEL THAT DEVIATES FROM A STD HYTYPE II PRINTER

3. CHARACTERS SHOWN ON THIS DRAWING DO NOT REFLECT AESTHETICS OF INDIVIDUAL TYPE STYLES

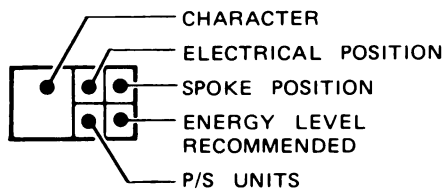4. ELECTRICAL POSITION IS PRINTWHEEL SPOKE POSITION AS VIEWED FROM THE CHARACTER SIDE OF THE PRINTWHEEL

Figure 3-6. 96-CHARACTER PRINT WHEEL - PLASTIC

¢	5	91
		3

b4	b3	b2	b1	(MSB) b7 = 0, b6 = 1, b5 = 0	b7 = 0, b6 = 1, b5 = 1	b7 = 1, b6 = 0, b5 = 0	b7 = 1, b6 = 0, b5 = 1	b7 = 1, b6 = 1, b5 = 0	b7 = 1, b6 = 1, b5 = 1
0	0	0	0	SP	O [86|10, 4]	@ [75|21, 4]	P [10|86, 4]	, [41|18, 1]	p [67|29, 4]
0	0	0	1	! [37|59, 2]	1 [82|14, 2]	A [18|78, 4]	Q [52|44, 4]	a [59|37, 3]	q [72|24, 4]
0	0	1	0	" [33|63, 2]	2 [83|13, 3]	B [8|88, 4]	R [28|68, 4]	b [68|28, 3]	r [55|41, 2]
0	0	1	1	# [92|4, 4]	3 [84|12, 3]	C [36|60, 3]	S [14|82, 4]	c [62|34, 3]	s [51|45, 3]
0	1	0	0	$ [7|89, 4]	4 [85|11, 3]	D [32|64, 4]	T [19|77, 3]	d [60|36, 3]	t [53|43, 3]
0	1	0	1	% [79|17, 4]	5 [87|9, 3]	E [16|80, 4]	U [34|62, 4]	e [58|38, 3]	u [63|33, 3]
0	1	1	0	& [77|19, 4]	6 [88|8, 3]	F [22|74, 4]	V [12|84, 4]	f [45|51, 3]	v [64|32, 3]
0	1	1	1	' [23|73, 1]	7 [89|7, 3]	G [40|56, 4]	W [42|54, 4]	g [65|31, 4]	w [54|42, 3]
1	0	0	0	([76|20, 2]	8 [90|6, 4]	H [26|70, 4]	X [50|46, 4]	h [61|35, 3]	x [70|26, 3]
1	0	0	1	) [74|22, 2]	9 [91|5, 3]	I [25|71, 3]	Y [44|52, 4]	i [47|49, 2]	y [66|30, 3]
1	0	1	0	* [15|81, 3]	: [29|67, 2]	J [21|75, 3]	Z [6|90, 3]	j [49|47, 3]	z [71|25, 3]
1	0	1	1	+ [11|85, 2]	; [27|69, 2]	K [46|50, 4]		k [69|27, 3]	. [39|16, 1]
1	1	0	0	, [78|55, 1]	¼ [81|15, 4]	L [20|76, 3]		l [43|53, 2]	
1	1	0	1	− [35|61, 1]	= [9|87, 2]	M [38|58, 4]		m [48|48, 4]	
1	1	1	0	. [80|57, 1]	½ [73|23, 4]	N [24|72, 4]		n [57|39, 3]	
1	1	1	1	/ [31|65, 2]	? [17|79, 2]	O [30|66, 4]	— [13|83, 1]	o [56|40, 3]	DEL

Legend:
- CHARACTER
- ELECTRICAL POSITION
- SPOKE POSITION
- ENERGY LEVEL RECOMMENDED

NOTES:

1. USE ENERGY SWITCH POSITION M FOR NORMAL USE, FOR MULTISTACK.

2. ◪ DESIGNATES RECOMMENDED LEVEL THAT DEVIATES FROM A STD HYTYPE II PRINTER.

3. CHARACTERS SHOWN ON THIS DRAWING DO NOT REFLECT AESTHETICS OF INDIVIDUAL TYPE STYLES.

4. ELECTRICAL POSITION IS PRINTWHEEL SPOKE POSITION AS VIEWED FROM THE CHARACTER SIDE OF THE PRINTWHEEL.

Figure 3-7. 88-CHARACTER PRINT WHEEL - METAL

b4	b3	b2	b1	b7=0 b6=1 b5=0	b7=0 b6=1 b5=1	b7=1 b6=0 b5=0	b7=1 b6=0 b5=1	b7=1 b6=1 b5=0	b7=1 b6=1 b5=1
0	0	0	0	SP	O (86|10/4)	@ (75|21/4)	P (10|86/4)	, (41|18/1)	p (67|29/4)
0	0	0	1	! (37|59/2)	1 (82|14/2)	A (18|78/4)	Q (52|44/4)	a (59|37/3)	q (72|24/4)
0	0	1	0	" (33|63/2)	2 (83|13/3)	B (8|88/4)	R (28|68/4)	b (68|28/3)	r (55|41/2)
0	0	1	1	# (92|4/4)	3 (84|12/3)	C (36|60/3)	S (14|82/4)	c (62|34/3)	s (51|45/3)
0	1	0	0	$ (7|89/4)	4 (85|11/3)	D (32|64/4)	T (19|77/3)	d (60|36/3)	t (53|43/3)
0	1	0	1	% (79|17/4)	5 (87|9/3)	E (16|80/4)	U (34|62/4)	e (58|38/3)	u (63|33/3)
0	1	1	0	& (77|19/4)	6 (88|8/3)	F (22|74/4)	V (12|84/4)	f (45|51/3)	v (64|32/3)
0	1	1	1	' (23|73/1)	7 (89|7/3)	G (40|56/4)	W (42|54/4)	g (65|31/4)	w (54|42/3)
1	0	0	0	((76|20/2)	8 (90|6/4)	H (26|70/4)	X (50|46/4)	h (61|35/3)	x (70|26/3)
1	0	0	1	) (74|22/2)	9 (91|5/3)	I (25|71/3)	Y (44|52/4)	i (47|49/2)	y (66|30/3)
1	0	1	0	* (15|81/3)	: (29|67/2)	J (21|75/3)	Z (6|90/3)	j (49|47/3)	z (71|25/3)
1	0	1	1	+ (11|85/2)	; (27|69/2)	K (46|50/4)	$\frac{2}{3}$ (3|93/4)	k (69|27/3)	. (39|16/1)
1	1	0	0	, (78|55/1)	$\frac{1}{4}$ (81|15/4)	L (20|76/3)	£ (4|92/4)	l (43|53/2)	
1	1	0	1	− (35|61/1)	= (9|87/2)	M (38|58/4)	$\frac{1}{3}$ (93|3/4)	m (48|48/4)	
1	1	1	0	. (80|57/1)	$\frac{1}{2}$ (73|23/4)	N (24|72/4)	$\frac{3}{4}$ (94|2/4)	n (57|39/3)	
1	1	1	1	/ (31|65/2)	? (17|79/2)	O (30|66/4)	— (13|83/1)	o (56|40/3)	DEL

CHARACTER
ELECTRICAL POSITION
SPOKE POSITION
ENERGY LEVEL RECOMMENDED

NOTES:

1. USE ENERGY SWITCH POSITION M FOR NORMAL USE, FOR MULTISTACK.

2. ◪ DESIGNATES RECOMMENDED LEVEL THAT DEVIATES FROM A STD HYTYPE II PRINTER.

3. CHARACTERS SHOWN ON THIS DRAWING DO NOT REFLECT AESTHETICS OF INDIVIDUAL TYPE STYLES.

4. ELECTRICAL POSITION IS PRINTWHEEL SPOKE POSITION AS VIEWED FROM THE CHARACTER SIDE OF THE PRINTWHEEL.

Figure 3-8. 92-CHARACTER PRINT WHEEL - METAL
(Rank Xerox)

ESC Y	ESC Z
¢ 0 0 / 5 3	' 39 57 / 5 1

Figure 3-9. 96-character print wheel — metal (Diablo). Each character cell lists electrical positions / spoke positions (top pair) and energy level recommended (bottom pair).

(MSB) b7				0	0	1	1	1	1
b6				1	1	0	0	1	1
b5				0	1	0	1	0	1
b4	**b3**	**b2**	**b1**						
0	0	0	0	SP	O · 86 10 / 5 4	@ · 75 21 / 8 4	P · 10 86 / 6 4	` · 95 1 / 5 1	p · 67 29 / 5 4
0	0	0	1	! · 37 59 / 3 2	1 · 82 14 / 5 2	A · 18 78 / 7 4	Q · 52 44 / 7 4	a · 59 37 / 5 3	q · 72 24 / 5 4
0	0	1	0	" · 33 63 / 4 2	2 · 83 13 / 5 3	B · 8 88 / 6 4	R · 28 68 / 7 4	b · 68 28 / 5 3	r · 55 41 / 4 2
0	0	1	1	# · 92 4 / 6 4	3 · 84 12 / 5 3	C · 36 60 / 7 3	S · 14 82 / 5 4	c · 62 34 / 5 3	s · 51 45 / 4 3
0	1	0	0	$ · 7 89 / 5 4	4 · 85 11 / 5 3	D · 32 64 / 7 4	T · 19 77 / 6 3	d · 60 36 / 5 3	t · 53 43 / 4 3
0	1	0	1	% · 79 17 / 8 4	5 · 87 9 / 5 3	E · 16 80 / 6 4	U · 34 62 / 7 4	e · 58 38 / 5 3	u · 63 33 / 5 3
0	1	1	0	& · 77 19 / 7 4	6 · 88 8 / 5 3	F · 22 74 / 6 4	V · 12 84 / 6 4	f · 45 51 / 4 3	v · 64 32 / 5 3
0	1	1	1	' · 23 73 / 2 1	7 · 89 7 / 5 3	G · 40 56 / 7 4	W · 42 54 / 8 4	g · 65 31 / 5 4	w · 54 42 / 7 3
1	0	0	0	(· 76 20 / 3 2	8 · 90 6 / 5 4	H · 26 70 / 7 4	X · 50 46 / 7 4	h · 61 35 / 5 3	x · 70 26 / 5 3
1	0	0	1	) · 74 22 / 3 2	9 · 91 5 / 5 3	I · 25 71 / 3 3	Y · 44 52 / 7 4	i · 47 49 / 3 2	y · 66 30 / 5 3
1	0	1	0	* · 15 81 / 5 3	: · 29 67 / 3 2	J · 21 75 / 5 3	Z · 6 90 / 6 3	j · 49 47 / 3 3	z · 71 25 / 5 3
1	0	1	1	+ · 11 85 / 5 2	; · 27 69 / 3 2	K · 46 50 / 7 4	[· 81 15 / 3 2	k · 69 27 / 5 3	{ · 4 92 / 3 2
1	1	0	0	, · 78 18 / 3 1	< · 41 55 / 5 2	L · 20 76 / 6 3	\ · 3 93 / 5 2	l · 43 53 / 3 2	| · 73 23 / 3 2
1	1	0	1	- · 35 61 / 4 1	= · 9 87 / 5 2	M · 38 58 / 8 4	] · 1 95 / 3 2	m · 48 48 / 8 4	} · 93 3 / 3 2
1	1	1	0	. · 80 16 / 3 1	> · 5 91 / 5 2	N · 24 72 / 7 4	^ · 2 94 / 5 1	n · 57 39 / 5 3	~ · 94 2 / 5 1
1	1	1	1	/ · 31 65 / 4 2	? · 17 79 / 5 2	O · 30 66 / 7 4	_ · 13 83 / 5 1	o · 56 40 / 5 3	DEL

Legend:
- CHARACTER
- ELECTRICAL POSITION
- SPOKE POSITION
- ENERGY LEVEL RECOMMENDED
- P/S UNITS

NOTES:
1. USE ENERGY SWITCH POSITION M FOR NORMAL USE, FOR MULTISTACK,
2. ◪ DESIGNATES RECOMMENDED LEVEL THAT DEVIATES FROM A STD HYTYPE II PRINTER.
3. CHARACTERS SHOWN ON THIS DRAWING DO NOT REFLECT AESTHETICS OF INDIVIDUAL TYPE STYLES.
4. ELECTRICAL POSITION IS PRINTWHEEL SPOKE POSITION AS VIEWED FROM THE CHARACTER SIDE OF THE PRINTWHEEL.

Figure 3-9. 96-CHARACTER PRINT WHEEL - METAL
(Diablo)

ESC Y

[	5	91
	5	2

ESC Z

3	0	0
	5	2

		(MSB) b7		0	0	1	1	1	1
		b6		1	1	0	0	1	1
b4	b3	b2	b1 / b5	0	1	0	1	0	1
0	0	0	0	SP	O (86 10 / 5 4)	@ (75 21 / 8 4)	P (10 86 / 6 4)	` (41 18 / 3 1)	p (67 29 / 5 4)
0	0	0	1	! (37 59 / 3 2)	1 (82 14 / 5 2)	A (18 78 / 7 4)	Q (52 44 / 7 4)	a (59 37 / 5 3)	q (72 24 / 5 4)
0	0	1	0	" (33 63 / 4 2)	2 (83 13 / 5 3)	B (8 88 / 6 4)	R (28 68 / 7 4)	b (68 28 / 5 3)	r (55 41 / 4 2)
0	0	1	1	μ (92 4 / 6 3)	3 (84 12 / 5 3)	C (36 60 / 7 3)	S (14 82 / 5 4)	c (62 34 / 5 3)	s (51 45 / 4 3)
0	1	0	0	$ (7 89 / 5 4)	4 (85 11 / 5 3)	D (32 64 / 7 4)	T (19 77 / 6 3)	d (60 36 / 5 3)	t (53 43 / 4 3)
0	1	0	1	% (79 17 / 8 4)	5 (87 9 / 5 3)	E (16 80 / 6 4)	U (34 62 / 7 4)	e (58 38 / 5 3)	u (63 33 / 5 3)
0	1	1	0	& (77 19 / 7 4)	6 (88 8 / 5 3)	F (22 74 / 6 4)	V (12 84 / 6 4)	f (45 51 / 4 3)	v (64 32 / 5 3)
0	1	1	1	' (23 73 / 2 1)	7 (89 7 / 5 3)	G (40 56 / 7 4)	W (42 54 / 8 4)	g (65 31 / 5 4)	w (54 42 / 7 3)
1	0	0	0	((76 20 / 3 2)	8 (90 6 / 5 4)	H (26 70 / 7 4)	X (50 46 / 7 4)	h (61 35 / 5 3)	x (70 26 / 5 3)
1	0	0	1	) (74 22 / 3 2)	9 (91 5 / 5 3)	I (25 71 / 3 3)	Y (44 52 / 7 4)	i (47 49 / 3 2)	y (66 30 / 5 3)
1	0	1	0	* (15 81 / 5 3)	: (29 67 / 3 2)	J (21 75 / 5 3)	Z (6 90 / 6 3)	j (49 47 / 3 3)	z (71 25 / 5 3)
1	0	1	1	+ (11 85 / 5 2)	; (27 69 / 3 2)	K (46 50 / 7 4)	] (3 93 / 6 4)	k (69 27 / 5 3)	. (39 16 / 3 1)
1	1	0	0	, (78 55 / 3 1)	¼ (81 15 / 6 4)	L (20 76 / 6 3)	£ (4 92 / 5 4)	l (43 53 / 3 2)	< (1 95 / 6 2)
1	1	0	1	− (35 61 / 4 1)	= (9 87 / 5 2)	M (38 58 / 8 4)	° (93 3 / 5 1)	m (48 48 / 8 4)	2 (2 94 / 5 2)
1	1	1	0	. (80 57 / 3 1)	½ (73 23 / 6 4)	N (24 72 / 7 4)	¾ (94 2 / 6 4)	n (57 39 / 5 3)	> (95 1 / 6 2)
1	1	1	1	/ (31 65 / 4 2)	? (17 79 / 5 2)	O (30 66 / 7 4)	— (13 83 / 5 1)	o (56 40 / 5 3)	DEL
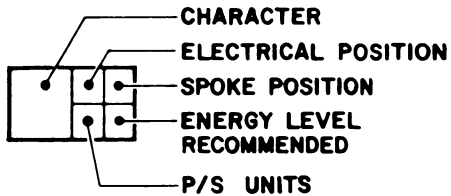
— CHARACTER
— ELECTRICAL POSITION
— SPOKE POSITION
— ENERGY LEVEL RECOMMENDED
— P/S UNITS

NOTES:

1. USE ENERGY SWITCH POSITION M FOR NORMAL USE, FOR MULTISTACK.

2. ◨ DESIGNATES RECOMMENDED LEVEL THAT DEVIATES FROM A STD HYTYPE II PRINTER.

3. CHARACTERS SHOWN ON THIS DRAWING DO NOT REFLECT AESTHETICS OF INDIVIDUAL TYPE STYLES.

4. ELECTRICAL POSITION IS PRINTWHEEL SPOKE POSITION AS VIEWED FROM THE CHARACTER SIDE OF THE PRINTWHEEL.

Figure 3-10.   96-CHARACTER PRINT WHEEL – METAL
(Rank Xerox)

3.5.3   ASCII-to-Decimal Equivalents

Table 3-2
DECIMAL VALUES OF ASCII CHARACTERS

						Units				
		0	1	2	3	4	5	6	7	8	9
	0		SOH	STX	ETX	EOT	ENQ	ACK	BEL	BS	HT
	10	LF	VT	FF	CR	SO	SI	DLE	DC1	DC2	DC3
	20	DC4	NAK	SYN	ETB	CAN	EM	SUB	ESC	FS	GS
T	30	RS	US	SP	!	"	#	$	%	&	'
	40	(	)	*	+	,	–	.	/	0	1
e	50	2	3	4	5	6	7	8	9	:	;
	60	<	=	>	?	@	A	B	C	D	E
n	70	F	G	H	I	J	K	L	M	N	O
	80	P	Q	R	S	T	U	V	W	X	Y
s	90	Z	[	\	]	^	_	`	a	b	c
	100	d	e	f	g	h	i	j	k	l	m
	110	n	o	p	q	r	s	t	u	v	w
	120	x	y	z	{	|	}	~			

SECTION 4

REMOVAL & REPLACEMENT PROCEDURES

4.1   GENERAL INSTRUCTIONS

WARNING:
1. Removing the top cover of the Model 630 exposes a safety hazard to unqualified personnel. Before performing any removal procedure on the Model 630, make sure that the AC power is switched OFF, and the power cord is unplugged.
2. DO NOT apply power to the machine while any of the circuit boards are disconnected; to do so can cause radical carriage movement and damage to the machine.

The removal procedures are arranged in this section in the logical sequence in which some of them must be performed. When one procedure refers to another, the section number of the referenced procedure is listed in parentheses; for example, "Remove the top cover (4.2)". For these procedures, it is assumed that any paper feed accessories such as a sheet feeder or forms tractor have already been removed if necessary.

In most cases, the reassembly procedure simply reverses the removal procedure, and thus is not described here. Any differences or special considerations required during reassembly are noted.

4.2   TOP COVER REMOVAL

1) Unplug the power cord.
2) Remove the platen knob by pulling it straight to the right.
3) Remove the access cover by lifting it at the front and sliding it forward.
4) If not already done, remove the shipping restraint screw from the rear of the top cover (Fig. 4-1).
5) Loosen the two captive screws securing the top cover (Fig. 4-2).
6) Lift off the top cover.
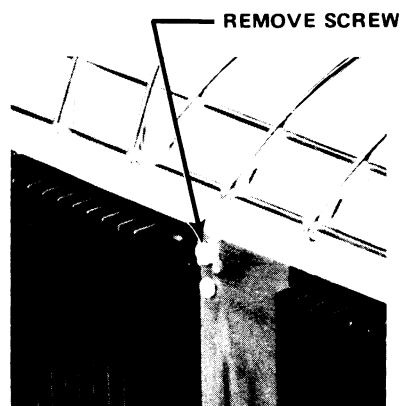
Figure 4-1. TOP COVER SHIPPING SCREW
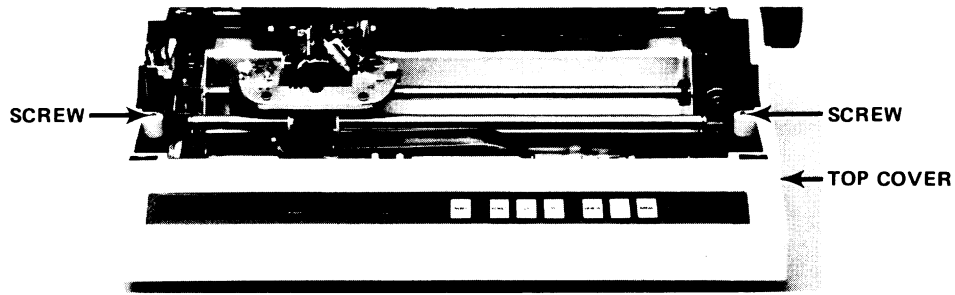
Figure 4-2. TOP COVER MOUNTING SCREWS

4.3 PLATEN REMOVAL

1) Turn the power switch OFF.
2) Remove the top cover (4.2).
3) Depress the platen latch lever (Fig. 4-3) at each end of the platen, and lift the platen out of the printer.

Figure 4-3. PLATEN LATCH LEVER

4.4 CIRCUIT BOARD REMOVALS

An electrostatic shield covers the circuit board compartment ("card cage") at the left rear of the unit. This card cage cover can be removed after loosening the two screws pointed out in Figure 4-4. The locations of the various Model 630 circuit boards are shown in Figure 4-5.

4.4.1 PCE / PPI / SPI / HPRO5 / HPRO6 Circuit Boards Removal

1) Unplug the power cord.
2) Remove the top cover (4.2).
3) Remove the card cage cover.
4) Carefully disconnect all of the cables connected along the left, right and top sides of the board.
5) Slide the board up out of its guides.

4.4.2   SCE Circuit Board Removal

1) Unplug the power cord.
2) Remove the top cover (4.2).
3) Remove the card cage cover.
4) Carefully disconnect the two cables from the right side of the SCE board.
5) Loosen (no more than 3 turns) the four screws (A) holding the SCE board assembly in position as shown in Figure 4-6.
6) Lift the SCE board up out of its edge connector and out of the machine.
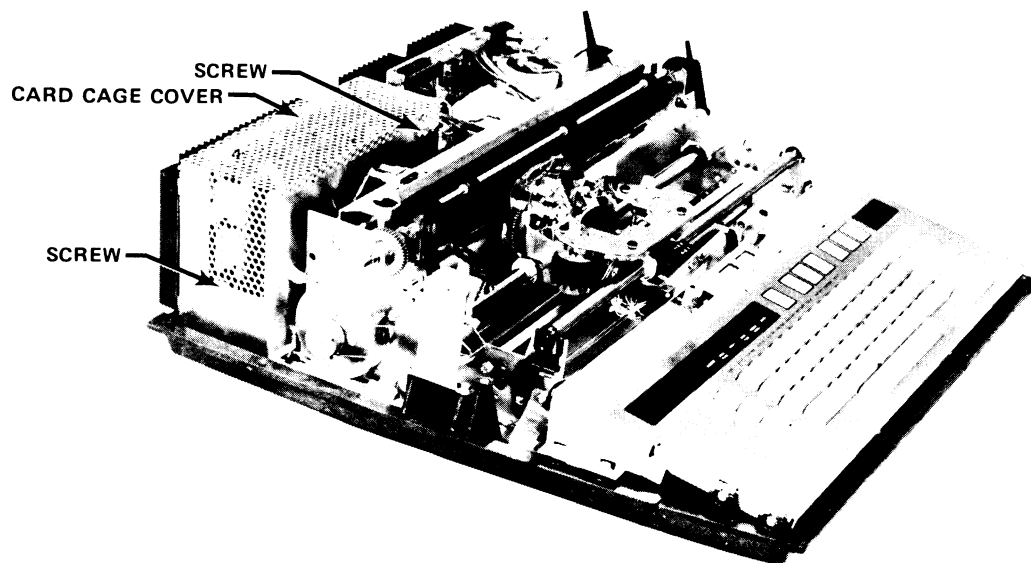
Figure 4-4.   CARD CAGE COVER
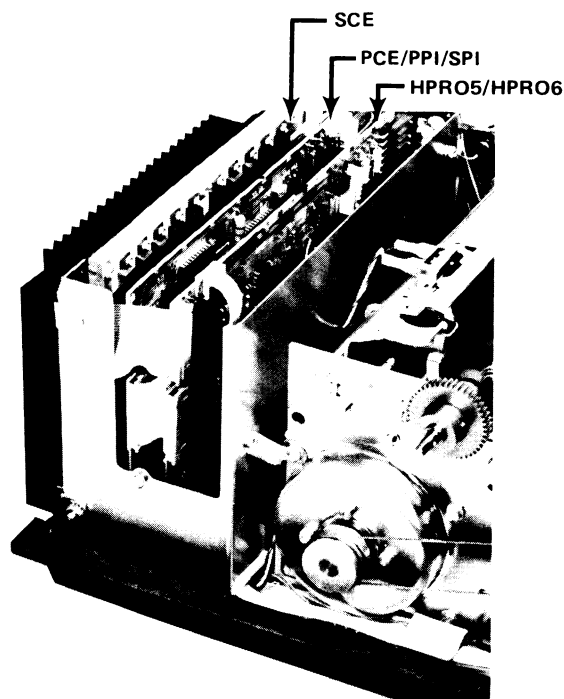
Figure 4-5.   CIRCUIT BOARD LOCATIONS
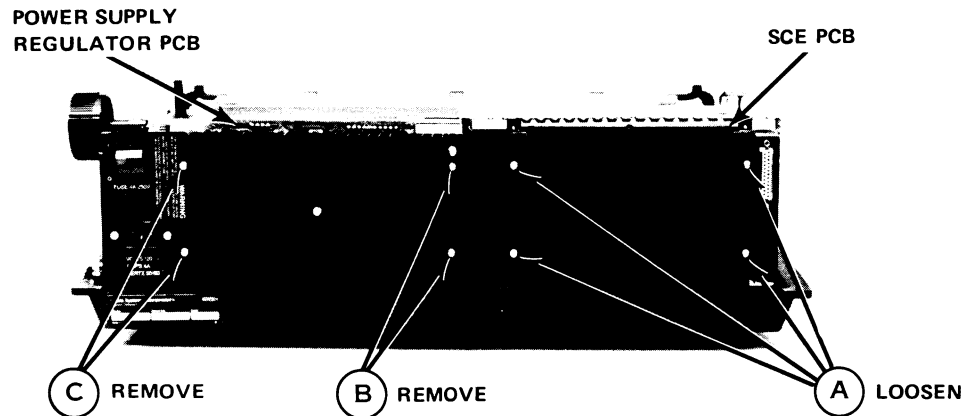
Figure 4-6. MOUNTING SCREWS FOR SCE AND P/S REGULATOR CIRCUIT BOARDS

4.5   POWER SUPPLY REMOVAL / CONVERSION

4.5.1   Regulator Circuit Board Removal
The power supply regulator circuit board can be removed separately as described here, or as part of the complete power supply assembly (4.5.2).

1) Unplug the power cord.
2) Remove the top cover (4.2).
3) Disconnect the two cables at the top edge of the regulator circuit board, and the one cable at the left edge of the board.
4) Refer to Figure 4-6.
   Remove the two screws (B) holding the regulator board heat sink to the rear of the unit. Remove the two screws (C) at the other end of the heat sink near the ON-OFF switch.
5) Lift the regulator circuit board far enough to gain access to the cable connection at the lower right edge of the circuit board. Disconnect the cable, and then remove the circuit board from the machine.

4.5.2   Power Supply Assembly Removal

1) Unplug the power cord.
2) Remove the top cover (4.2).
3) Position the Model 630 so that you are facing the rear of the machine.
4) Remove the four mounting screws (A) and the ground strap screw (B) identified in Figure 4-7.
5) Referring to Figure 4-8, remove the trim plate from the center rear panel of the machine. To do this, loosen the four screws (C and D) that secure one side of the plate to the SCE heat sink, and the other side to the power supply heat sink. Slide the trim plate up out of the machine.
6) Disconnect the DC power cable from the top edge of the power supply regulator board.
7) Gently manipulate the power supply assembly out the rear of the machine. Avoid snagging and straining any of the cables.

Rev A (4/82)
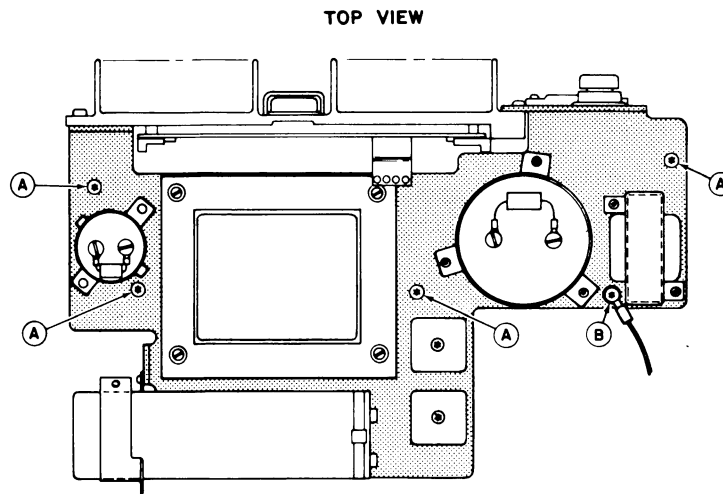
Figure 4-7.   POWER SUPPLY ASSEMBLY MOUNTING SCREWS
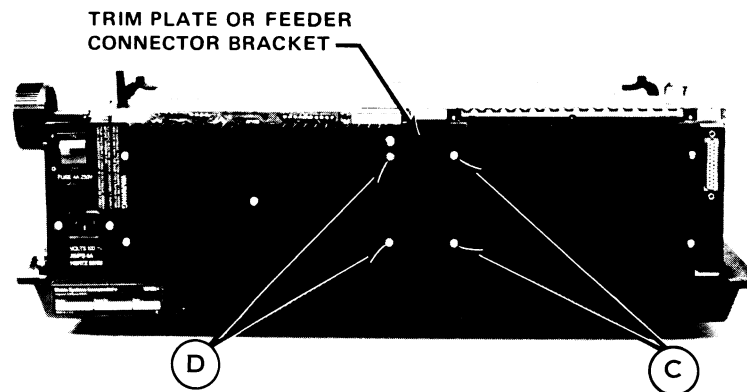
Figure 4-8.   REAR PANEL TRIM PLATE

4.5.3   Power Supply AC Input Conversion

The internal power supply of the Model 630 can be configured to operate from any one of four different input voltages: 100, 120, 220 or 240 VAC at 49 to 61 Hertz.

A universal conversion kit includes all parts required to convert from-to any of these voltages.   Each part in the kit is also available separately, as listed below.   Which of the parts are actually used in a particular conversion depends on the from-to configurations. For example, converting from a 100 VAC input to a 120 VAC input does not require a new line fuse since both configurations use a 4 amp fuse; however, when converting from 100 VAC to 220 VAC, the old 4 amp fuse must be replaced by a 2 amp fuse.

Figure 4-9 shows the required wiring configuration for each input voltage, and Figure 4-10 shows the locations of the associated label changes that may be required.

Parts List:

Item	Part No.	Description
	321344-01	Complete kit
1	302983-01	Label, Fuse, 4A (use with 100 and 120V input)
2	302970-01	Label, Fuse, 2A (use with 220 and 240V input)
3	302964-01	Label, Rating, 100V
4	302962-01	Label, Rating, 120V
5	302966-01	Label, Rating, 220V
6	302968-01	Label, Rating, 240V
7	10604-07	Fuse, 4A, Fast-Blow (use with 100 and 120V input)
8	10604-08	Fuse, 2A, Fast-Blow (use with 220 and 240V input)
9	10708	Jumper, Terminal Block

Conversion Procedure

1) Disconnect the AC power cord, and remove the top cover (4.2).
2) Remove the power supply assembly from the Model 630 (4.5.2).
3) Position the power supply assembly on its back so that the terminal block (TB1) on the bottom of the power supply assembly is accessible.
4) On the terminal block, reposition the terminal jumper(s) and line filter leads according to the appropriate diagram shown in Figure 4-9. It should be unnecessary to alter the position of the transformer leads; they are shown for reference only.

> NOTE: The proper positions on the terminal block (TB1) for the brown and blue wires from the line filter depends on the wire colors on the top two terminals of the on-off switch. If the top left terminal has a brown wire and the top right terminal a blue wire (as viewed from the front of the machine), follow the colors listed in Figure 4-9; if the colors on the on-off switch are opposite, reverse the wire colors shown in Figure 4-9.

5) Turn the power supply right side up.
6) Check the value of the line fuse presently in the unit against the fuse requirement for the new input voltage, as shown in the Parts List above. Install the proper fuse.
7) Check the fuse label to see if it matches the fuse size that is now being used. If a new fuse label is required, select the proper label, remove the adhesive backing and apply the label to the location indicated in Figure 4-10. Make sure the label completely covers the existing fuse data printed on the panel.
8) Select the proper voltage rating label, remove the adhesive backing, and apply the label to the location indicated in Figure 4-10.
9) Connect the proper CSA-approved line cord (Diablo P/N 100448-01), apply power and verify that the DC output voltages are correct.
10) Turn off power, disconnect the line cord, and reinstall the power supply assembly into the Model 630.

Rev A (4/82)
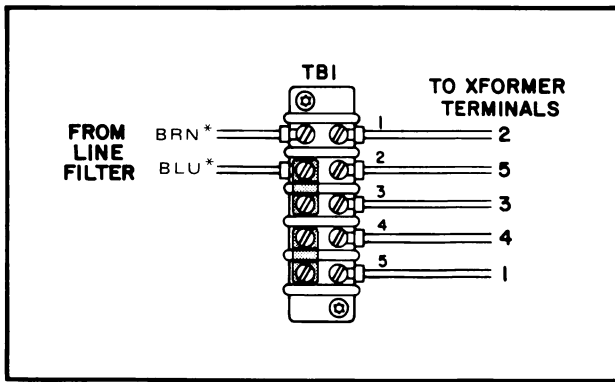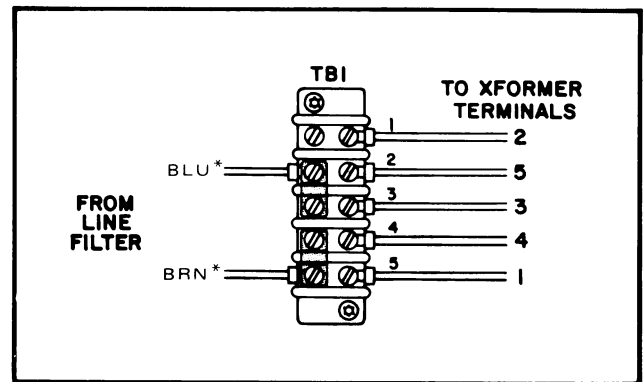
(100V WIRING)	(120V WIRING)
(220V WIRING)	(240V WIRING)
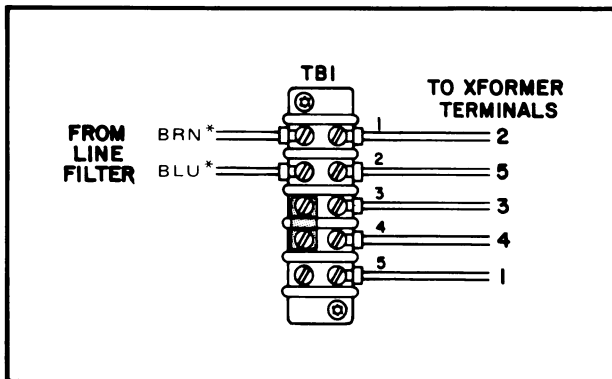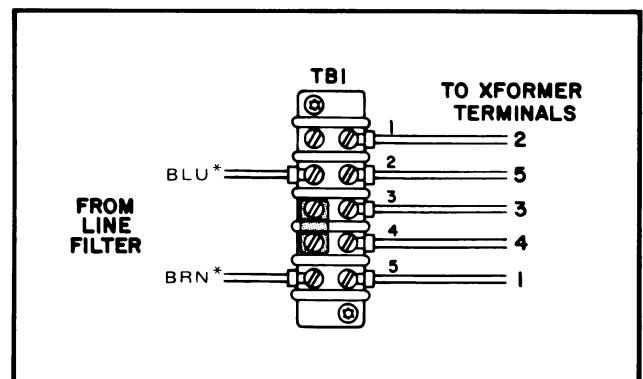
* The wire colors shown above apply if the on-off switch has a brown wire on the top left terminal and a blue wire on the top right terminal (viewed from front of machine). If the wire colors on the switch are opposite (brown on right, blue on left), the wire colors from the line filter to TB1 must be opposite to that shown above.

Figure 4-9. AC INPUT WIRING
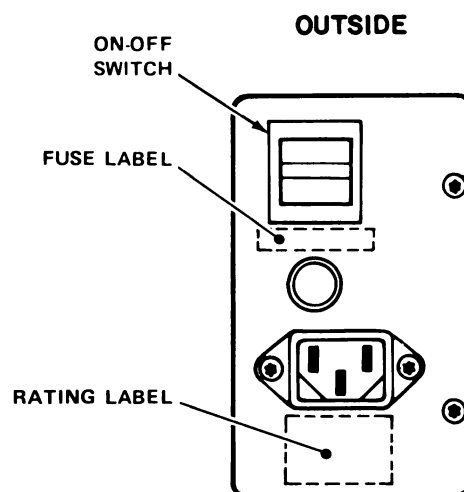
Figure 4-10. INPUT POWER LABEL LOCATIONS

4.6   SPI CONTROL PANEL REMOVAL

1) Unplug the power cord.
2) Remove the top cover (4.2).
3) Remove the two screws holding the left end of the control panel to the bottom pan.
4) Loosen the two screws holding the right end of the control panel to the bottom pan.
5) Note carefully how the control panel cable connector is oriented (see Fig. 4-11). This connector is not keyed, and can easily be installed backwards. (This will not damage the machine, but will cause improper operation.)
6) Disconnect the control panel cable connector.
7) Turn the control panel over and slide the control panel cable out of the cable retainers on the bottom side of the control panel.

Reassembly Note: Be sure to reattach all ground straps that were disconnected during disassembly.
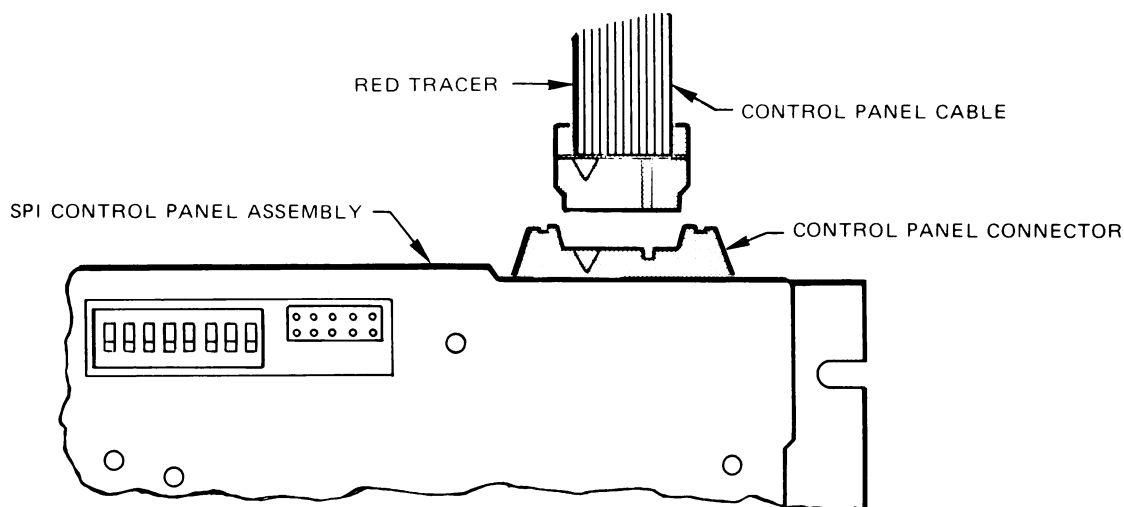
Figure 4-11. SPI CONTROL PANEL CABLE

4.7   HPRO5 CONTROL PANEL REMOVAL

The control panel removal procedure varies depending on whether the unit is an RO or a KSR, and on the type of ESD shielding used. The removal procedures for RO and KSR control panels are described separately. For ESD shielding on some early units, a metal plate is clipped in place across the bottom of the control panel. When the control panel is mounted, there are three screws holding the bottom edge of this plate to the bottom pan of the machine. On later units, a ground plane on the control panel circuit board provides ESD shielding, and the separate metal shield is not used.

Another aspect of the removal procedure subject to variation concerns the position of the cable that connects to the control panel from the HPRO5 circuit board. A design change to the control panel circuit board reversed the pin-outs on the connector, and thus requires that the cable be connected to the board just opposite of the way it is connected in earlier units. Figure 4-12 illustrates these two arrangements and identifies the circuit board etch level where the reversal occurs.
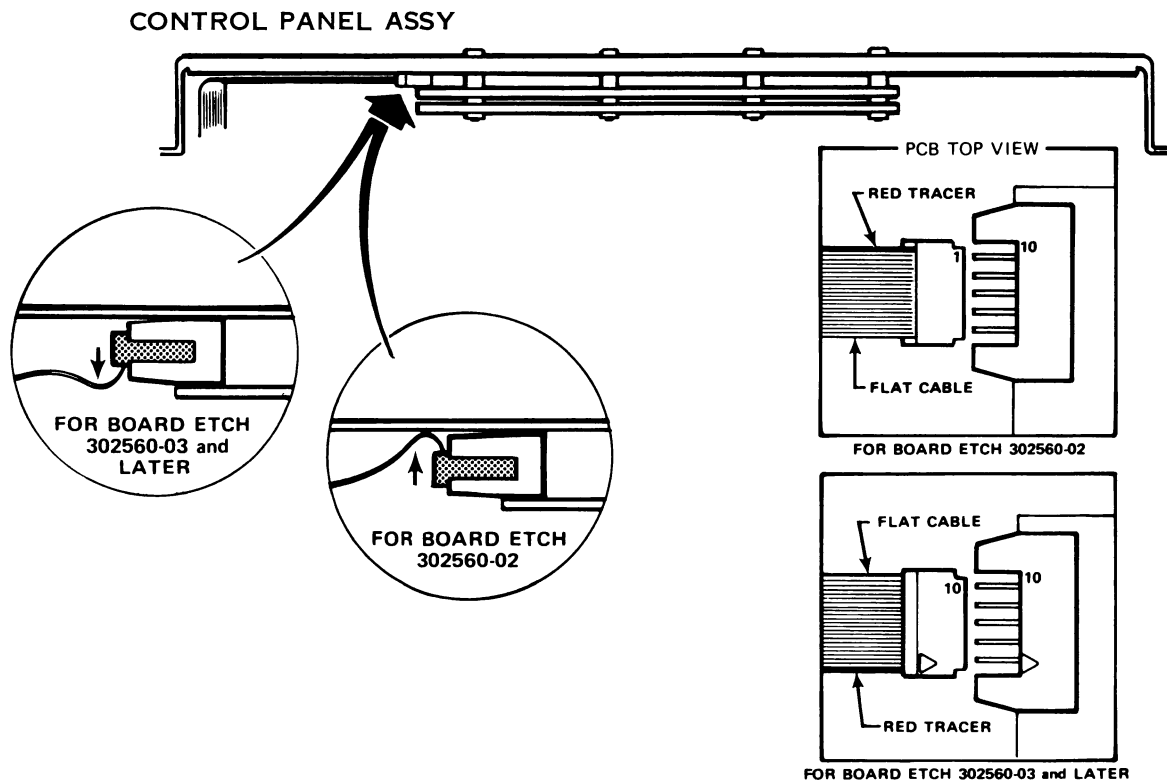
CONTROL PANEL ASSY

Figure 4-12. HPRO5 CONTROL PANEL CABLE

4.7.1   RO Control Panel Removal

1) Unplug the power cord.
2) Remove the top cover (4.2).
3) Loosen the 3 screws holding the control panel ESD shield (if present) to the bottom pan of the machine.
4) At each end of the control panel, remove the 2 screws holding the control panel to the bottom pan.
5) Disconnect the ground strap at each end of the control panel.
6) Slide the control panel forward to release the ESD shield from the bottom pan.
7) Tip the rear of the control panel upward to expose the cable connector on the bottom side of the panel.
      NOTE: Note carefully how the connector is oriented (see Fig. 4-12). This connector is not keyed, and can easily be installed backwards. (This will not damage the machine, but will cause improper operation.

8) Disconnect the cable.

Reassembly Notes:
      1. Be sure to reattach the ground straps at each end of the control panel.
      2. Be sure that the control panel cable is connected correctly before remounting the control panel assembly. (See explanation under 4.7)

4.7.2   KSR Control Panel Removal

The KSR control panel can be removed either separately or as part of the keyboard assembly. This procedure describes its removal as a separate assembly. Subsection 4.8 describes removal of the complete keyboard–control panel assembly.

1) Unplug the power cord.
2) Remove the top cover (4.2).
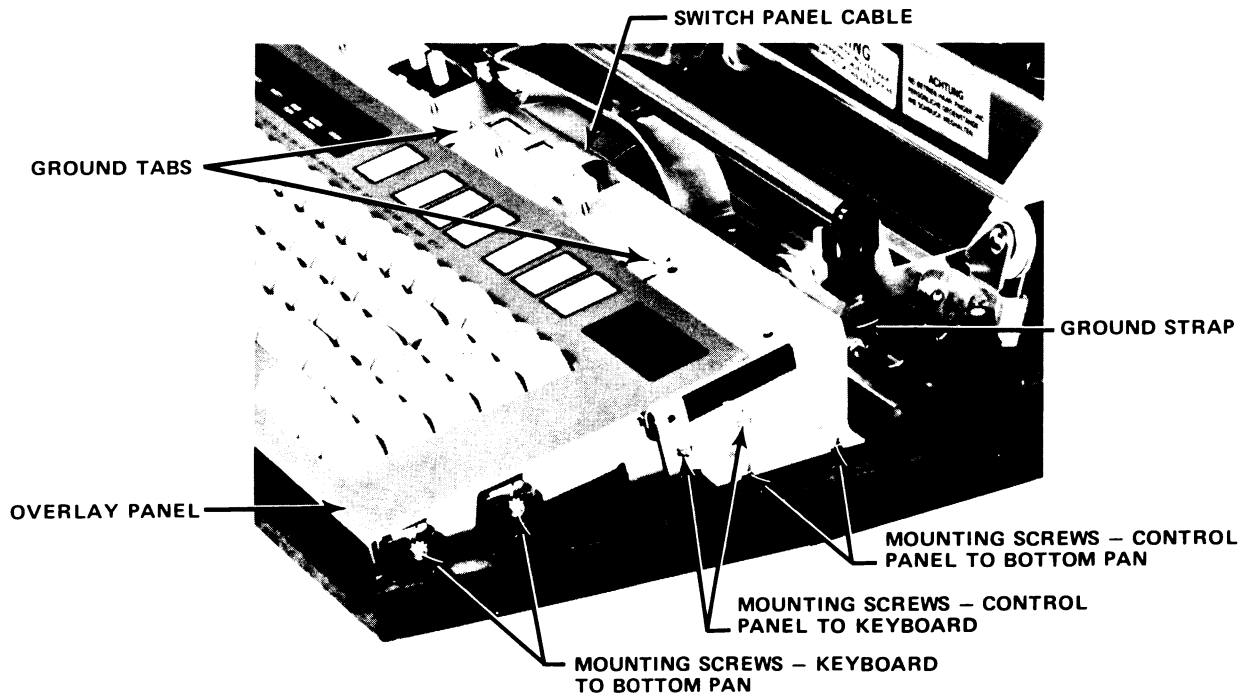
Figure 4-13.   KEYBOARD–CONTROL PANEL REMOVAL

Refer to Figure 4-13.

3) Remove the two screws securing the ground tabs of the overlay panel.
4) Disconnect the short cable that connects the overlay switch panel to the control panel.
5) For reference during reassembly, look closely at how the overlay panel is fitted onto the keyboard; then lift the overlay panel off the keyboard.
6) Disconnect the ground strap at each end of the control panel.
7) At both ends of the control panel, remove the two screws that fasten the control panel to the keyboard assembly.
8) At both ends of the control panel, remove the two screws that secure the control panel to the bottom pan.
9) Rock the rear of the control panel upward to expose the cables on the bottom side of the control panel.
10) For reference during reassembly, carefully note the position of the cable connector at the left end of the control panel circuit board; then disconnect this cable.
11) Disconnect the cable that connects the control panel to the keyboard.
12) Remove the control panel.

4.8   KEYBOARD ASSEMBLY REMOVAL

1) Unplug the power cord.
2) Remove the top cover (4.2).

Refer to Figure 4-13.
3) Disconnect the ground strap at each end of the control panel.
4) Remove the two screws that secure each end of the control panel to the bottom pan.
5) Loosen the two screws that secure each end of the keyboard assembly to the bottom pan.
6) Lift the rear of the keyboard-control panel assembly to expose the control panel cable.
7) For reference during reassembly, note the way the control panel cable connects at the left end of the control panel circuit board; then disconnect the cable.
8) Lift the keyboard out of the machine.

> NOTE: The membrane switch overlay panel is fastened down only at its rear edge. If the keyboard assembly must be inverted, support the overlay panel so that it doesn't fall free.

4.9   PRINT MECHANISM REMOVAL

1) Unplug the power cord.
2) Remove the top cover (4.2).
3) Remove the control panel (4.6 or 4.7) if this is an RO unit, or the entire keyboard-control panel assembly (4.8) if it is a KSR unit.
4) Disconnect the two cable connectors mounted at the lower front of the carriage (Item A, Fig. 4-16).
5) Loosen the screw (Item B, Fig. 4-16) that holds the carriage cable mounting bracket, and release the bracket from the carriage.
6) Remove the two screws holding the cover open switch bracket to the bottom pan. Lay the bracket assembly out of the way at the left side of the machine.
7) Loosen the two screws holding the cable shield plate on the left side of the bottom pan (Fig. 4-14). Slide the plate forward and lift it out.
NOTE: Later units do not have this shield plate.
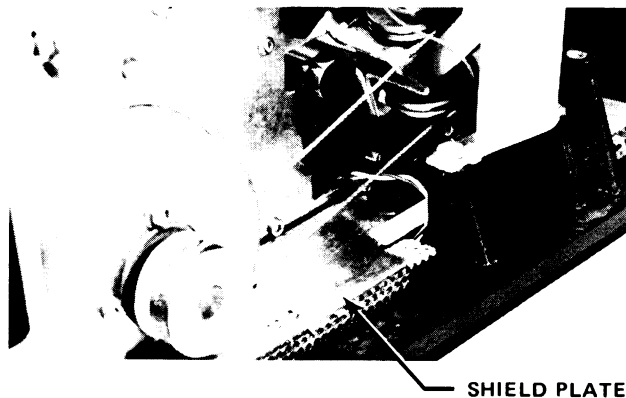
SHIELD PLATE

Figure 4-14. RIBBON CABLE SHIELD PLATE

8) Make note of the wire connections to the paper-out switch, and then disconnect the wires from the switch. (Yellow wire to left terminal, brown wire to right.)
9) Disconnect the ground straps located on the print mechanism at the left front corner, the right front corner, the left rear corner, and the center of the right side frame.
   NOTE: Your unit may not have all of these ground straps.

10) Remove the card cage cover.
11) Disconnect the paper feed motor cable from either the PCE, PPI or SPI circuit board.
12) Disconnect the carriage drive motor cable from the SCE circuit board.
13) Unlatch the print mechanism from the bottom pan. The mechanism is held in place by two retainers located just inside the side frames of the mechanism, as shown in Figure 4-15. The retainers are unlatched by pulling the retainer slides toward the center of the mechanism. (A forceful tug may be required to overcome the detent.)
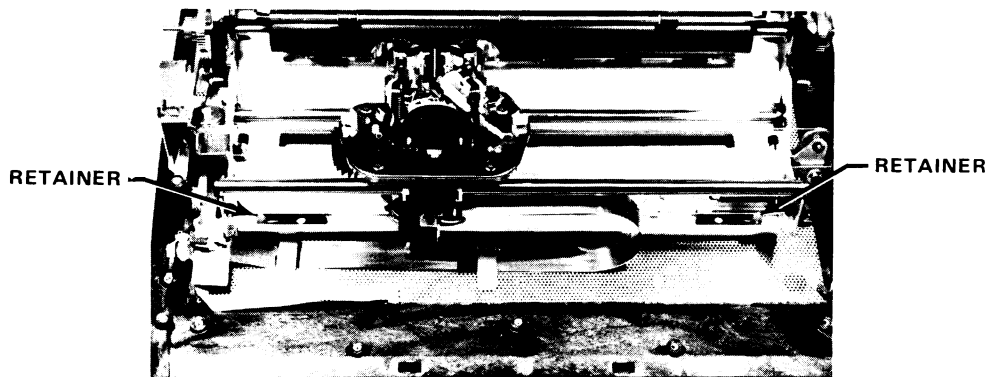
Figure 4-15. PRINT MECHANISM FRONT RETAINERS

14) Before the print mechanism can be removed completely from the machine, a cable that connects to the carriage drive motor from underneath must be disconnected as follows:
   Carefully raise the front of the print mechanism above the retainer pins and slide it forward a <u>short</u> distance (approximately 3" / 76mm). While holding the front of the mechanism up, reach underneath it and disconnect the flat cable from the carriage drive motor.
15) Gently lift the mechanism out of the bottom pan.

Reassembly Notes:
   To reinstall the print mechanism, simply reverse the removal procedure, with attention to the following details:
   - Check that the rubber shock mount inserts are properly positioned in the mount brackets that hold the rear of the print mechanism in the bottom pan.
   - Be sure to connect the flat cable to the carriage drive motor from underneath before latching the print mechanism in position.

4.10   CARRIAGE ASSEMBLY REMOVAL

1) Unplug the power cord.
2) Remove the top cover (4.2), platen, ribbon and print wheel.
3) Remove the control panel (4.6 or 4.7).

Refer to Figure 4-16.
4) Disconnect the two cable connectors (A) mounted at the lower front of the carriage assembly.
5) Loosen the screw (B) that holds the carriage cable mounting bracket, and release the bracket from the carriage.
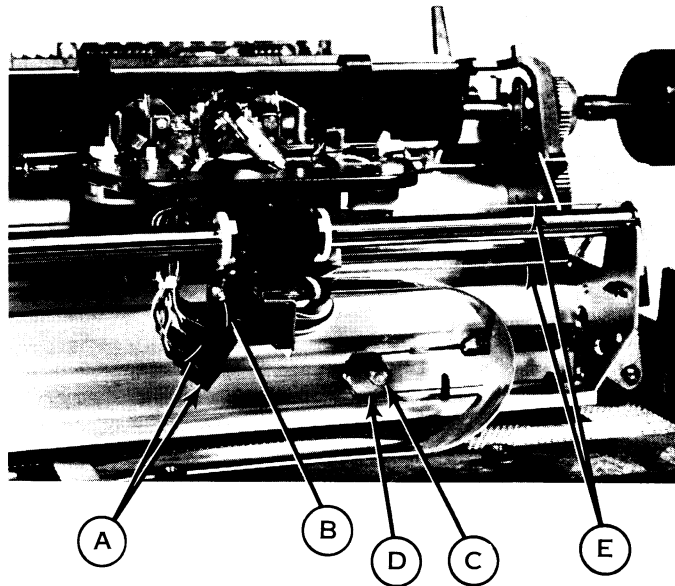
Figure 4-16.   CARRIAGE ELECTRICAL CABLE ASSEMBLY & SNUBBER
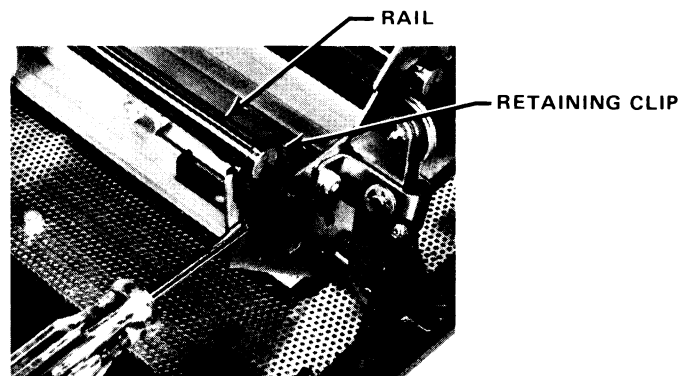
Figure 4-17.   RAIL CLIP REMOVAL

6) Loosen the lock screw (C) on the snubber eccentric (D) slightly, and rotate the eccentric 1/2 turn clockwise to release the tension on the carriage drive cable (E).
7) Slip the drive cable off one of its pulleys, and then unhook the two ends of the cable from their anchor slots on the carriage. The drive cable may now be completely removed from the machine, if desired. (To restring the cable, see subsection 4.14.)

8) Using a screwdriver or other suitable implement as shown in Figure 4-17, remove the retaining clips (4) from the ends of the two carriage rails. The clip is removed by rotating the screwdriver, not by prying. The shank of the screwdriver must be at least 8" long, and its blade must be narrow enough to insert through the clip.

> CAUTION: After the clips are removed, the front rail is unrestrained. Take care that it does not fall free.

8) Lift one end of the rails and slide the carriage off.

Reassembly Notes:
- To install the carriage assembly, reverse the removal procedure.
- For restringing the carriage drive cable, see subsection 4.14.
- A replacement carriage assembly will be equipped with either jackscrew or self-locking type cable connectors. The self-locking type is designed with a detent feature to hold the two halves of the connector together. If it becomes necessary to mismatch the two halves of these connectors; i.e., a jackscrew type connector joined to a self-locking type connector; neither the detent feature nor the jackscrews are functional. In this case, it is recommended that the two halves of the connector be held together wih a cable tie to ensure a secure, reliable connection.

4.11 RIBBON DECK REMOVAL

1) Unplug the power cord.
2) Remove the access cover, ribbon and print wheel.
3) Remove the two cable ties located near the carriage cable connectors (Fig. 4-18). (In some units, only one cable tie is used here.)
4) Disconnect the top connector from the carriage. (In some cases, it may be helpful to remove the control panel before performing this step.)
5) Remove the two TORX screws (Fig. 4-19) holding the ribbon deck to the carriage assembly.
6) Pivot the right side of the ribbon deck forward in order to clear the ribbon lift eccentric and then remove the ribbon deck.
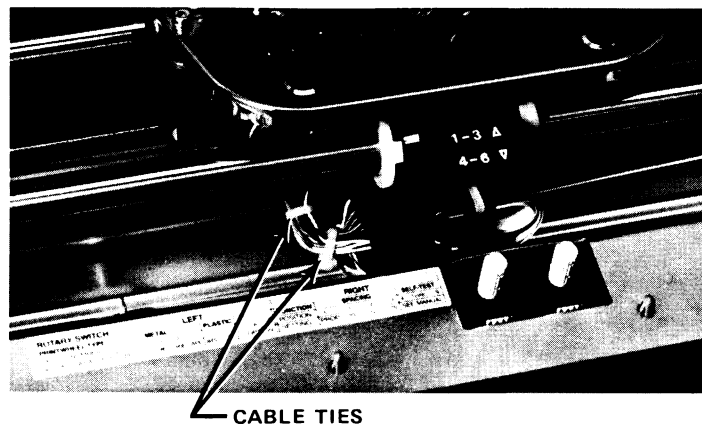
CABLE TIES

Figure 4-18. RIBBON DECK CABLE TIES

MOUNTING SCREW (2)
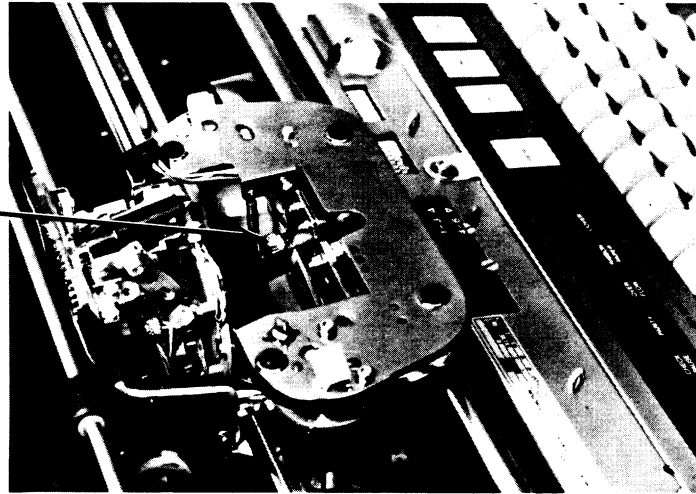
Figure 4-19. RIBBON DECK MOUNTING SCREWS

4.12 RIBBON LATCH REMOVAL

1) Unplug the power cord.
2) Remove the access cover, ribbon and print wheel.
3) Remove the ribbon deck (4.11).
4) Unhook the latch spring from the ribbon latch.
5) Using a pin punch, remove the retaining pin from the latch.
   Note: For convenience when removing the left latch, the ribbon drive motor may
   be unfastened if desired.
6) Remove the latch and spring from the ribbon deck.

4.13 CARRIAGE DRIVE MOTOR REMOVAL

1) Unplug the power cord.
2) Remove the top cover (4.2).
3) Remove the ribbon cartridge.
4) Remove the control panel (4.6 or 4.7).
5) Remove the print mechanism (4.9).
6) Remove the carriage drive cable (steps 6 and 7 of 4.10).
7) Remove the four motor mounting screws around the drive capstan.
8) Slide the motor out through the rear of the print mechanism.

Reassembly Notes:
- To install the carriage drive motor, reverse the removal procedure.
- To restring the carriage drive cable, refer to subsection 4.14.

4.14 RESTRINGING THE CARRIAGE DRIVE CABLE

The anchor ball fixed to the middle of the drive cable is not centered between the two
ends. Consequently, the cable has a short section and a long section. The outer end of
the long section connects to the right side of the carriage, and the outer end of the short
section connects to the left side of the carriage.
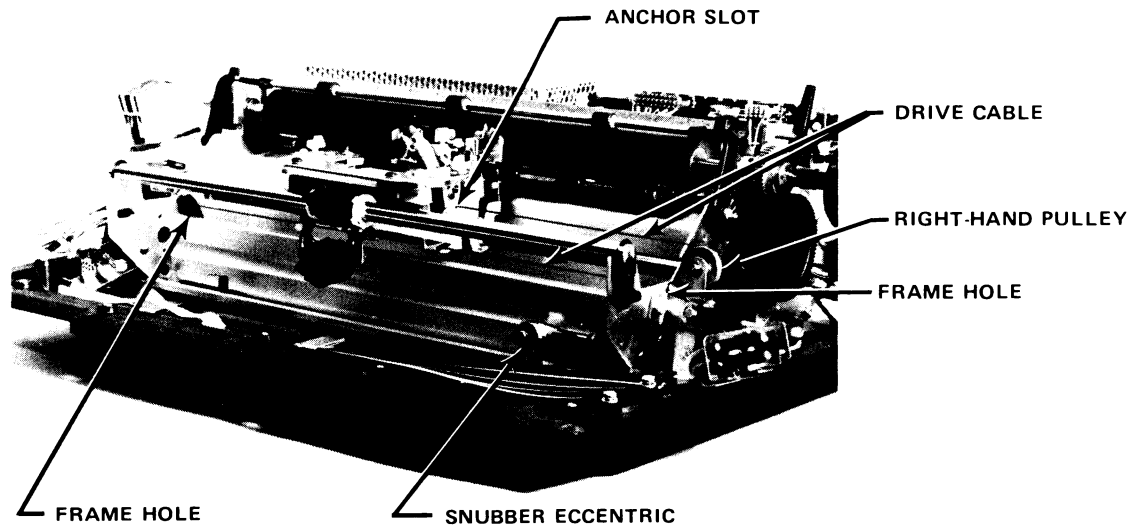
Figure 4-20. STRINGING THE DRIVE CABLE - LONG SECTION

Refer to Figure 4-20.
1) Position the carriage near the center of its travel.
2) Starting from outside the left frame of the printer mechanism, insert the end of the long cable section through the hole in the left frame, bring it across under the carriage and insert it through the hole in the right frame.
3) Bring the cable end up around the pulley on the right frame, and hook the anchor ball into the anchor slot in the right side of the carriage. Hereafter, continue to hold sufficient tension on the cable to prevent the anchor ball from slipping out of its anchor slot.
4) Grasp the free end of the cable and pull all of the cable slack out through the left frame so that the carriage begins moving rightward. Continue pulling until the carriage contacts the right end stop.

Refer to Figure 4-21.
5) Bring the cable rearward around the lower left pulley and under the capstan of the carriage drive motor.
6) Starting at the inner rim of the capstan, wind the cable four turns clockwise around the capstan. (Wind it snug but not tight.) This should bring the middle anchor ball on the cable to the capstan.

   NOTE: Early production units require five turns around the capstan.

7) Rotate the capstan within the windings to align the capstan anchor slot with the cable anchor ball. Seat the ball into the slot.
8) Wind 1/2 turn more cable onto the capstan (4-1/2 turns total), and then route the cable forward around the upper left pulley. (NOTE: Early production units used a longer drive cable which requires 5-1/2 total turns of cable on the capstan.)
9) Bring the end of the cable over to the carriage, and hook the anchor ball into the anchor slot in the left side of the carriage.
10) Slowly move the carriage from one end of the rails to the other a couple of times and check that the cable is properly seated on its pulleys, and that the cable windings on the capstan are not overlapping.
11) To tighten the cable, turn the cable snubber eccentric counterclockwise until it stops, using a 3/4" wrench.
12) Tighten the snubber eccentric lock screw.
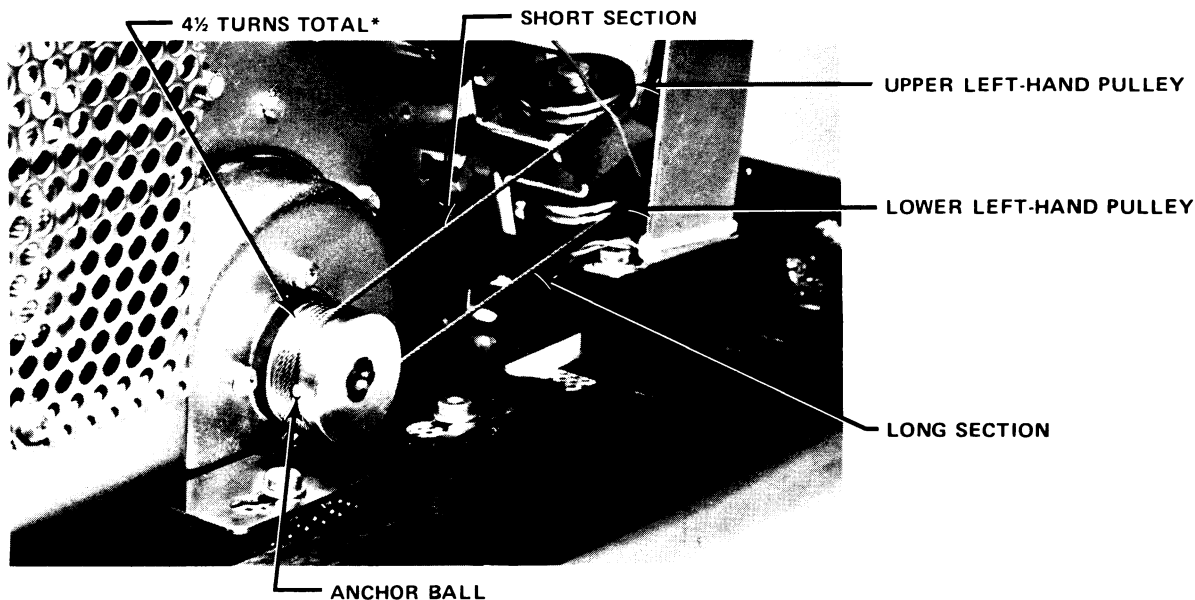
*Early production units used a longer drive cable which requires 5½ turns on the capstan.

Figure 4-21. STRINGING THE DRIVE CABLE - SHORT SECTION

4.15   PAPER FEED MOTOR REMOVAL

1) Unplug the power cord.
2) Remove the top cover (4.2).
3) Remove the platen (4.3).
4) Remove the card cage cover.
5) Unplug the paper feed motor cable from connector J2 on either the PCE, PPI or SPI circuit board.
6) Remove the three screws holding the paper feed motor to the right side frame. Note that of the three mounting spacers used, the one on the top screw is different from the other two.
7) The motor can now be slipped out through the hole in the side frame.

4.16   BOTTOM FEED KIT INSTALLATION

In addition to the parts included in the Bottom Feed Kit, some early Model 630 units require a new style one-piece card guide to replace the old two-piece card guide used on those early units (see Fig. 4-22). The new style card guide must be ordered separately, if needed.
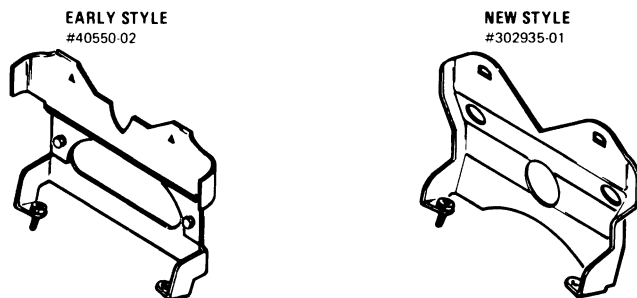
Figure 4-22. CARD GUIDES
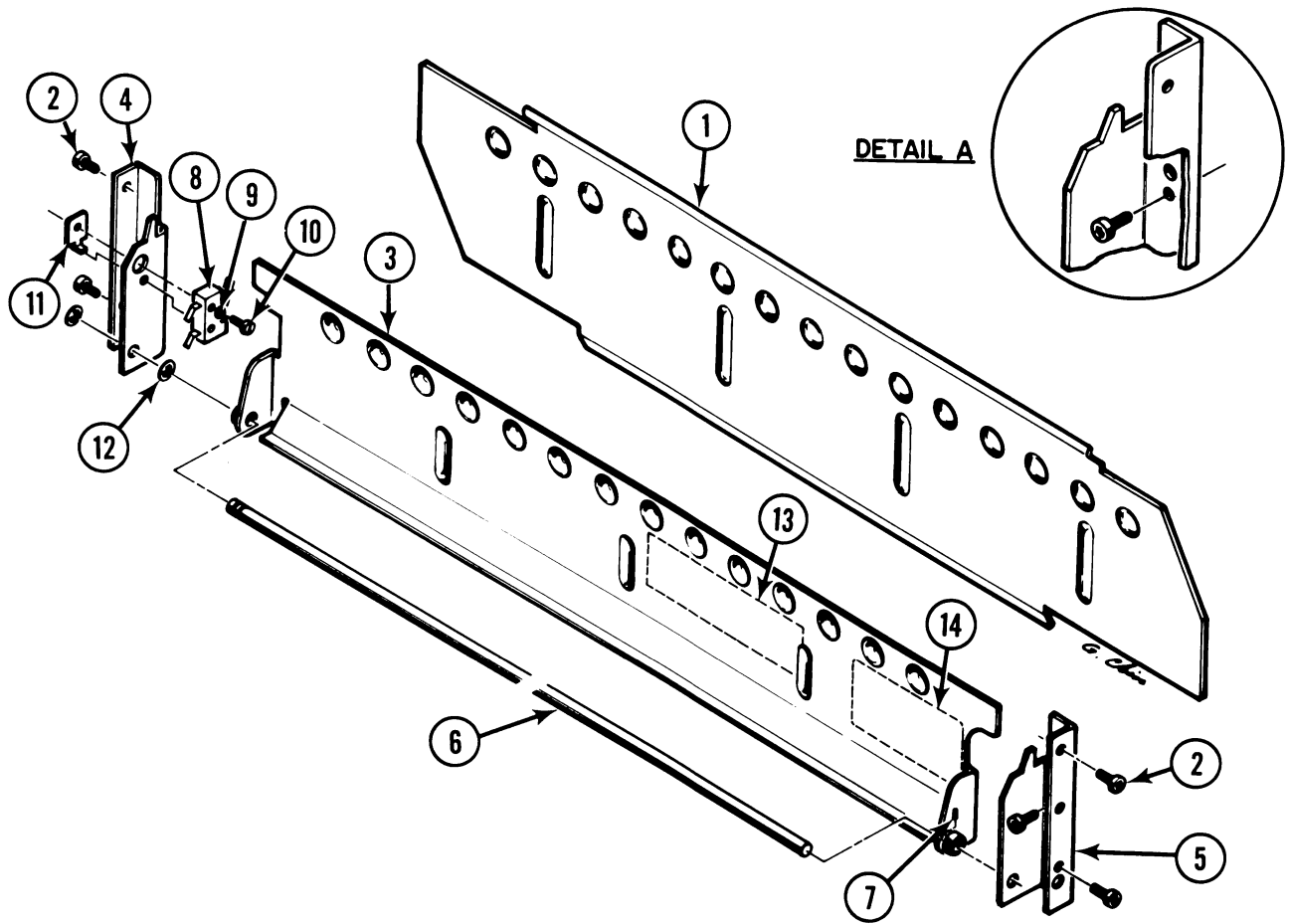
Figure 4-23.   BOTTOM FEED KIT

PARTS LIST:

Item	Description	Qty
1	Rear Plate, Paper Chute	1
2	Screw, 4-40 x .250 Pan Head Torx	6
3	Bail, Paper Chute	1
4	Support Bracket, Left	1
5	Support Bracket, Right	1
6	Shaft, Paper Chute	1
7	Setscrew, 6-32 x .187 Hex Skirt, Cup Point	2
8	Switch, Snap-Action	1
9	Lockwasher, #2	1
10	Screw, 2-56 x .500 Hex Washer Head	1
11	Nut Plate, 2-56	1
12	Retaining Ring	2
13	Warning Label, English	1
14	Warning Label, German	1

Rev A (4/82)

LEFT SUPPORT BRACKET

SUPPORT BRACKET TAB

BPO SWITCH

BPO WIRES

SETSCREW

SWITCH LEVER

REAR PLATE

BAIL

SHAFT
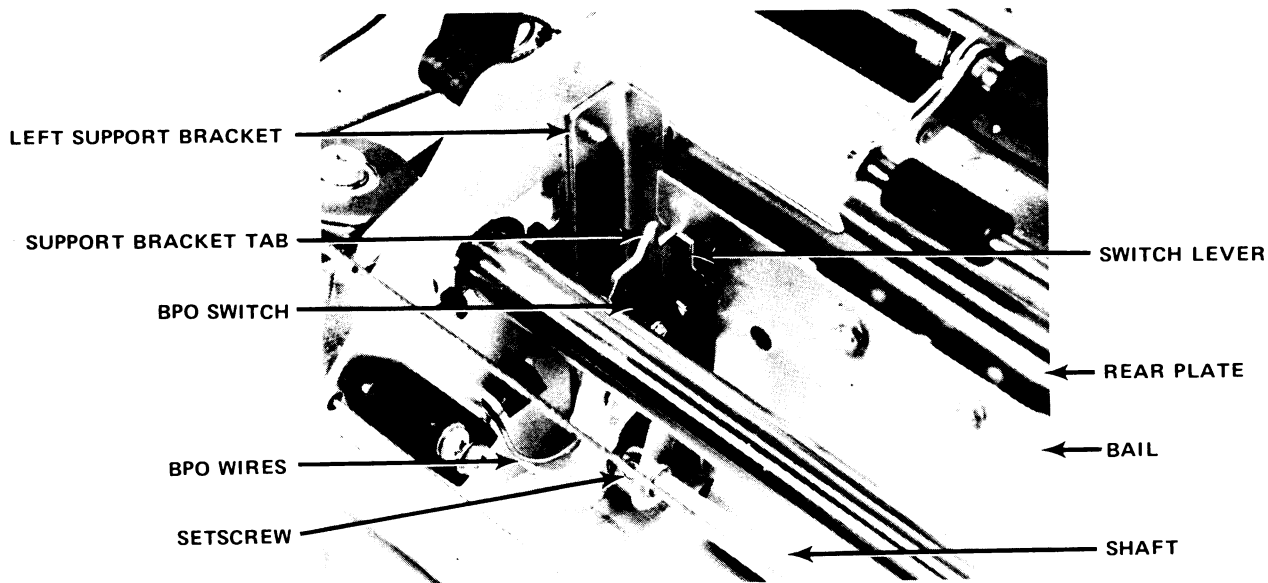
Figure 4-24. BOTTOM FEED ASSEMBLY

1) Check the contents of the Bottom Feed Kit to see that none of the parts are missing (see Figure 4-23 and associated parts list). If any parts are missing, refer to the Model 630 Parts Catalog (Publication No. 90444-XX) for the proper part numbers to order.
2) Unplug the power cord.
3) Remove any paper handling devices.
4) Remove the top cover (4.2).
5) Remove the ribbon, print wheel, platen and paper cradle.
6) Remove the card guide assembly by removing the two screws that fasten it to the rear carriage bearing.
7) Remove the large paper feed idler gear from the paper feed motor assembly.
8) Lift the front of the machine to expose the plate covering the paper feed slot in the bottom pan. Remove the cover plate by removing six screws from the metal cover (early units), or by snapping out the plastic cover (later units).
9) Remove the ribbon cable shield plate located along the left side of the unit (see Fig. 4-25). (Later units do not have this shield plate.)
10) Disconnect the wires from the Top Paper Out (TPO) switch.

Refer to Figures 4-23 and 4-24 during the following steps.
11) Lower the paper chute rear plate (Item 1) into position flat against the printer frame as shown in Figure 4-24. The row of bumps on the plate must be at the top and projecting forward away from the printer frame. The plate rests on the printer frame on either side of the bottom slot. (Note — Installation will be easier with the carriage centered.)
12) Thread the two setscrews (7) part way into the collars on the paper chute bail (3).
13) Assemble the Bottom Paper Out (BPO) switch (8) to the left paper chute support bracket (4) using the new switch, one 2-56 x .500" hex washer head screw, one #2 lockwasher and a nut plate (do not tighten).
14) Thread a 4-40 x .250" Torx screw into the rear-facing hole in both the left and right support brackets, as shown in Detail "A" of Figure 4-23. After the screw has formed threads in the hole, back it out to the point where the screw tip is flush with the surface of the bracket.

SUPPORT BRACKET
MOUNTING SCREWS

BPO WIRES

SHIELD PLATE
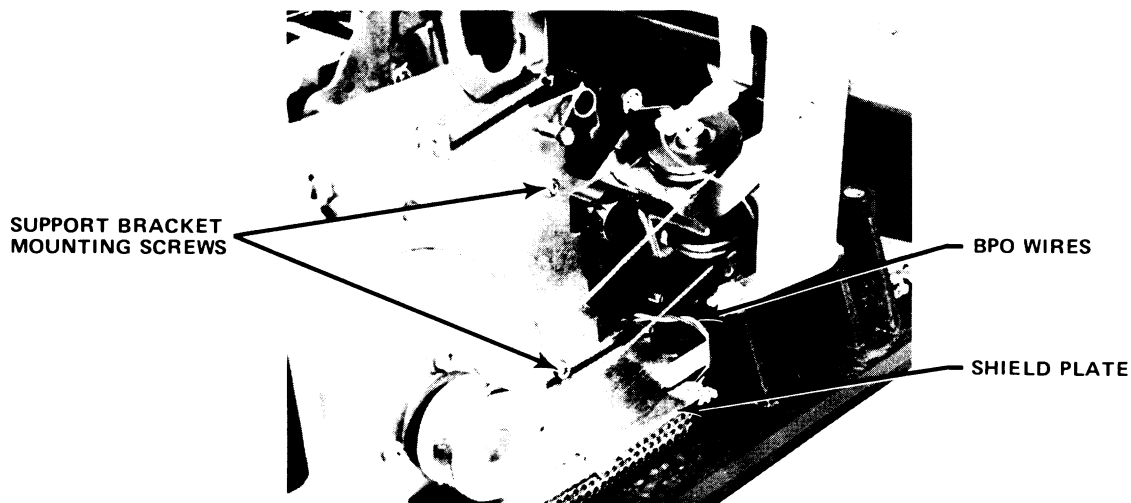
Figure 4-25. ROUTING OF THE BPO SWITCH WIRES

15)   Assemble the bottom paper chute bail (3) to the bottom paper chute shaft (6) and to the left and right support brackets (4 and 5), using the two retaining rings (12) at the left end of the shaft.

16)   Install the bail/support bracket assembly down behind the rear carriage rail, directly in front of the rear plate (do not secure yet).

17)   Center the bail (3) for equal contact against the left and right support bracket tabs (Fig. 4-24), and then tighten the two setscrews (7) to secure the bail to the paper chute shaft.

18)   Route the two wires removed from the TPO switch into the cable trough on the left side of the printer. Pass these wires through the square cutout in the printer frame below the rear carriage rail.

19)   Connect the paper out switch wires to the BPO switch (yellow wire to bottom terminal; brown wire to top terminal).

20)   Reinstall the shield plate over the cable trough, with the paper out switch wires exiting near the same point as the cover open switch wires (Fig. 4-25).

21)   Push the left and right support brackets against the rear plate, and fasten the brackets to the printer frame with two 4-40 x 1/4" Torx drive pan head screws (2) on each bracket.

22)   Thread the rear-pointing screw (Detail "A", Fig. 4-23) into each support bracket so that the tip of the screw pushes the rear plate (1) snugly against the printer frame.

23)   Make sure that the actuator lever of the BPO switch is positioned on the front side of the paper chute bail, so that the switch actuates when the bail swings forward.

24)   Adjust the BPO switch as follows:
         1.   Start with the bail resting against the rear plate, and the BPO switch rocked away from the bail.
         2.   Place a .035" shim between the bail and the BPO switch lever.
         3.   Push the switch toward the bail to the point where the switch actuates.
         4.   Tighten the switch screw.
         5.   Check for positive actuation/deactuation of the BPO switch when a standard sheet of printer paper is passed through the bottom feed paper path.

25) Attach the two warning labels (English and German) onto the front surface of the paper chute bail in the positions shown in Figure 4-23.
26) Install the card guide. This must be the new style one-piece card guide to prevent the card guide from catching the leading edge of the paper during paper feed. The same mounting screws are used for both the old and new style card guides.
27) Install the paper feed idler gear on the paper feed drive motor assembly.
28) Install the paper cradle, platen, print wheel, ribbon, top cover, access cover and any paper handling device removed earlier.
29) Connect the power cord, and apply power.

4.17   WIRE HARNESS REMOVAL

1) Unplug the power cord.
2) Remove the top cover (4.2).
3) Remove the print mechanism (4.9).
4) Remove the wires from the cover open switch and free them from the bracket.
5) Remove the two clips securing the carriage ribbon cable to the bottom pan.
6) Remove the card cage cover and all circuit boards from the card cage (4.4).
7) Remove the four screws securing the card cage housing, and remove the card cage and plastic cable clip that secures the ribbon cable to the bottom pan.
8) Note the orientation of the bracket and then remove the two screws and hold-down bracket securing the circuit board edge connectors.
9) Remove the wire harness.

Installation

1) Route the new harness properly.
2) Mount the circuit board edge connectors in place using the bracket and two screws. (Be sure to reattach any ground strap that was disconnected during removal.)
3) Install the two clips to secure the carriage ribbon cable to the bottom pan.
4) Connect the two wires to the cover open switch, and secure them to the bracket with a cable tie, or with the cable clip if present.
5) Install the card cage housing and plastic cable clip that secures the ribbon cable to the lower case.
6) Install the card cage circuit boards and card cage cover.
7) Install the print mechanism.

4.18.   ACCESSORY PIN FEED PLATEN INSTALLATION

Installation Procedure

1) Remove the top cover (4.2).
2) Remove the friction feed platen, if installed (4.3).
3) Pull the paper bail and the paper release lever forward, toward the front of the unit.
4) Check that the paper cradle (Fig. 4-26) is properly positioned with the retaining forks of the cradle positioned over the locating pins.
5) Grasp the pin feed platen with one hand at each end, with the drive gear located at the righthand end of the platen, and the arm assembly at each end of the platen pointing upward.
6) Depress the platen latches on the printer, and lower the platen into place with the grooved collar at each end of the platen seated in the corresponding notch in the
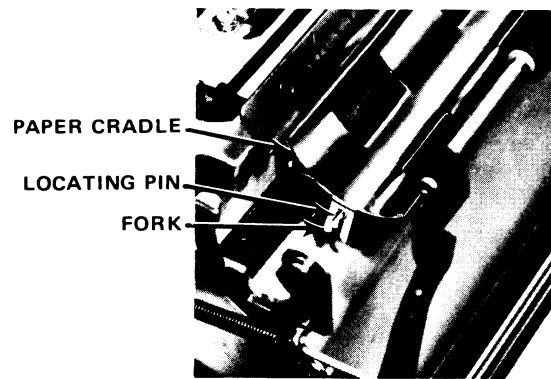
Figure 4-26. PAPER CRADLE
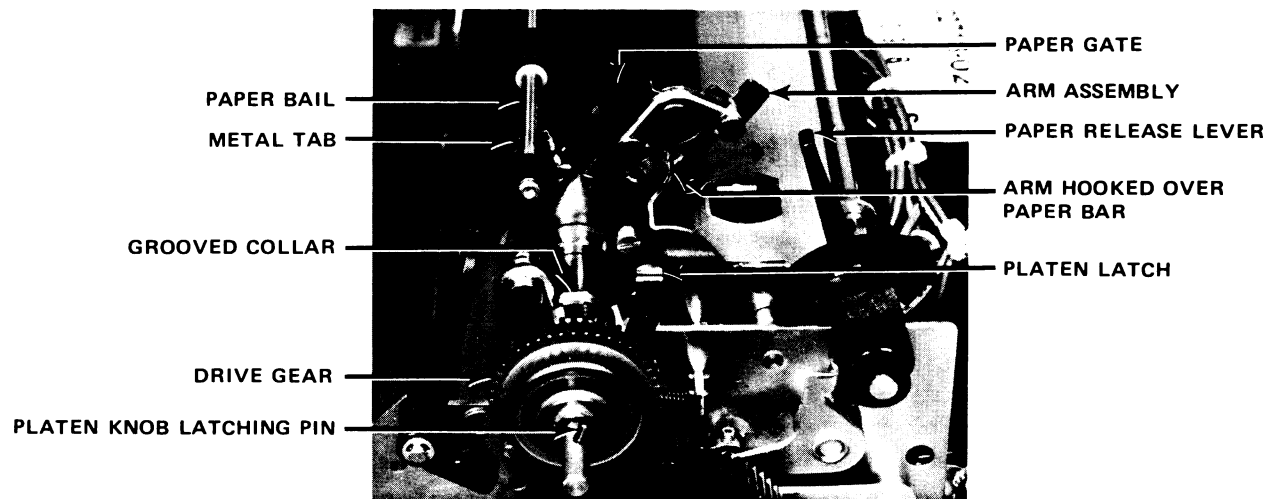
Figure 4-27. PIN FEED PLATEN INSTALLATION

printer side frame. As the platen is being lowered, guide the arm assemblies so that the slot in each arm hooks over the paper bar as shown in Figure 4-27. This locks the arm assemblies into proper position.

7) Release the platen latches, and then rotate the platen in both directions to see if it is clamped firmly in place.

8) Install the top cover and access cover. (The same sound panel is used with both the friction platen and pin feed platen.)

9) Install the platen knob by aligning the slot in the knob with the pin through the platen shaft, and then pushing firmly to latch the knob to the pin.

Loading Paper With The Pin Feed Platen

1) Pull the paper bail forward, away from the platen.
2) Push the paper release lever to its rear position.
3) Lift open the paper gate (Fig. 4-27) at each end of the platen. (The gate will remain open if lifted to its limit.)

4) Insert the leading edge of the paper down behind the paper bar (Fig. 4-27) and platen while manually turning the platen to feed the paper around and up in front of the platen.

5) Pull the paper release lever forward to release the paper. (This is the normal position for this lever when the pin feed platen is being used.)

6) Grasp the leading edge of the paper and pull it further around the platen so the pins on the platen engage the holes along the side edges of the paper. Ensure that the pins at both ends of the platen engage exactly opposite holes along the sides of the paper so that the paper will feed straight when the platen rotates.

7) Close the paper gates to lock the paper onto the feed pins.

8) Push the paper bail rearward. The bail will rest against the metal tab on each of the paper gates on the platen. This holds the bail rollers slightly out away from the platen surface.

ADJUSTMENT PROCEDURES

5.1 GENERAL INFORMATION

5.1.1 Adjustment Prerequisites

Adjustments should be performed on the Model 630 only after all lubrication and disassembly/assembly procedures have been completed. Since there is interaction between some of the adjustments, it is important that they be performed in the proper sequence, as they are presented here. This also is the proper sequence even when the adjustments are only being checked. Any mandatory prerequisites are specified with each adjustment procedure.

To maintain the best possible print quality, maximum usable print wheel life, and maximum reliability of the printer mechanism, the repair technician should make a practice of checking all of the adjustments during each service visit to the machine. On a machine that is not exhibiting any obvious symptoms of maladjustment, the adjustments can be validated quickly by visual and tactile observation. When any parts have been replaced on the mechanical assembly, it is important that all associated adjustments be checked thoroughly and carefully.

5.1.2 Summary of Adjustments

The adjustment procedures are listed below in their proper order.

Table 5-1
SUMMARY OF ADJUSTMENTS

Subsec.	Adjustment	Location	Printing Required
5.2	Platen Clutch and Bearings	On Printer	No
5.3	Paper Release Actuator	Frame Assy.	No
5.4	Top Paper Out	"	No
5.5	Bottom Paper Out	"	No
5.6	Paper Feed Gear Backlash	"	No
5.7	Print Wheel Home	On Carriage Assy.	No
5.8	Print Wheel To Hammer Alignment	"	No
5.9	Hammer Armature	"	No
5.10	Ribbon Height	"	No
5.11	Ribbon Lift (with ribbon lift option)		No
5.12	Card Guide	"	Yes
5.13	Hammer Angle	"	Yes

5.1.3 Conditions For Test And Alignment

Power – Power is to be applied to the printer only when specified while making adjustments. It is used to electrically detent the print wheel and carriage servo motors, to hold the ribbon lift plate in operating position, and for cycling the printer through a RESTORE sequence when required.

<u>Platen</u> - When making adjustments that affect print quality, the platen used should be in good condition and free from wear or defects.

<u>Ribbon</u> - Ribbon adjustments are to be made using a carbon film ribbon cartridge.

<u>Precautions</u> - Always remove the special adjustment tool(s) from the print wheel motor shaft <u>before</u> initiating a RESTORE sequence, to prevent damage to the printer. Also, always ensure that the tool is properly seated prior to making any measurements.

5.1.4   <u>Special Adjustment Tools</u>
Some of the adjustments require special adjustment tools #40795, 40795-02 and 301445-01. (Note: Tool 40795-01 will also serve for any adjustment where tool 40795-02 is specified.) Tool #40796 is shown in subsection 5.9 (Fig. 5-12).

Figure 5-1 identifies the tool features that are used for adjustments on the Model 630. Other features found on these tools, but not identified in Figure 5-1, are used for adjustments on Diablo HyType II printers. The illustration identifies the features by letter-number designators. In the adjustment procedures which call for the use of these tools, the features to be used are specified by these designators.
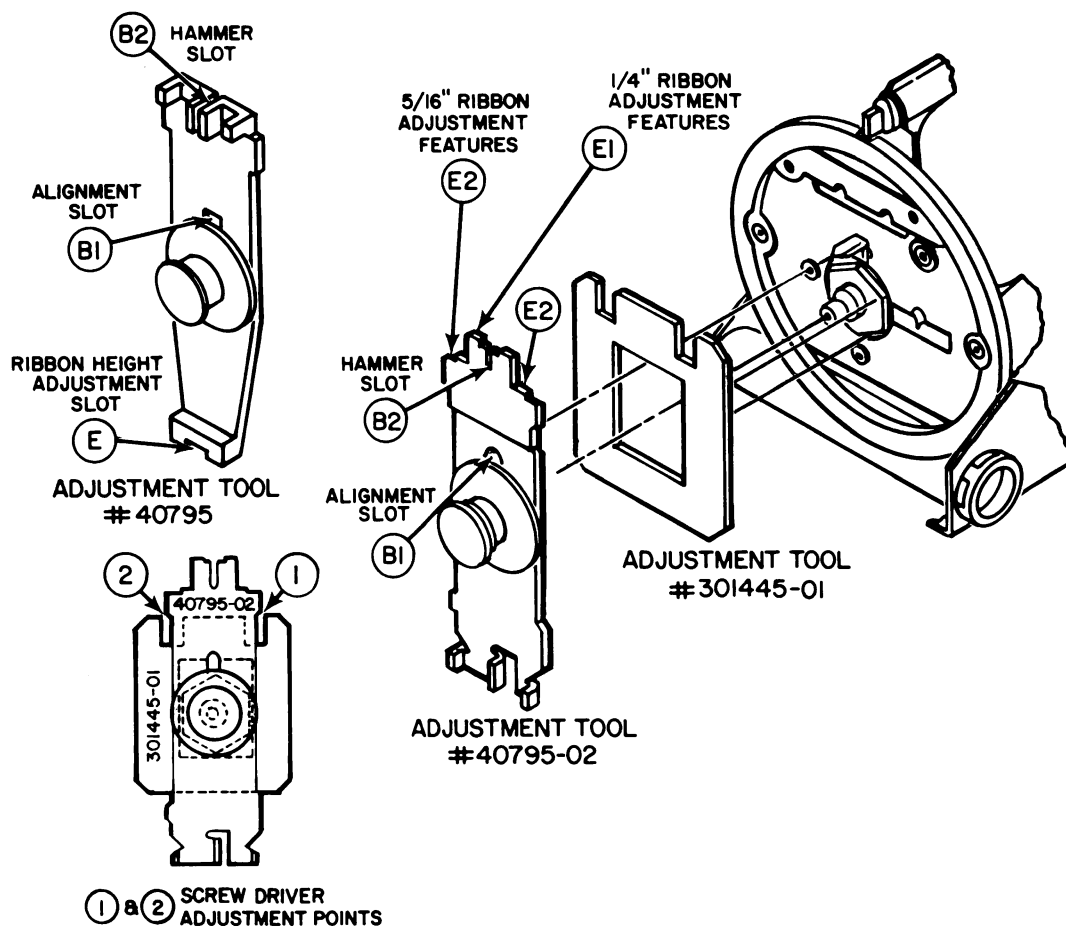
Figure 5-1.   ADJUSTMENT TOOLS 40795, 40795-02 and 301445-01

5.1.5 Print Quality Considerations

Print quality is dependent on several factors, one of which is proper adjustment of the printer. Adjustments to the Model 630 which directly affect print quality are:

> Print Wheel To Hammer Alignment
> Hammer Armature Adjustment
> Ribbon Height
> Card Guide Adjustments
> Hammer Angle Adjustments

Other factors that affect print quality can be controlled entirely by the equipment operator. These factors are thoroughly discussed in a Diablo booklet entitled DIABLO SUPPLIES GUIDE, Publication No. 90071-XX.

Proper assessment of print quality requires that the print samples used for evaluation be obtained under standardized conditions. Therefore, tests should be made with a new print wheel and a multistrike ribbon, on a good grade of standard bond paper, with the multicopy lever on the carriage set for single copy. Print quality testing can be done as follows:

> 1) Print a full line of "H's".
> 2) Compare the test results with the examples shown here, in the following manner:

<div align="center">

H H H H H

(a) (b) (c) (d) (e)

</div>
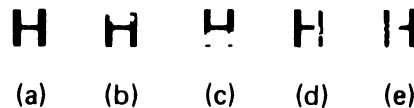
Example (a) –	Impressions similar to this with uniform density and good edge definition indicate proper printer adjustment.
(b) –	Impressions similar to this indicate HAMMER ANGLE adjustment may be required to correct for hammer striking heavier at bottom.
(c) –	Impressions similar to this indicate HAMMER ANGLE adjustment may be required to correct for hammer striking heavier at top.
(d, e) –	Impressions similar to these indicate that a PRINT WHEEL TO HAMMER or HAMMER ANGLE adjustment may be required.

HANG THIS PORTION OVER THE HAMMER GUIDE.

INSERT THIS PORTION BETWEEN THE HAMMER ARMATURE AND HAMMER COIL.

FINE ADJUSTMENT SHIM
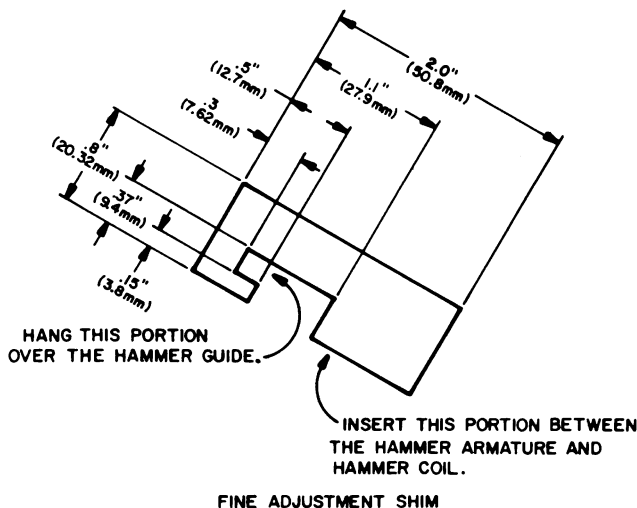
Figure 5-2. FINE ADJUSTMENT SHIM

To fine adjust the print quality, if desired, a .005" plastic shim, as shown in Figure 5-2, can temporarily be placed between the hammer armature and hammer coil. The shim decreases hammer energy significantly. This will in turn amplify nonuniform print density for easy adjustment. Be sure to remove the shim when adjustment is completed.

The fine-adjustment shim may be cut from .005" plastic shim stock (Diablo P/N 41144-07 or equivalent), using the pattern shown. In addition, always use a multistrike carbon film ribbon for print quality adjustments.

5.2   PLATEN CLUTCH ADJUSTMENT and PLATEN BEARING CHECK

Purpose
The Platen Bearing Check will detect unacceptable platen wobble that can prevent proper adjustment of the printer.
The Platen Clutch Adjustment sets the amount of clearance within the platen clutch.

Bearing Check
1)   Remove the access cover and top cover.
2)   Lift the platen out of its mounting slots and position it with its bearing collars resting on top of the closed platen latches.
3)   Spin the platen manually while it is resting on the latches, and visually check for wobble of the platen.   Any wobble indicates that the platen shaft has somehow become bent and must be replaced.   Check also that the platen spins smoothly in its bearings.

Platen Clutch Check
The platen clutch end play should be .003", +/-.001" (.076, +/-.025mm), as shown in Figure 5-3.

Adjustment Procedure
1)   Loosen the setscrews (A) in the platen clutch hub, and adjust the hub on its shaft to obtain the specified dimension.
2)   Tighten the setscrews.

Figure 5-3
PLATEN CLUTCH ADJUSTMENT

.003" ± .001"
(.076 ± .025 mm)
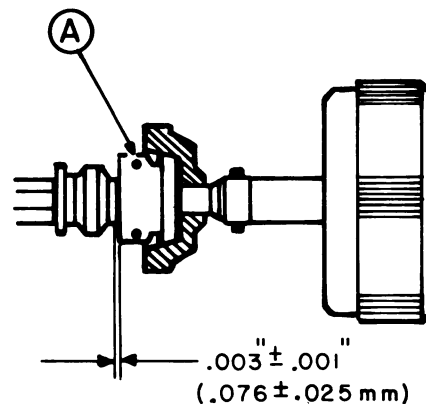
5.3   PAPER RELEASE ACTUATOR ADJUSTMENT

Refer to Figure 5-4.

Purpose
To ensure even and maximum pressure of the pressure rollers against the platen to give even paper movement.

Prerequisites
-    Check for platen wobble (subsection 5.2).
-    The paper release actuator (B) also actuates the top paper out bail actuator (E in Fig. 5-5).   To avoid interference during this adjustment, it may be necessary to loosen the top paper out bail actuator on its shaft, and then readjust it (see 5.4) after this adjustment has been completed.
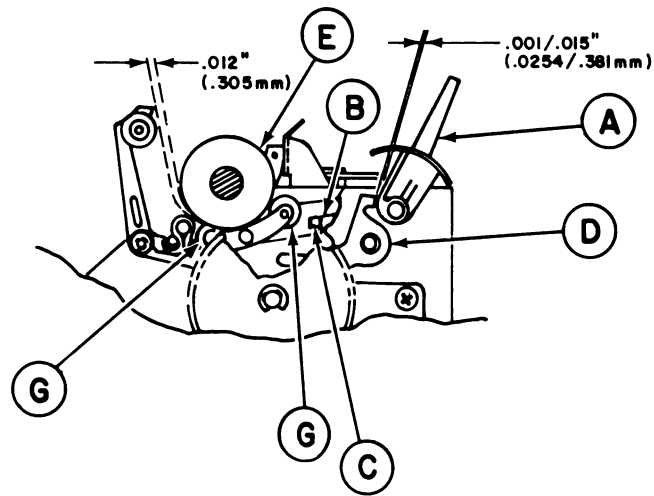
Figure 5-4. PAPER RELEASE ACTUATOR ADJUSTMENT

Adjustment Procedure
With the paper release lever (A) fully forward, the paper feed rollers (G) must clear the platen (E) by at least .070" (1.78mm). The system is adjusted as follows to achieve this:

1) Remove the access cover and top cover.
2) Insert 4 sheets of standard form paper (.012" / .305mm), and move the paper release lever (A) fully rearward.
3) Ensure that the torque shaft arm tab (B) is touching the lower edge of the pressure roller support arm slots (C).
4) Remove the 4 sheets of paper and reinsert 1 sheet. Ensure that the paper release actuator (D) clears the ramp on the paper release lever (A) by .001" to .015" (.025mm to .38mm). Loosen the 2 setscrews securing the actuator, and adjust the actuator to achieve this dimension.
5) Retighten the 2 setscrews.
6) Remove the sheet of paper. Insert a 6" (15.24cm) wide strip of standard form paper (.003" / .076mm thickness) between the platen (E) and each set (3 front and 3 rear) of pressure rollers (G). Check that both the platen and the rollers rotate when the strip is pulled free. If rotation does not occur, the torque shaft arm tab (B) has been pushed down too low, and the paper release actuator (D) should be readjusted.
7) If the top paper out bail actuator has been loosened, readjust it according to subsection 5.4.

5.4   TOP PAPER OUT BAIL AND SWITCH ADJUSTMENT

Purpose
To ensure proper sensing of a paper out condition when using continuous forms paper.

Prerequisites
Subsections 5.2, 5.3.
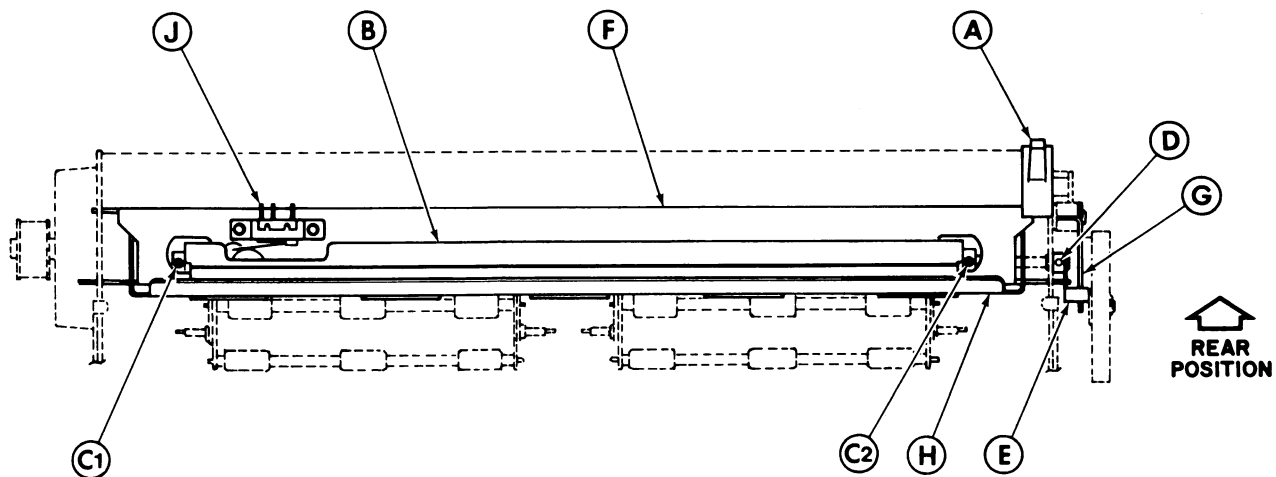
Figure 5-5. TOP PAPER OUT BAIL AND SWITCH ADJUSTMENT

Adjustment Procedure

Refer to Figure 5-5.
1) Remove the access cover and top cover.
2) Set the paper release lever (A) to its forward position.
3) Gently push the top paper out bail (B) forward against the platen. The two ends of the bail should contact the platen simultaneously, within .015" (.38mm), and the tabs on the bail should pass freely through the notches in the paper bar (H).
4) Loosen setscrews (C1) and (C2), and adjust the bail as necessary.
5) Retighten the setscrews.
6) Set the paper release lever (A) to its rear position.
7) Loosen setscrew (D) holding bail actuator (E) to the bail pivot shaft.
8) Rotate the bail actuator (E) so that its tab touches the top edge of the paper release actuator (G). While holding the actuator (E) in this position, adjust the bail (B) for a gap of .005/.035" (.127mm/.889mm) between the rear edge of the bail (B) and the comb (F).
9) Retighten setscrew (D).
10) Set the paper release lever (A) to its forward position.
11) Loosen the two mounting screws holding the top paper out switch (J).
12) Adjust the switch so that it deactuates when the bail (B) approaches to within .060" to .010" (1.5mm to .254mm) of the platen, as measured from either end of the bail.
13) Retighten setscrew (D).

5.5 BOTTOM PAPER OUT BAIL AND SWITCH ADJUSTMENT

Purpose
To ensure proper sensing of a paper out condition when using continuous forms paper with bottom feed.

Adjustment Procedure

Refer to Figure 5-6.
1) Remove the access cover and top cover.
2) Check to see that the bail is centered for equal contact against the tabs on the support brackets at both ends of the bail. If adjustment is necessary, loosen the

Rev A (4/82)
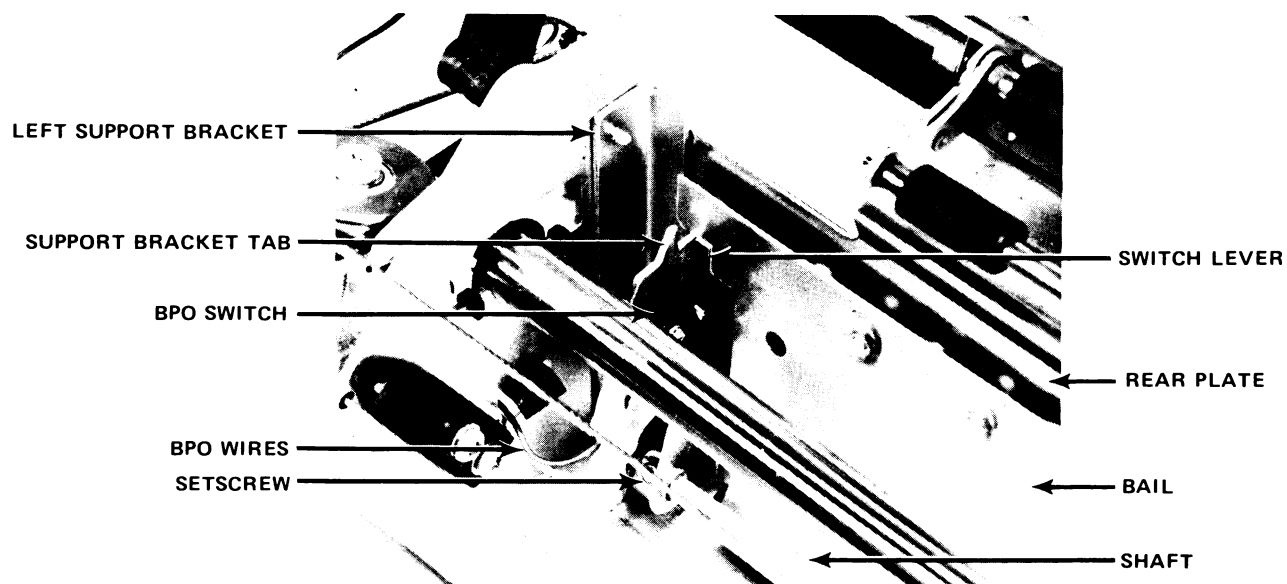
Figure 5-6. BOTTOM PAPER OUT BAIL AND SWITCH ADJUSTMENT

two setscrews holding the bail to the the paper bail shaft, slide the bail to its proper position, and then retighten the setscrews.

3) Check for positive actuation/deactuation of the BPO switch when a standard sheet of printer paper is passed through the bottom feed paper path.

If adjustment of the switch appears necessary, proceed as follows while referring to Figure 5-6.

4) Slightly loosen the screw/s holding the BPO switch. (Early versions use two screws.)
5) Start with the bail resting against the rear plate, and the BPO switch rocked away from the bail.
6) Place a .035" shim between the bail and the BPO switch lever.
7) Push the switch toward the bail to the point where the switch actuates.
8) Tighten the switch screw/s.
9) Check again for proper operation of the switch when a sheet of paper is passed through the bottom feed paper path.

5.6   PAPER FEED GEAR BACKLASH ADJUSTMENTS

Purpose
To prevent binding or excessive backlash of the paper feed gear train, and thus ensure consistent vertical print registration.

Prerequisites
Subsections 5.2, 5.3 and 5.4.

Adjustment Procedure
Refer to Figure 5-7.
1) Remove the access cover, top cover and platen.
2) On the inner side of idler gear (C), slightly loosen the locking nut that locks idler gear eccentric (E).
3) Turn idler gear eccentric (E) clockwise to move idler gear (C) away from motor pinion gear (A).
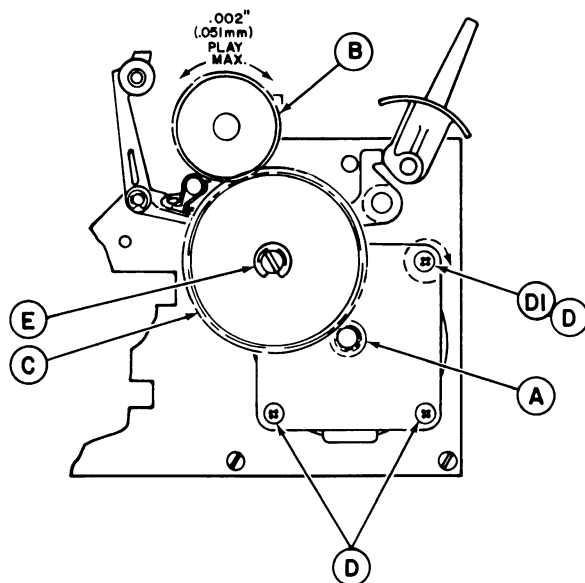
Figure 5-7. PAPER FEED GEAR ADJUSTMENTS

4) Move pinion gear (A) in and out (not side-to-side). While moving the pinion gear, rotate idler gear eccentric (E) counterclockwise until idler gear (C) starts to move with pinion gear (A). Back off (clockwise) on eccentric (E) to the point where the idler gear just stops moving.
5) Carefully tighten the locking nut on the inner side of idler gear (C).
6) Loosen the paper feed motor mounting screws (D).
7) Install the platen.
8) Rotate the paper feed motor clockwise around mounting screw (D1) until idler gear (C) and platen drive gear (B) can be held tightly together by hand.
9) While holding gears (B) and (C) together with one hand, tighten screws (D).

5.7   PRINT WHEEL HOME

Purpose
During print wheel seeks, the print wheel is allowed to stop, or "detent", only at a precise position in alignment with each print wheel spoke. If, during a Restore sequence, the print wheel fails to stop at this position, the print wheel logic will initiate a print wheel seek retry. If the print wheel logic is unable to obtain the correct condition after 8 consecutive retries, it will issue a CHECK command to stop the printer. This situation normally indicates that a "print wheel home" adjustment is needed.

Check Procedure

1) Remove the ribbon cartridge, and tilt the print wheel motor forward away from the platen.
2) Initiate a Restore sequence, and verify that the correct "home" character has been positioned squarely in front of the print hammer. Home characters for the various types of print wheels are:

    Plastic 96   =   w
    Metal 88   =   90° vertical flag notch
    Metal 92   =   90° vertical flag notch
    Metal 96 – Xerox   =   Character at spoke position 0
    Metal 96 – Diablo =   Character at spoke position 0

If the "home" character is displaced <u>less than</u> one character width, perform Print Wheel to Hammer Alignment (subsection 5.8).

If the "home" character is displaced <u>one full character</u> position, perform the "print wheel home" adjustment procedure outlined below.

If the "home" character is displaced <u>more than</u> one full character position, perform <u>both</u> the print wheel alignment and the home position alignment procedures. In this event, perform the wheel alignment first.

Adjustment Procedure

This procedure requires the use of the Model 630 PCB Extender Kit and an oscilloscope.

NOTE: The following procedure uses Test 30 in the self-test mode of the Model 630 HPRO5 to generate continuous print wheel restore cycles and thus facilitate the adjustment. For other versions of the Model 630, it will be necessary to produce repeated print wheel restore cycles by means of the host system software.

1) Turn off the AC power to the Model 630.
2) Remove the access cover, top cover and card cage shield.
3) Mount the PCE (PPI or SPI) circuit board on the PCB Extender.
4) Set up the oscilloscope as follows:

    <u>Channel 1:</u>   2V/Div Vertical
                 Connect Probe to J3-48 (-PW HOME) on the PCE (PPI or SPI)
                        circuit board

    <u>Channel 2:</u>   2V/Div Vertical
                 Connect Probe to J3-47 (+PW EVEN) on the PCE (PPI or SPI)
                        circuit board

    <u>Trigger:</u>   Channel 1, negative slope

    <u>Horizontal Sweep:</u>   100 usec/Div

5) For HPRO5 units, set the unit for Self-Test mode and apply AC power.
   (Note: The cover open switch must be defeated.)
6) For HPRO5 units, select and start Test 30 – Print Wheel Restore.
   For other Model 630 versions, apply AC power, and initiate continuous print wheel restore cycles by means of the host system software.

7) Using a 7/16" open-end wrench, adjust the home sensor eccentric (Item A, Figure 5-8) to obtain the timing relationship shown in Figure 5-9. The negative edge of -PW HOME should occur at the midpoint of a +PW EVEN high period.

NOTE: To avoid requiring a delayed-sweep oscilloscope for this adjustment, it is necessary to trigger the scope on the same signal edge that is used as the adjustment reference point (see Fig. 5-9). It is imperative that the scope be accurately triggered. Also, closely check the time span of one of the complete +PW EVEN pulses in the display so that the adjustment reference point (starting point of scope sweep at left edge of the display) can be accurately adjusted to coincide with the midpoint of a +PW EVEN high period, as shown in Figure 5-9.
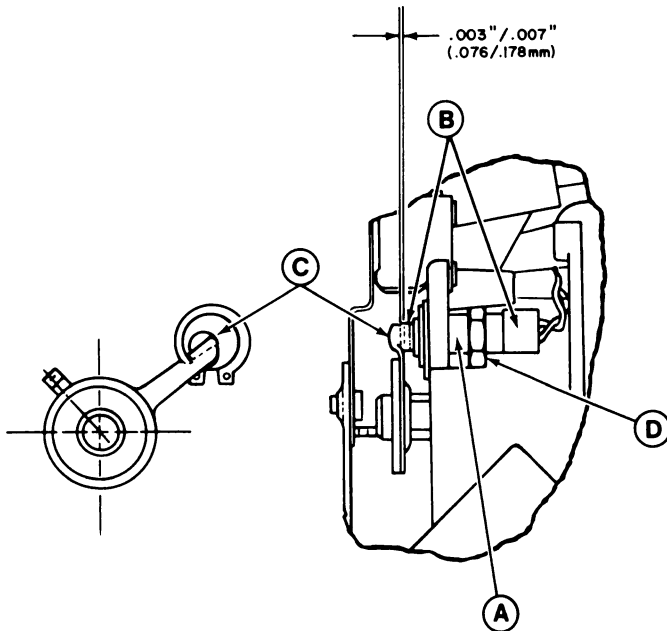
Figure 5-8.
PRINT WHEEL HOME ALIGNMENT.
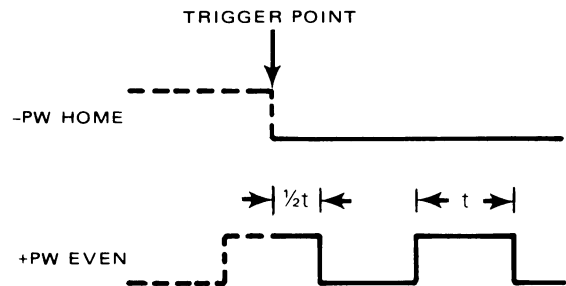
Figure 5-9.
PRINT WHEEL HOME
ADJUSTMENT WAVEFORMS

Refer to Figure 5-8.
8) If the print wheel spins continuously (8 revolutions), the sensor (B) may be located too far from the print wheel home sensor flag (C). In this case, loosen nut (D) with a 5/16" open-end wrench, and rotate the sensor clockwise until the print wheel stops.
9) Use a plastic shim to verify .003" to .007" (.076mm to .178mm) clearance between the surface of the sensor and the edge of the flag.
10) Retighten nut (D).

Figure 5-10.
PRINT WHEEL HOME SENSOR WAVEFORM
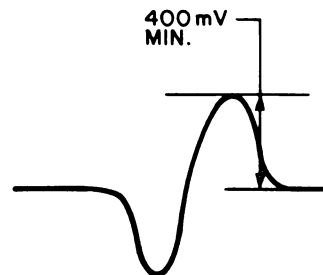
11) The electrical signal out of the sensor should be at least 400mV peak. Figure 5-10 illustrates this signal as seen at terminal J3-13 on the SCE circuit board.

5.8   PRINT WHEEL TO HAMMER ALIGNMENT

Purpose
To set mechanical alignment of print wheel spoke to hammer position.

Adjustment Procedure
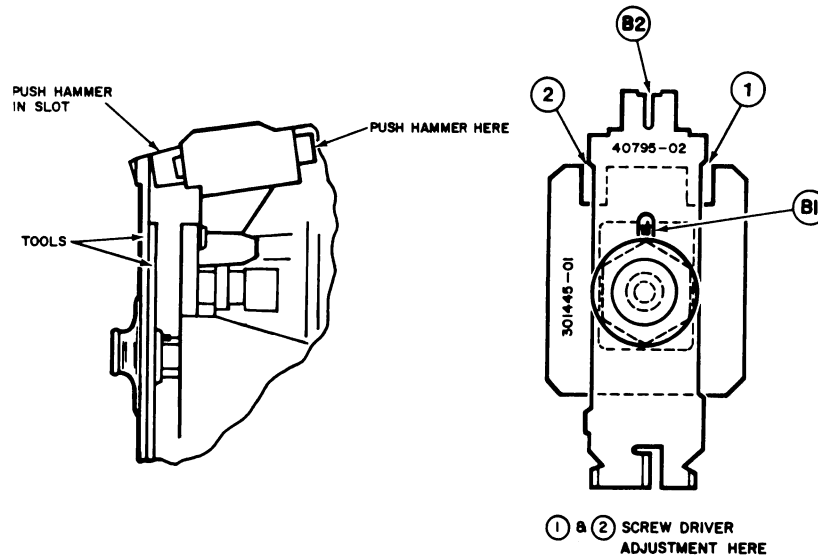
Figure 5-11.   PRINT WHEEL TO HAMMER ALIGNMENT

Refer to Figures 5-11 and 5-1.

1) Remove the paper, ribbon and print wheel from the printer.
2) Apply power to the printer, and allow it to complete its RESTORE sequence.
3) Install Adjustment Tool 301445-01 over the nut on the front of the print wheel hub as shown in Figure 5-11.
4) Install Adjustment Tool 40795, 40795-01 or 40795-02 firmly on the print wheel motor hub and ensure that it is properly seated with its alignment slot (B1) engaged over the tab on the hub's alignment plate.
5) Rotate the alignment tool to bring its hammer slot (B2) in front of the print hammer.
6) Push lightly against the carriage to activate the carriage and print wheel servos, and thereby detent the print wheel motor.
   NOTE: This means of detenting the print wheel motor will not work with the Model 630 SPI, and possibly some other versions of the Model 630. Two other means of activating print wheel detent are as follows:
   1 -   SCE assemblies 302690-10 and below have a jumper plug at location F12. When this jumper is removed, the print wheel is detented.
   2 -   SCE assemblies 302690-11 and above do not have jumper F12. In this case, mount the SCE board on Extender board #320048-02. This extender board has a switch to open the -PW SMD line (pin 51 on J3) and cause print wheel detent.

7) With the print wheel detented, manually push the print hammer gently toward the alignment tool until its face enters the tool's hammer slot (B2). If the hammer face slides easily into the slot without contacting the sides of the slot, print wheel to hammer alignment is correct. If the hammer contacts the sides of the slot, or will not enter the slot at all, continue with this procedure.

8) Place the tip of a blade screwdriver in either of points 1 or 2. The screwdriver may then be twisted to move the alignment plate in relation to the print wheel hub to achieve proper alignment.

NOTE: If adjustment of the alignment plate was required, it will be necessary also to check the Print Wheel Home adjustment (subsection 5.7).

5.9   HAMMER ARMATURE ADJUSTMENT

Purpose
To obtain proper hammer striking force.

Prerequisites
Subsections 5.2, 5.7 and 5.8.
Also verify that the platen is in good condition and free of surface defects. If this is to be an adjustment for high print quality, it is advisable that a new platen be installed (even if only temporarily).
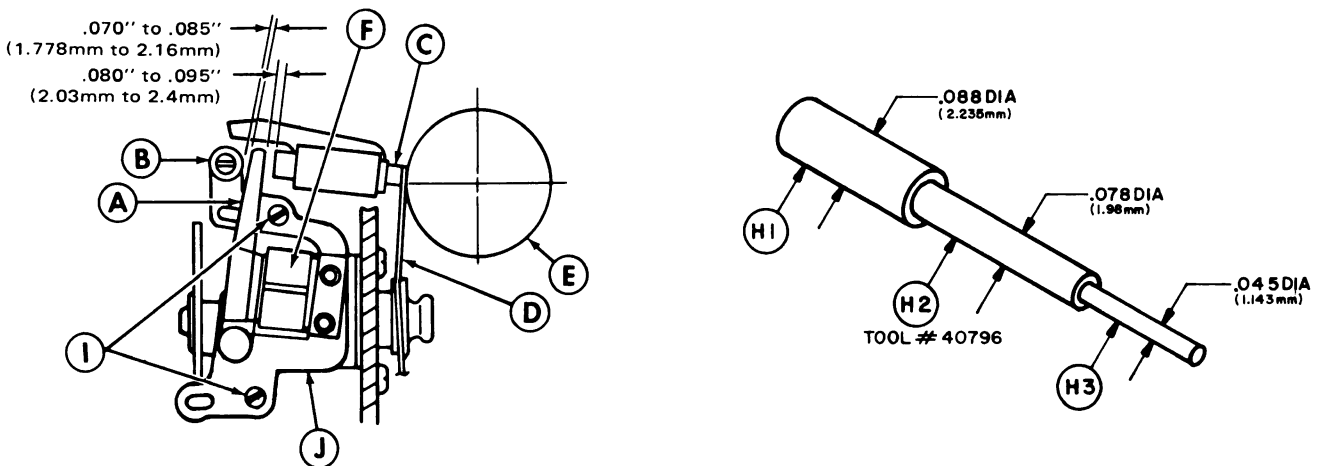
Figure 5-12.   HAMMER ARMATURE ADJUSTMENTS AND ADJUSTMENT TOOL

Adjustment Procedure

NOTE: This adjustment is performed with a metal print wheel installed on the printer.

Refer to Figure 5-12.
1) Turn off power to the printer.
2) Remove access cover, ribbon, print wheel shield, print wheel and paper.
3) Hold the hammer armature (A) against the hammer coils (F), and check for no gap between the armature and coils.

4) While continuing to hold the hammer armature against the hammer coils, insert adjustment tool 40796 section H2 between the armature (A) and the armature stop eccentric (B). Adjust the eccentric (B) as necessary for a very light resistance to passage of the tool when slid along the side of the armature past the eccentric.

5) Set the multicopy lever on the carriage to its UP position.

6) Rotate the print wheel manually to position one of the larger characters (M, W, E, etc.) in front of the print hammer. (NOTE: If this is to be an adjustment for high print quality, it is advisable that a new print wheel be used, even if only temporarily).

7) Insert Adjustment Tool 40796 section H1 between the armature (A) and the anvil end of the print hammer (C). With the tool in place, lightly press in on the armature (A) until it stops against the hammer coils (F). This will drive the print hammer (C) in to nestle the selected print wheel petal (D) lightly against the platen (E). Gently rock the print wheel slightly back and forth, and verify that the petal can move with a very light drag. Repeat this check while rotating the platen and moving the carriage each time until the entire printing surface condition has been checked.

If adjustment is needed, loosen screws (I) and adjust the print hammer armature assembly (J) to achieve best hammer to platen dimensions. Retighten screws (I).

5.10   RIBBON HEIGHT ADJUSTMENT

The ribbon height adjustment procedure varies slightly depending on the following factors:

- Design level of the adjustment tool
- Ribbon width (1/4" or 5/16")
- Whether or not optional ribbon lift feature is installed

Purpose
To obtain proper height of the ribbon in relation to the level of the print line.

Prerequisites
On units equipped with the ribbon lift option, check the ribbon lift adjustment (5.11) before adjusting ribbon height. Since ribbon height and ribbon lift interact, if the setting of either of these is changed, the other one must be checked.

Check - Using Adjustment Tool 40795 (1/4" ribbons only)
Refer to Figure 5-13A.
1) Remove the access cover, print wheel shield, ribbon cartridge and print wheel.
2) Install the 40795 adjustment tool on the hub of the print wheel motor shaft, and rotate the tool to bring the ribbon height adjustment feature (E) to the top.
3) Tilt the print wheel motor into operating position, and install a multistrike carbon film ribbon cartridge.
4) Push up on the ribbon base plate tab "X" so the TOP edge of the exposed ribbon is brought near the top of the tool. (NOTE: In units without optional ribbon lift, the ribbon base plate is permanently fixed in the raised position.)
The top edge of the ribbon should be visible within the slot, as shown in Figure 5-13A.

<u>Check</u> - Using Adjustment Tool 40795-01/-02   (1/4" or 5/16" ribbons)
Refer to Figure 5-13B.
1) Remove the access cover, print wheel shield, ribbon cartridge and print wheel.
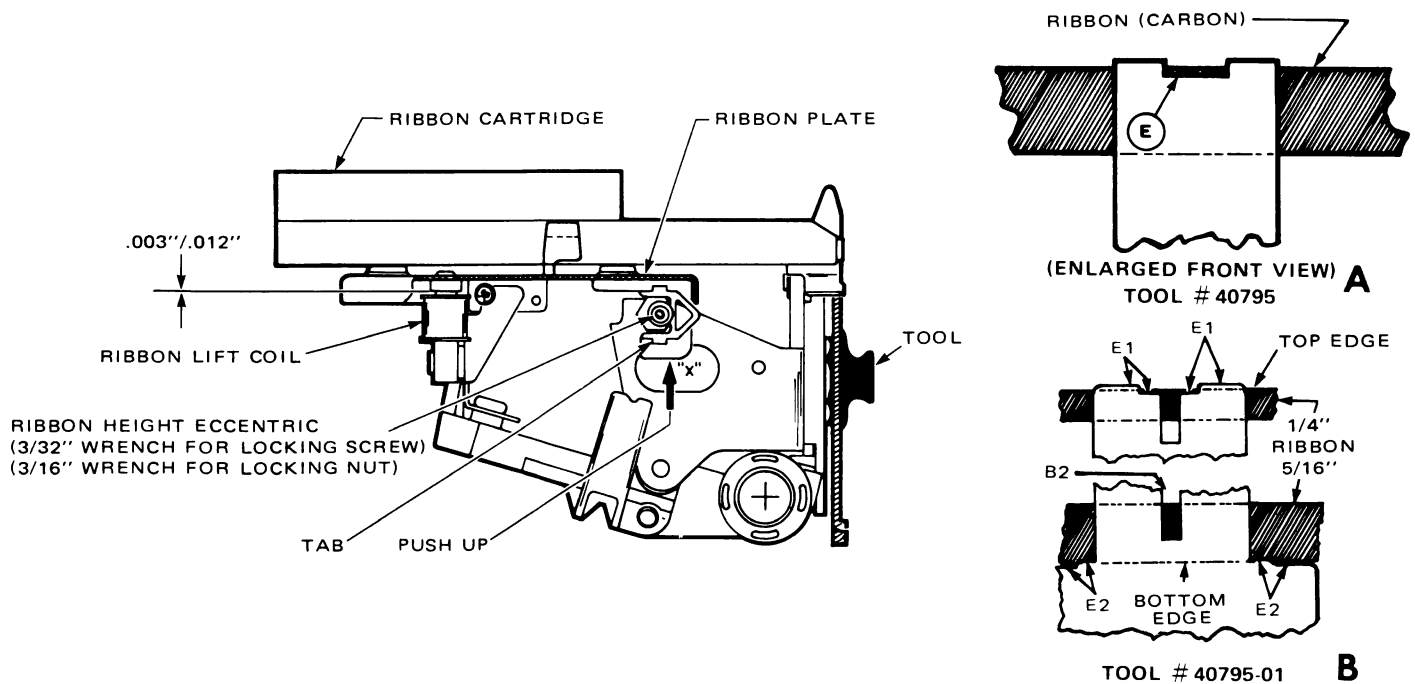
Figure 5-13. RIBBON HEIGHT ADJUSTMENT

2) Install the 40795-01 or -02 adjustment tool on the hub of the print wheel motor shaft, and rotate the tool to bring its hammer adjustment slot feature (B2) to the top.
3) Tilt the print wheel motor into operating position, and install a multistrike carbon film ribbon cartridge.
4) Push up on the ribbon base plate tab "X" so that the tab is held against the ribbon height eccentric.   (NOTE: In units without optional ribbon lift, the ribbon base plate is permanently fixed in the raised position.)
5) Check the position of the exposed portion of the ribbon for proper height adjustment as follows:

        1/4" ribbons -   The TOP edge of the ribbon must appear between the high and low planes of tool features (E1).
        5/16" ribbons -   The BOTTOM edge of the ribbon must appear between the high and low planes of tool features (E2).

<u>Adjustment Procedure</u>
1) Loosen the ribbon height eccentric locking screw (or nut), and adjust the eccentric as required to set the ribbon at the proper level. (The screw version requires a 3/32" hex wrench; the nut version requires a 3/16" nut driver.)
2) Retighten the locking screw (or nut).
3) Remove the ribbon cartridge and tool.   Replace the print wheel, print wheel shield and the operating ribbon cartridge.
4) If this unit is equipped with the ribbon lift option, check the ribbon lift adjustment (5.11).

5.11   RIBBON LIFT ADJUSTMENT   (Units with Ribbon Lift option)

Purpose
To properly set the position of the ribbon lift coils in relation to the ribbon base plate pole piece.

Prerequisites
Since ribbon height and ribbon lift interact, if the setting of either of these is changed, the setting of the other one must be checked.

Check
Refer to Figure 5-13.
1) Remove the access cover and ribbon cartridge.
2) Push up on the ribbon base plate tab (X) so that the tab firmly contacts the ribbon height eccentric.
3) Check for .005" to .012" (0.12 to 0.30mm) gap between the ribbon lift coil laminations and the ribbon base plate pole piece.

Adjustment Procedure
Refer to Figure 5-13.
1) Loosen the two ribbon lift coil mounting screws.
2) Place a .005" plastic shim between the ribbon lift coil laminations and ribbon base plate pole piece.
3) Push up on the ribbon base plate tab (X) so that the tab firmly contacts the ribbon height eccentric.
4) Raise the ribbon lift coils so that the coil laminations are firmly and evenly seated against the shim and pole piece.
5) Retighten the coil mounting screws, and remove the shim.
6) Recheck the ribbon height adjustment (5.10). If ribbon height is readjusted, the ribbon lift adjustment must be checked again.

5.12   CARD GUIDE ADJUSTMENTS

These adjustment procedures apply to the 2-piece card guide assembly originally used on the Model 630. The 1-piece card guide presently being used is designed to meet the same specifications without the need for adjustments. (See Fig. 5-14.)

EARLY STYLE
#40550-02

NEW STYLE
#302935-01
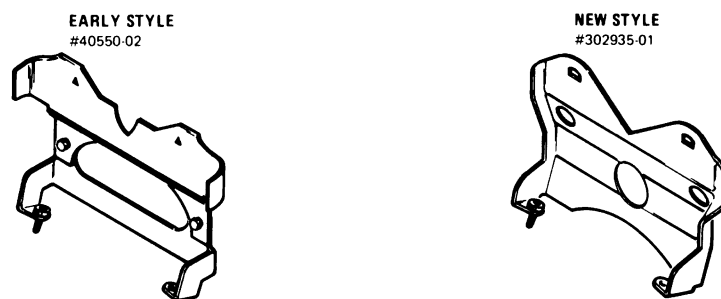
Figure 5-14.   CARD GUIDES

Purpose
To ensure that the card guide does not interfere with ribbon movement or the leading edge of the paper.

Adjustment Procedure - Card Guide Height
Refer to Figure 5-15A.
1) Print a line of E's.
2) Remove the access cover.
3) Without rotating the platen, move the carriage to the left until characters are visible through both triangular openings in the card guide as shown.
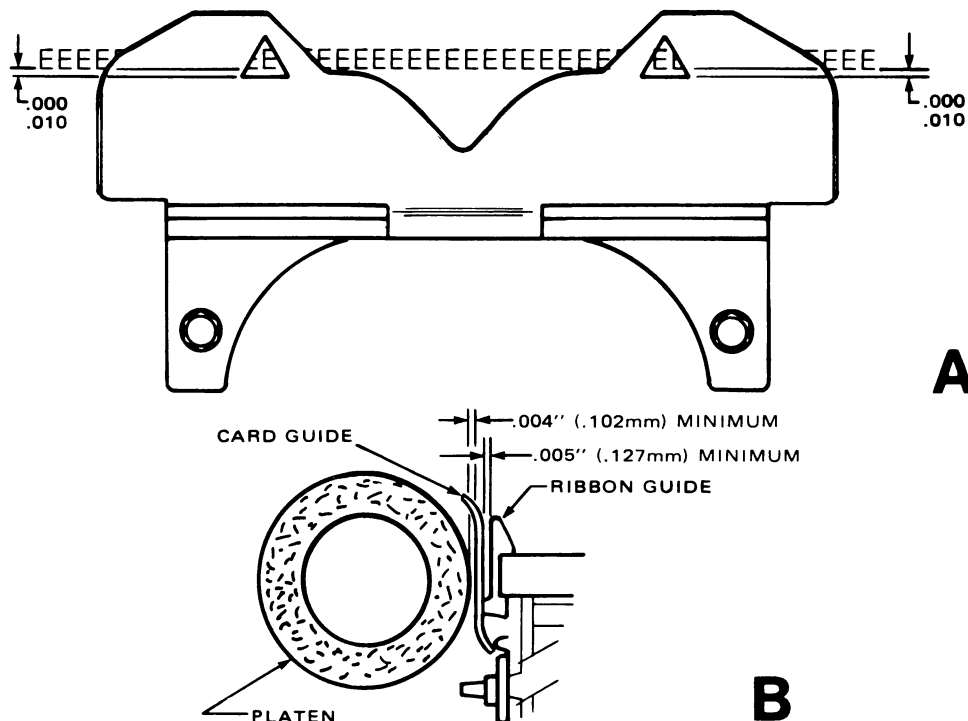
Figure 5-15. CARD GUIDE ADJUSTMENTS

4) The gap between the bottom of the characters and the bottom of each opening must be within the range .000" to .015" (.000mm to .381mm).
5) If adjustment is required, remove the ribbon, print wheel shield, and print wheel; then loosen the two 3/16" card guide mounting screws, and raise or lower the card guide to achieve the specified dimension.
6) Retighten the mounting screws.

Adjustment Procedure - Card Guide Clearance
Refer to Figure 5-15B.
1) Using a .005" plastic shim, check for no-drag shim clearance between the card guide and the ribbon guide posts on both sides of the carriage. Normally this dimension is set by the depth of the ribbon guide post tabs. Shim drag indicates that the card guide has become tilted, in which case its support arms should be gently reformed to achieve proper ribbon post clearance.
2) Using the .005" plastic shim, check for no-drag clearance between the card guide and the platen along the full length of the platen.

5.13   HAMMER ANGLE ADJUSTMENTS

CAUTION: These are very sensitive adjustments, carefully set at the factory.   These adjustments should be changed only after thorough evaluation of the print quality strongly indicates that adjustment is necessary, and after all prerequisite adjustments have first been made.

Purpose
To correct for shading of printed characters, either top-to-bottom or side-to-side, caused by changes in the adjustments.

Prerequisites
Subsections 5.8 and 5.9.

Check
1)   Print a line of "H's", using the largest print font available.
2)   Visually check for shading of the printed characters.

Adjustment Procedure - To correct top-to-bottom shading

Refer to Figure 5-16.
1)   Loosen screws (A) slightly on both sides of the hammer guide.
2)   Using a small screwdriver in eccentric slot (B), adjust the hammer pitch angle.
3)   Tighten screws (A).
4)   Repeat the Check and this Adjustment Procedure until top-to-bottom shading is eliminated.
5)   Check Print Wheel To Hammer Alignment (5.8) and Hammer Armature Adjustment (5.9).
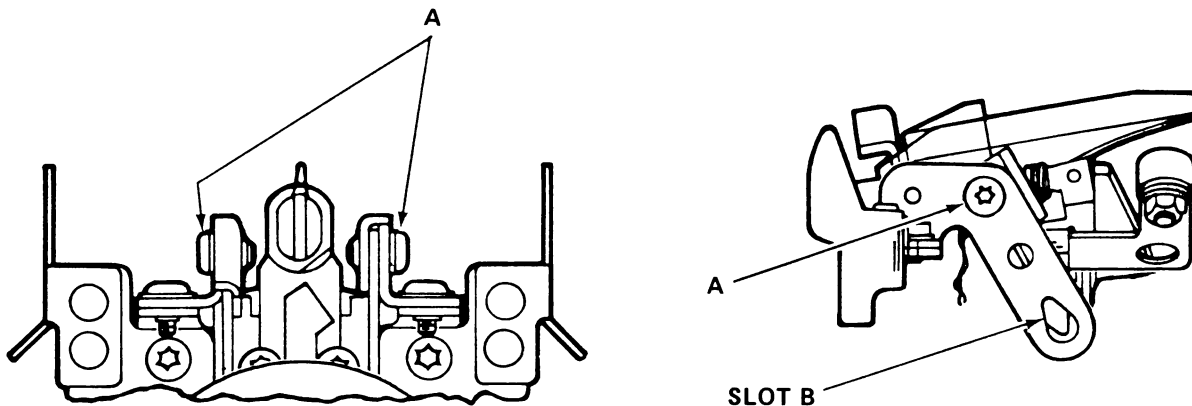
Figure 5-16.   PRINT HAMMER TOP-TO-BOTTOM ADJUSTMENT

Adjustment Procedure - To correct side-to-side shading

Refer to Figure 5-17.
1)   Loosen screws (C) on each side of the hammer adjustment bracket.
2)   Using a small screwdriver in slot (D), adjust the hammer azimuth angle.
3)   Tighten screws (C).

4) Repeat the Check and this Adjustment Procedure until side-to-side shading is eliminated.

5) Check Print Wheel to Hammer Alignment (5.8) and Hammer Armature Adjustment (5.9).
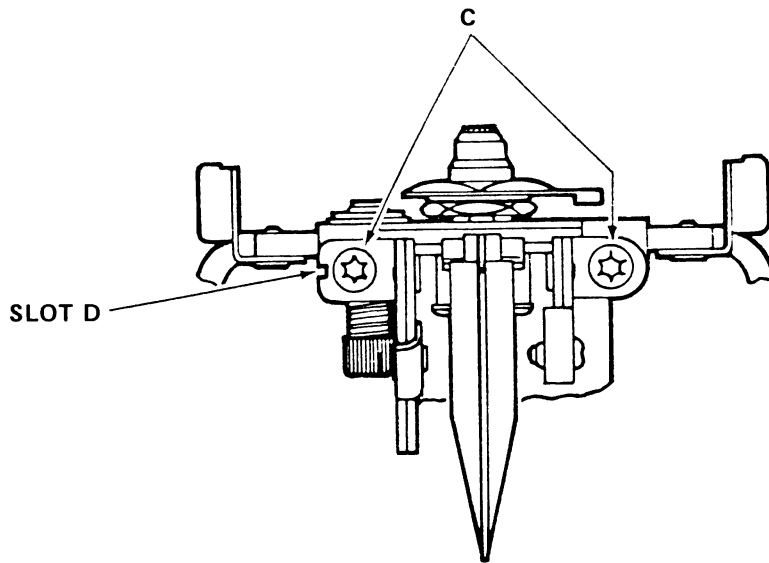
Figure 5-17. PRINT HAMMER SIDE-TO-SIDE ADJUSTMENT

MAJOR SUBASSEMBLY REPLACEMENT PARTS

6.1   GENERAL INFORMATION

This Section contains a basic breakdown only of the major subassemblies of the Model 630 Printers/Terminals.   For a detailed parts breakdown, refer to Diablo Publication No. 90444-XX, Model 630 Parts Catalog.
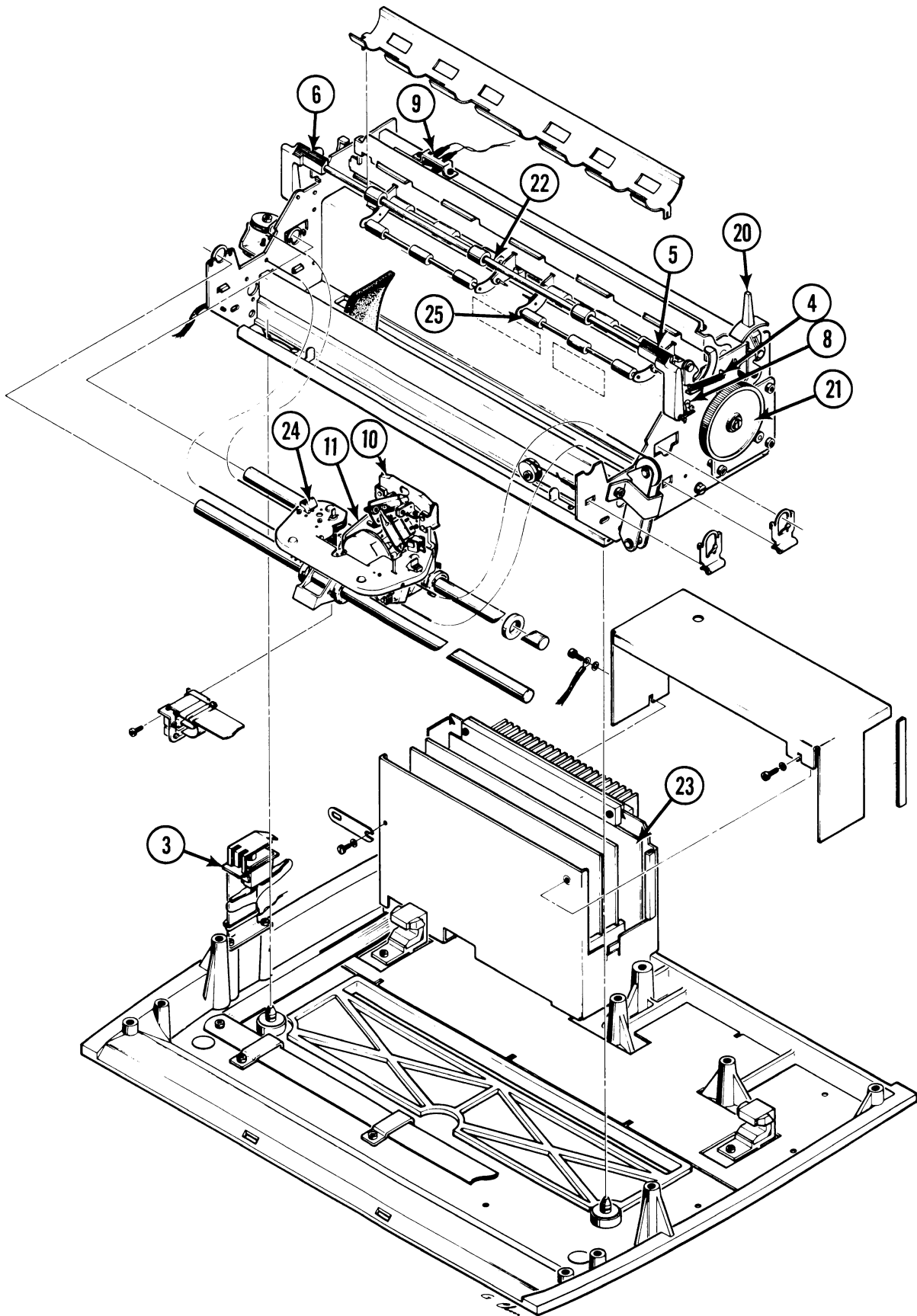
6.2   MODEL 630 MAJOR SUBASSEMBLIES

Item	Part No.	Description
1*	100043-01	Switch, Power
2*	100398-01	Jumper, Socket Plug
3	10961	Switch, Interlock
4	20424	Spring, Platen Latch
5	24074-02	Bail Arm, Right
6	24076-02	Bail Arm, Left
7*	24075-03	Platen Assembly
8	24088-01	Spring, Bail Arm
9	24436-04	Switch, Snap Action
10	301416-01	Shield, Print Wheel
11	302500-03S	Carriage Assembly, with Ribbon Lift
	302500-04S	Carriage Assembly, without Ribbon Lift
12*	302640-02	Carriage Motor Assembly
13*	302659-01	Knob, Platen
14*	302736-02	I/O Interface Cable
15*	302825-20	Power Supply Assembly, 120 Vac (Note 3)
16*	302906-04	EIA Cable Assembly, 25 Ft.
	302906-05	EIA Cable Assembly, 50 Ft.
	152S24160	EIA Cable Assembly, 10 Ft.
17*	302935-01	Card Guide
18*	302945-06S	Control Panel Assembly, 7-Switch
	302945-07S	Control Panel Assembly, 3-Switch
19*	302955-01	Access Cover Assembly
20	320473-01	Lever, Paper Release
21	320552-01	Paper Feed Motor Assembly
22	320583-01	Paper Bail Assembly
23	302660-XXB	PCE PCB Assembly
	302690-XXB	SCE PCB Assembly
	302779-XXB	HPRO5 PCB Assembly
	302840-XXB	HPRO6 PCB Assembly
	320270-XXB	PPI PCB Assembly
	320293-XXB	SPI PCB Assembly
	302810-XXB	Power Supply PCB Assembly
24	24120	Latch, Ribbon Box
	24147	Pin, Latch
	24146	Spring, Latch
25	24080-01	Roller Assembly, Front Pressure
	24081-01	Roller Assembly, Rear Pressure
26*	42665-01	Power Cord, 100/120V, 7.5 Ft, USA only
	42665-02	Power Cord, 220/240V, 7.5 Ft, USA only
	100448-01	Power Cord, 125V, 2 meters, International
	100448-02	Power Cord, 250V, 2 meters, International

NOTES:
   (1)   Items marked by an asterisk (*) are not shown.
   (2)   A part number followed by "-XX" means different configurations/revisions. Refer to the parts catalog.
   (3)   Only the 120Vac version is available as a spare part. If another is required, Input Voltage Field Conversion Kit, Part No. 321344-01 must also be ordered.

CIRCUIT DIAGRAMS & CABLE WIRING LISTS

7.1   GENERAL DISCUSSION

Diablo Systems logic diagrams emphasize the functions performed by the logic elements rather than the kinds of devices used. For example, a NAND gate may appear on a Diablo diagram as either a positive logic AND function with the output inverted (NAND), or as a negative logic OR function with the inputs inverted (NOR). This practice runs contrary to some logic drawing standards which require the use of the NAND symbol for both functions, but aids field service personnel in troubleshooting and system design engineers in understanding the principles of operation of the design.

This functional approach to logic symbology is basic to the logic documentation conventions employed by Diablo Systems. The conventions that govern logic symbology, signal nomenclature, and other drawing standards that may help the reader interpret Diablo logic diagrams, are discussed in the following paragraphs.

7.2   LOGIC SYMBOLOGY

The logic function symbols used in Diablo Systems logic diagrams conform closely to those set forth in MIL-STD-806 or ANSI Y32.14-1973. Small scale integration (SSI) circuits are represented by their function symbol. Medium scale (MSI) and large scale (LSI) integration devices, such as shift registers, RAM's, ROM's, etc., are represented by rectangles with function labels. Since both positive and negative logic conventions can appear in a single diagram, the unfilled-circle negation symbol specified by MIL-STD-806 or ANSI Y32.14-1973 is used to distinguish between LO true and HI true signals.

Usually, all logic symbols are drawn with inputs on the left and outputs on the right. Some device symbols, such as flip-flops, show inputs and other external connections on the top and bottom of the symbol for clarity. Also, the drawings themselves are usually drawn with major signal flows from left to right, top to bottom. However, drawing layout restrictions occasionally require the reverse of this, and that some symbols be drawn with a vertical orientation.

Figure 7-0 is a sample diagram, drawn to include examples of most, if not all, of the drawing conventions used. Note that in some cases two "grid coordinate" systems are used. One, shown on the perimeter of the diagram, is useful in locating a portion of a circuit or a particular component on the diagram itself, and has no other meaning. The other involves the component identifiers, such as "Resistor H35". The identifier is a "grid coordinate" code for locating that component on its printed circuit board. Further, textual reference to a device, such as a flip-flop, will usually further identify the device by its major output terminal. In the case of flip-flops, the "Q" output is usually used, i.e. FF B25-9.

7.3   CIRCUIT DIAGRAMS

The schematic diagrams in this manual represent the latest version of each circuit board in production at the time of this writing. Listed on the back of each diagram is the revision history of the circuit board, plus a listing of the solid state components used, and their component designator codes used for locating each device on its circuit board.

There are two important part numbers associated with each circuit board in the Model 630:

1) The PCB Assembly part number identifies the complete circuit board with components installed. This number is silk-screened onto the top (component side) of the PCB. The revision letter of the board assembly generally is marked on this side of the PCB also.

2) The PCB part number (etch number) is the part number of the blank PCB without components. This number is etched on the bottom side of the PCB.

7.4   CONNECTOR WIRING LISTS

The following wiring lists give the pin-to-pin wiring of the cable assemblies in the Model 630.   The signal that appears at each pin is also identified.   These lists should be used in conjunction with the interconnect diagrams shown in Figures 7-2a thru 7-2e.

Each row (read horizontally) lists all connector terminals that interconnect, and also lists the signal on those terminals.

CONNECTORS   SIGNAL

P1, P2, P3, P4, P5

P1	P2	P3	P4	P5 (Power Harness)		
P1-1	P2-1	P3-1	P4-1	P5-1		-12V
P1-2	P2-2	P3-2	P4-2	P5-2	P6-7	Chassis Gnd
P1-3	P2-3	P3-3	P4-3	P5-3	P6-2	+5V
P1-4	P2-4	P3-4	P4-4	P5-4		(Key)
P1-5	P2-5	P3-5	P4-5	P5-5		Gnd
P1-6	P2-6	P3-6	P4-6	P5-6	P6-6	Gnd
P1-7	P2-7	P3-7	P4-7	P5-7	P6-1	+16V
P1-8	P2-8	P3-8	P4-8	P5-8		-POWER DOWN
P1-9	P2-9	P3-9	P4-9	P5-9		Gnd
P1-10	P2-10	P3-10	P4-10	P5-10		+40V

1	☐	-12VDC
2	☐	CHASSIS GROUND
3	☐	+5VDC
4	■	KEY
5	☐	SIGNAL GROUND
6	☐	SIGNAL GROUND
7	☐	+16VDC
8	☐	-POWER DOWN
9	☐	SIGNAL GROUND
10	☐	+40VDC

P6 (Optional Feeder Connector)

P6-1	P1-7	P2-7	P3-7	P4-7	P5-7	+16V
P6-2	P1-3	P2-3	P3-3	P4-3	P5-3	+5V
P6-4	P16					Paper Out
P6-6	P1-6	P2-6	P3-6	P4-6	P5-6	Gnd
P6-7	P1-2	P2-2	P3-2	P4-2	P5-2	Chassis Gnd

P7 (Connects to SCE PCB J3)

P7-1	P9-8	HAMMER COIL RTN
P7-2	P9-17	VCCR
P7-3	P9-7	HAMMER COIL DRIVE
P7-4	P9-16	I OUT 1
P7-5	P9-6	PFM
P7-6	P9-15	VCCR
P7-7	P9-5	PRM
P7-8	P9-14	I OUT 2
P7-9	P9-4	PFM
P7-10	P9-13	+16V
P7-11	P9-3	PRM
P7-12	P9-12	Gnd
P7-13	P9-2	PW HOME SENSOR
P7-14	P9-11	PXDR1
P7-15	P9-1	SENSOR RETURN
P7-16	P9-10	PXDR2
P7-20	P11-1	VCCR
P7-21	- - -	Gnd
P7-22	P11-2	I OUT 4
P7-24	P11-3	VCCR
P7-26	P11-4	I OUT 3

```
P7-27    P10-4     Pulled HI to +5V
P7-28    P11-5     +16V
P7-29    P10-3     Gnd
P7-30    P11-6     Gnd
P7-31    P10-2     +16V
P7-32    P11-7     CXDR4
P7-33    P10-1     END-OF-RIBBON SENSOR
P7-34    P11-8     CXDR2
P7-37    P8-38     +PCMD1
P7-38    P8-37     +PCMD2
P7-39    P8-40     +PD5
P7-40    P8-39     +PD1
P7-41    P8-42     +PD4
P7-42    P8-41     +PD2
P7-43    P8-44     +PD3
P7-44    P8-43     +PD0
P7-45    P8-46     PW POS B
P7-46    P8-45     PW POS A
P7-47    P8-48     -PW HOME
P7-48    P8-47     +PW EVEN
P7-49    P8-50     -CAR. SMD
P7-50    P8-49     +HAMMER FIRE
P7-51    P8-52     -PW SMD
P7-52    P8-51     - - -
P7-53    P8-54     SCE CLK (5 MHz)
P7-54    P8-53     Gnd
P7-55    P8-56     +CD3
P7-56    P8-55     -END OF RIBBON
P7-57    P8-58     +CD1
P7-58    P8-57     +CD2
P7-59    P8-60     +CD4
P7-60    P8-59     +CD0
P7-61    P8-62     +CCMD1
P7-62    P8-61     +CD5
P7-63    P8-64     CAR. POS A
P7-64    P8-63     +CCMD2
P7-65    P8-66     +CAR. EVEN
P7-66    P8-65     CAR. POS B
P7-67    - - -     Chassis Gnd
P7-68    - - -     Chassis Gnd
P7-69    - - -     Chassis Gnd
P7-70    - - -     Chassis Gnd
```

P7, P8

P8 (Connects to J3 of PCE, PPI or SPI PCB)

```
P8-20    P10-17    RIBBON MOTOR PHASE A
P8-22    P10-16    RIBBON MOTOR PHASE A
P8-24    P10-15    RIBBON MOTOR PHASE B
P8-26    P10-14    RIBBON MOTOR PHASE B
P8-28    P10-13    RIBBON LIFT RTN
P8-30    P10-12    RIBBON LIFT
P8-32    P10-11    -SINGLE SHEET
P8-34    P10-10    Gnd
P8-37    P7-38     +PCMD2
P8-38    P7-37     +PCMD1
P8-39    P7-40     +PD1
```
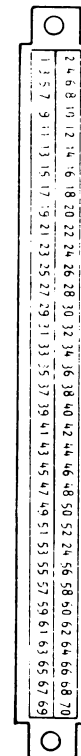
```
P8-40    P7-39    +PD5
P8-41    P7-42    +PD2
P8-42    P7-41    +PD4
P8-43    P7-44    +PD0
P8-44    P7-43    +PD3
P8-45    P7-46    PW POS A
P8-46    P7-45    PW POS B
P8-47    P7-48    +PW EVEN
P8-48    P7-47    -PW HOME
P8-49    P7-50    +HAMMER FIRE
P8-50    P7-49    -CAR. SMD
P8-51    P7-52    - - -
P8-52    P7-51    -PW SMD
P8-53    P7-54    SCE CLK RETURN
P8-54    P7-53    SCE CLK
P8-55    P7-56    -END OF RIBBON
P8-56    P7-55    +CD3
P8-57    P7-58    +CD2
P8-58    P7-57    +CD1
P8-59    P7-60    +CD0
P8-60    P7-59    +CD4
P8-61    P7-62    +CD5
P8-62    P7-61    +CCMD1
P8-63    P7-64    +CCMD2
P8-64    P7-63    CAR. POS A
P8-65    P7-66    CAR. POS B
P8-66    P7-65    +CAR. EVEN
P8-67             To Paper Out switch (Common terminal)
P8-68             To Paper Out switch (N.C. terminal)
P8-69             To Cover Open switch (N.O. terminal)
P8-70             To Cover Open switch (Common terminal)
```

P9 (Connects to Carriage Assy P12)

```
P9-1     P7-15    PW HOME SENSOR RTN
P9-2     P7-13    PW HOME SENSOR
P9-3     P7-11    PRM
P9-4     P7-9     PFM
P9-5     P7-7     PRM
P9-6     P7-5     PFM
P9-7     P7-3     HAMMER COIL DRIVE
P9-8     P7-1     HAMMER COIL RTN
P9-10    P7-16    PXDR2
P9-11    P7-14    PXDR1
P9-12    P7-12    Gnd
P9-13    P7-10    +16V
P9-14    P7-8     I OUT 2
P9-15    P7-6     VCCR
P9-16    P7-4     I OUT 1
P9-17    P7-2     VCCR
```


P9
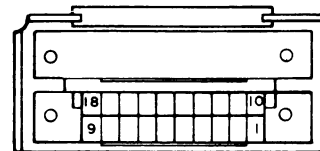
P10 (Connects to Carriage Assy P13)

P10-1	P7-33	END-OF-RIBBON SENSOR
P10-2	P7-31	+16V
P10-3	P7-29	Gnd
P10-4	P7-27	Pulled HI to +5V
P10-10	P8-34	Gnd
P10-11	P8-32	-SINGLE SHEET
P10-12	P8-30	+RIBBON LIFT
P10-13	P8-28	RIBBON LIFT RTN
P10-14	P8-26	RIBBON MOTOR PHASE B
P10-15	P8-24	RIBBON MOTOR PHASE B
P10-16	P8-22	RIBBON MOTOR PHASE A
P10-17	P8-20	RIBBON MOTOR PHASE A

P10
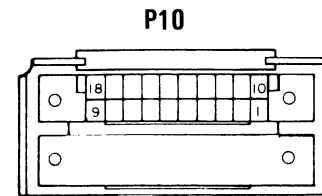
P11 (Connects to Carriage Motor Transducer)

P11-1	P7-20	VCCR
P11-2	P7-22	I OUT 4
P11-3	P7-24	VCCR
P11-4	P7-26	I OUT 3
P11-5	P7-28	+16V
P11-6	P7-30	Gnd
P11-7	P7-32	CXDR4
P11-8	P7-34	CXDR2

P11
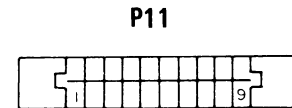
P12 (Connects Carriage Assy to P9 of Card Cage Harness)

P12-1	- To -	PW Home Sensor
P12-2		PW Home Sensor
P12-3		PW Motor
P12-4		PW Motor
P12-5		PW Motor
P12-6		PW Motor
P12-7		Hammer Coil
P12-8		Hammer Coil
P12-10		PW Transducer Preamp
P12-11		PW Transducer Preamp
P12-12		PW Transducer Preamp
P12-13		PW Transducer Preamp
P12-14		PW Transducer Preamp
P12-15		PW Transducer Preamp
P12-16		PW Transducer Preamp
P12-17		PW Transducer Preamp

P13 (Connects Carriage Assy to P10 of Card Cage Harness)

P13-1	- To -	EOR Sensor
P13-2		EOR Sensor
P13-3		EOR Sensor
P13-4		EOR Sensor
P13-10		Form Thickness Switch
P13-11		Form Thickness Switch
P13-12		Ribbon Lift Coil
P13-13		Ribbon Lift Coil
P13-14		Ribbon Drive Motor
P13-15		Ribbon Drive Motor
P13-16		Ribbon Drive Motor
P13-17		Ribbon Drive Motor

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<u>P14</u> (Connects to SCE PCB J2)
P14-2   To Carriage Motor
P14-3   To Carriage Motor

<u>P15</u> (Connects to J2 of PCE, PPI or SPI PCB)
P15-1   To Paper Feed Motor
P15-2   To Paper Feed Motor
P15-3   To Paper Feed Motor
P15-5   To Paper Feed Motor

<u>P16</u> (Single terminal from feeder option connector P6
          to Paper Out switch N.O. terminal)

<u>P17</u> - Model 630 PPI/HPRO6
          Connects Sprint 3 adapting connector to J4 on either the PPI or HPRO6 PCB.
          (Used only in units configured for Sprint 3 type interface.)
          See Figure 7-3 for interconnect diagram.

<u>P18</u> -   Model 630 PCE
          (Connects to PCE PCB J4)

P18-7   P19-4   +ADDR9
P18-8   P19-17   +ADDR8
P18-9   P19-5   +AD7
P18-10   P19-18   +AD6
P18-11   P19-6   +AD5
P18-12   P19-19   +AD4
P18-13   P19-7   +AD3
P18-14   P19-20   +AD2
P18-15   P19-8   +AD1
P18-16   P19-21   +AD0
P18-17   P19-9   (Key)
P18-18   P19-22   -WR
P18-19   P19-10   -RD
P18-20   P19-23   -PRINTER SELECT
P18-22   P19-24   -CLR
P18-23   P19-12   1 MS RTC RET
P18-24   P19-25   1 MS RTC
P18-25   P19-13   5 MHz CLK RET
P18-26   5 MHz CLK

<u>P18</u> - Models 630 HPRO5 and HPRO6 (P18 connects to PCE PCB J4)
          Note: P21 is required only when a customer PCB is installed.

P18-7   P20-7   P21-7   +ADDR9
P18-8   P20-8   P21-8   +ADDR8
P18-9   P20-9   P21-9   +AD7
P18-10   P20-10   P21-10   +AD6
P18-11   P20-11   P21-11   +AD5
P18-12   P20-12   P21-12   +AD4
P18-13   P20-13   P21-13   +AD3
P18-14   P20-14   P21-14   +AD2

P18-15	P20-15	P21-15	+AD1
P18-16	P20-16	P21-16	+AD0
P18-17	P20-17	P21-17	(Key)
P18-18	P20-18	P21-18	-WR
P18-19	P20-19	P21-19	-RD
P18-20	P20-20	P21-20	-PS
P18-21	P20-21	P21-21	
P18-22	P20-22	P21-22	-CLR
P18-23	P20-23	P21-23	1 MS RTC RET
P18-24	P20-24	P21-24	1 MS RTC
P18-25	P20-25	P21-25	5 MHz CLK RET
P18-26	P20-26	P21-26	5 MHz CLK

P19 -   Model 630 PCE
        (Interface connector)

P19-4	P18-7	+ADDR9
P19-5	P18-9	+AD7
P19-6	P18-11	+AD5
P19-7	P18-13	+AD3
P19-8	P18-15	+AD1
P19-9	P18-17	(Key)
P19-10	P18-19	-RD
P19-12	P18-23	1 MS RTC RET
P19-13	P18-25	5 MHz CLK RET
P19-17	P18-8	+ADDR8
P19-18	P18-10	+AD6
P19-19	P18-12	+AD4
P19-20	P18-14	+AD2
P19-21	P18-16	+AD0
P19-22	P18-18	-WR
P19-23	P18-20	-PS
P19-24	P18-22	-CLR
P19-25	P18-24	1 MS RTC
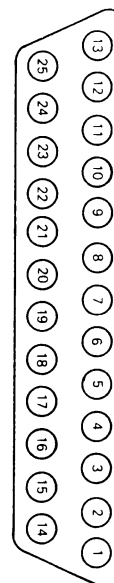
P19 -   Model 630 PPI/HPRO6
        (Adapting connector for Sprint 3 interface; see Figure 7-3.)

P19 -   Models 630 SPI/HPRO5
        (RS-232-C interface connector)

P19

P19-1	P22-1	Chassis Gnd
P19-2	P22-3	-TRANSMITTED DATA
P19-3	P22-5	-RECEIVED DATA
P19-4	P22-7	+REQUEST TO SEND
P19-5	P22-9	+CLEAR TO SEND (unused)
P19-6	P22-11	+DATA SET READY
P19-7	P22-13	Signal Gnd
P19-8	P22-15	+CARRIER DETECT *
P19-11	P22-21	+PRINTER READY *
P19-12	P22-23	+OPTION 2
P19-20	P22-14	+DATA TERMINAL READY
P19-22	P22-18	+OPTION 3

  * = HPRO5 only.

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<u>P19</u> -   Model 630 HPRO5
           (Current Loop interface connector)

P19-7   P22-13   XMIT SINK (Gnd)
P19-10   P22-19   +RECEIVE DATA (RCV A)
P19-13   P22-25   RECEIVE SINK (Gnd)
P19-17   P22-8   XMIT SOURCE
P19-18   P22-10   +XMIT DATA (XMIT B)
P19-19   P22-12   -XMIT DATA (XMIT A) (RTN)
P19-21   P22-16   -RECEIVE DATA (RCV B) (RTN)
P19-23   P22-20   RECEIVE SOURCE

<u>P20</u> -   (Connects to HPRO5 PCB J5 or HPRO6 PCB J3)
           Note: P21 is required only when a customer board is installed.

P20-1   P21-1   +ADDR15
P20-2   P21-2   +ADDR14
P20-3   P21-3   +ADDR13
P20-4   P21-4   +ADDR12
P20-5   P21-5   +ADDR11
P20-6   P21-6   +ADDR10
P20-7   P21-7   P18-7   +ADDR9
P20-8   P21-8   P18-8   +ADDR8
P20-9   P21-9   P18-9   +AD7
P20-10   P21-10   P18-10   +AD6
P20-11   P21-11   P18-11   +AD5
P20-12   P21-12   P18-12   +AD4
P20-13   P21-13   P18-13   +AD3
P20-14   P21-14   P18-14   +AD2
P20-15   P21-15   P18-15   +AD1
P20-16   P21-16   P18-16   +AD0
P20-17   P21-17   P18-17   (Key)
P20-18   P21-18   P18-18   -WR
P20-19   P21-19   P18-19   -RD
P20-20   P21-20   P18-20   -PRINTER SELECT
P20-21   P21-21   P18-21   +IO/-M
P20-22   P21-22   P18-22   -CLEAR
P20-23   P21-23   P18-23   Gnd
P20-24   P21-24   P18-24   +1 MS RTC
P20-25   P21-25   P18-25   Gnd
P20-26   P21-26   P18-26   5 MHz CLK

<u>P21</u> -   (Connects to Customer PCB J2)

P21-1   P20-1   +ADDR15
P21-2   P20-2   +ADDR14
P21-3   P20-3   +ADDR13
P21-4   P20-4   +ADDR12
P21-5   P20-5   +ADDR11
P21-6   P20-6   +ADDR10
P21-7   P20-7   P18-7   +ADDR9
P21-8   P20-8   P18-8   +ADDR8
P21-9   P20-9   P18-9   +AD7
P21-10   P20-10   P18-10   +AD6

```
P21-11      P20-11      P18-11      +AD5
P21-12      P20-12      P18-12      +AD4
P21-13      P20-13      P18-13      +AD3
P21-14      P20-14      P18-14      +AD2
P21-15      P20-15      P18-15      +AD1
P21-16      P20-16      P18-16      +AD0
P21-17      P20-17      P18-17      (Key)
P21-18      P20-18      P18-18      -WR
P21-19      P20-19      P18-19      -RD
P21-20      P20-20      P18-20      -PRINTER SELECT
P21-21      P20-21      P18-21      +IO/-M
P21-22      P20-22      P18-22      -CLEAR
P21-23      P20-23      P18-23      Gnd
P21-24      P20-24      P18-24      +1 MS RTC
P21-25      P20-25      P18-25      Gnd
P21-26      P20-26      P18-26      5 MHz CLK
```

P22 - RS-232-C Interface
       (Connects to SPI PCB J5 or HPRO5 PCB J4)

```
P22-1       P19-1       Chassis Gnd
P22-3       P19-2       -TRANSMITTED DATA
P22-5       P19-3       -RECEIVED DATA
P22-7       P19-4       +REQUEST TO SEND
P22-9       P19-5       +CLEAR TO SEND   (usused)
P22-11      P19-6       +DATA SET READY
P22-13      P19-7       Signal Gnd
P22-14      P19-20      +DATA TERMINAL READY
P22-15      P19-8       +CARRIER DETECT *
P22-17                  (Key)
P22-18      P19-22      +OPTION 3
P22-21      P19-11      +PRINTER READY *
P22-23      P19-12      +OPTION 2
```

P22 - Current Loop Interface
       (Connects to HPRO5 PCB J4)

```
P22-8       P19-17      XMIT SOURCE
P22-10      P19-18      +XMIT DATA (XMIT B)
P22-12      P19-19      -XMIT DATA (XMIT A) (RTN)
P22-13      P19-7       XMIT SINK (Gnd)
P22-16      P19-21      -RECEIVE DATA (RCV B) (RTN)
P22-17                  (Key)
P22-19      P19-10      +RECEIVE DATA (RCV A)
P22-20      P19-23      RECEIVE SOURCE
P22-25      P19-13      RECEIVE SINK (Gnd)
```

Rev A (4/82)

P23 - (Connects to Control Panel H5CPN PCB J3 from keyboard)
P24 - (Connects to Keyboard PCB J1 from control panel)

P23-1	P24-1	-SCAN 3
P23-2	P24-2	-SCAN 5
P23-3	P24-3	-SCAN 1
P23-4	P24-4	-SCAN 7
P23-5	P24-5	-SENSE 0
P23-6	P24-6	-SCAN 8
P23-7	P24-7	-SENSE 1
P23-8	P24-8	-SCAN 9
P23-9	P24-9	-SENSE 2
P23-10	P24-10	-SCAN 10
P23-11	P24-11	-SENSE 3
P23-12	P24-12	(Key)
P23-13	P24-13	-SENSE 4
P23-14	P24-14	-SCAN 0
P23-15	P24-15	-SENSE 5
P23-16	P24-16	-SCAN 2
P23-17	P24-17	-SENSE 6
P23-18	P24-18	-SCAN 4
P23-19	P24-19	-SENSE 7
P23-20	P24-20	-SCAN 6
P23-23	P24-23	Gnd
P23-24	P24-24	+5V
P23-25	P24-25	Gnd
P23-26	P24-26	+5V

P25 - (Connects to HPRO5 PCB J3 from Control Panel)
P26 - (Connects to Control Panel H5CPN PCB J1 from HPRO5 PCB)

P25-1	P26-1	-INIT SCAN
P25-2	P26-2	-LD SW & UPDATE SCAN
P25-3	P26-3	-SHIFT INPUT REG
P25-4	P26-4	-UPDATE OUTPUT REG
P25-5	P26-5	-CNTRL PNL STATUS
P25-6	P26-6	Gnd
P25-7	P26-7	+5V
P25-8	P26-8	Gnd
P25-9	P26-9	+5V
P25-10	P26-10	+16V

P27 - (Connects to HPRO5 PCB J2)
P28 - (Connects to Customer Board J2)

P27-1	P28-1	+HOLD
P27-2	P28-2	+HLDA
P27-3	P28-3	-XINTR (XIO)
P27-4	P28-4	-INTA
P27-5	P28-5	(Key)
P27-6	P28-6	+S1
P27-7	P28-7	+INTR
P27-8	P28-8	-RESTORE
P27-9	P28-9	- - -
P27-10	P28-10	- - -

P29 - (Connects to SPI PCB J6 from Control Panel)
P30 - (Connects to Control Panel LCPN PCB J1 from SPI PCB)

P29-1	P30-1	-CLR RDY
P29-2	P30-2	-LD SWITCHES
P29-3	P30-3	-SHIFT INPUT REG
P29-4	P30-4	-SET RDY
P29-5	P30-5	+CONTROL PANEL STATUS
P29-6	P30-6	Gnd
P29-7	P30-7	+5V
P29-8	P30-8	Gnd
P29-9	P30-9	+5V

Rev A (4/82)

Figure 7-0.
CIRCUIT DIAGRAM
NOTATION

FIG. 7-0   DRIVE PCB ASSEMBLY, STD
44055-XX   Rev A

ALTERNATE DIAGRAM TITLE SCHEMES

DIAGRAM PAGE NO. WHERE APPL

(P0031)

COMMON VOLTAGE CONNECTIONS

TWISTED PAIR SHIELDED

SLIP-ON PCB CONNECTORS

CIRCUIT CONTINUED ON PAGE INDICATED

CABLE DIAGRAM PAGE NO.

SPECIAL VOLTAGE CONNECTION

TEST POINT

DEVICE TYPE NO.

OUTPUT IC PIN NO.

SIGNAL POLARITY INDICATES ACTIVE LEVEL

OPTIONAL, FOR CLARITY WHEN NEEDED
DEVICE PIN NUMBER
DEVICE REFERENCE DESIGNATOR
DRAWING ZONE WHERE DESTINATION SYMBOL IS LOCATED (INCLUDED ONLY IF DRAWING IS ZONED)
SHEET NUMBER

SH5-F2-D3Q-B

+DATA STROBE

SH1-46-G1C-5   +DATA STROBE

COMPONENT IDENTIFIER and PCB LOCATION CODE

IDENTICAL COMPONENTS MULTIPLE PCB LOCATIONS

SPECIAL CIRCUIT GROUND

INTERFACE CONNECTOR

CIRCUIT CONTINUED FROM PAGE INDICATED

PLUG TYPE PCB CONNECTOR

ALTERNATE PCB EDGE CONNECTORS

DIAGRAM ZONE COORDINATES

Diablo Systems Incorporated

PCB ASSY DRIVE

44055-XX

Figure 7-1.
CIRCUIT BOARD CONNECTOR LOCATIONS
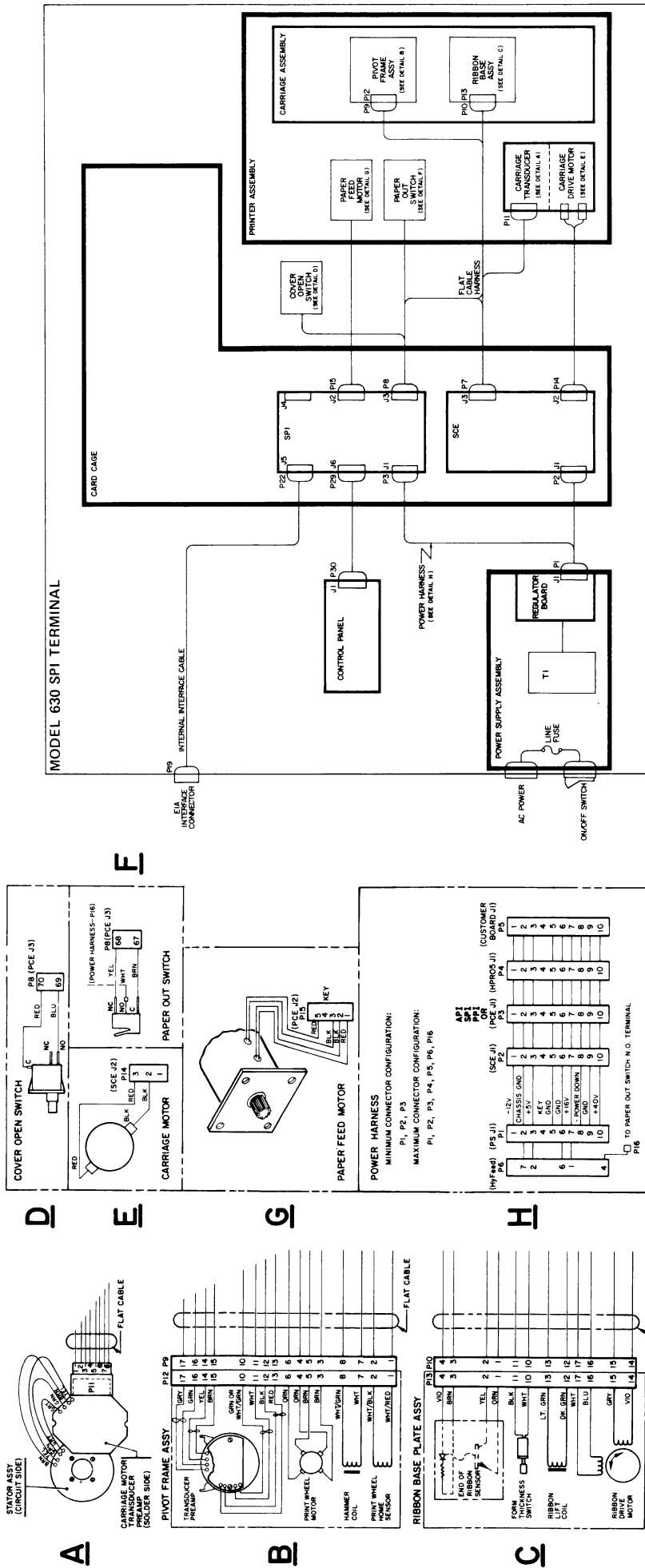
Figure 7-2d
INTERCONNECT WIRING DIAGRAM
MODEL 630 SPI
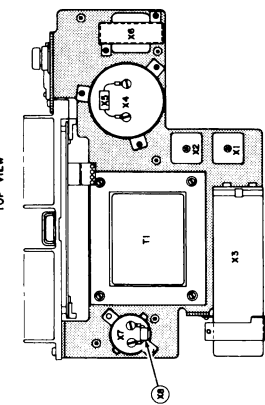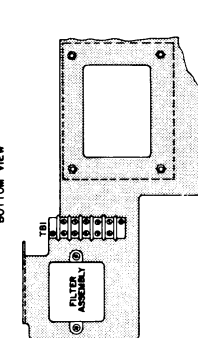
Figure 7-4.
POWER SUPPLY ASSEMBLY
302825-XX   Rev M

POWER SUPPLY ASSEMBLY
302825-XX   Rev M

For later revision levels of the Power Supply assembly, see Figure 7-4a.

REVISION HISTORY - P/S Assy 302825-XX

REV	ECO	ACTION
A	B1491	Releases Bill of Material (B/M).
B	B1637	B/M updated.
C	B1722	Schematic released.
D	B1829	Power Supply rear cover and heat sink altered.
E	B1886	Labels for P/S assembly released.
F	B2034	Incorporates changes to satisfy UL/CSA requirements.
G	B2262	Resistor A32, 470 ohms, replaced by two parallel 3.3K, 1/2W resistors at A33, A34 in +5V supply. Resistor C18, 820 ohms, replaced by 4 paralled 3.3K, 1/2W resistors at C7, C18, C19, C20 in +40V/+16V supply. Resistor at A37 in +5V supply moved to location A42. Resistor at C21 in +40V supply moved to location B22. 1A fuse in -12V supply moved from location A59 to A58. Resistor at A60 in -12V supply moved to location A57. Diodes at A63 and A64 in -12V supply moved to A59 and A60 respectively.
H	B2322	Capacitor B57 at -12V regulator (B61) output changed from 35V to 50V rating. Resistor A12 at pin 6 input of Regulator A17 in +5V supply changed to 1% rating. Capacitor B16 in +40V/+16V supply changes rating from 35V to 50V. Resistor A42 at overvoltage SCR in +5V supply changed from 1K to 820 ohms. Resistor A35 in +5V supply changed from 1K to 680 ohms 2% paralleled by 680 ohm 2% resistor at B34. Capacitor B39 in -POWER DOWN circuit changed from 3.9 mFd, 15V, to 3.3 mFd, 25V. Resistor A22 added to pin 10 output of Regulator A17 in +5V supply. Resistor C53 added to pin 10 output of Regulator C45 in +16V supply. Miscellaneous hardware changes; no effect on schematic.
J	B2337	Releases -09, -10, -11, -12 versions of PS Assembly; hardware changes to satisfy VDE/FCC requirements. No effect on schematic.
K	B2500	Hardware changes. No effect on schematic.
L	B2607	Hardware changes. No effect on schematic.
M	B2758	Releases -13, -14, -15, -16 versions of Power Supply Assembly, using Regulator Board 302810-06.

SOLID STATE COMPONENTS USED - P/S Assy 302825-XX

Bridge Rectifier, 100V   X1, X2

REVISION HISTORY - P/S Circuit Board Assy 302810-XX (Includes heat sink)

REV	ECO	ASSY	ETCH	ACTION
A	B1491	-02	-01	Releases Bill of Material (B/M).
B	B1637	-02	-01	B/M updated.
C	B1735	-02	-01	B/M corrected. Assembly drawing released.
D	B2034	-02	-01	Changes incorporated to satisfy UL/CSA requirements.
A	B2262	-03	-02	Releases -03 assy and -02 etch.
A	B2322	-04	-03	Releases -04 assy and -03 etch.
B	B2346	-04	-04	PCB artwork changed to move connector J2 .100" into PCB.
C	B2362	-04	-05	Releases new etch to correct trace error on -04 etch.
D	B2337	-XX	-05	Releases -05 assy; changes to comply with VDE/FCC requirements. No effect on schematic. (-XX = -04/-05)
E	B2500	-XX	-05	Revises B/M. No effect on schematic.
F	B2578	-XX	-05	Replaces .01 mFd cap. at A19 with .0033 mFd to prevent 6 amp fuse blowing.
G	B2618	-XX	-05	Change from 5.6V to 6.2V zener diode at B35, and from 680 ohm to 390 ohm resistor at A35 and B34 to prevent 5 amp fuse blowing when on-off switch repeatedly cycled.
H	B2727	-XX	-05	Hardware change. No effect on schematic.
J	B2758	-XX	-05	Releases -06 assy with 0.1 mFd cap. between pins 4 and 12 of I.C. at B43A to stabilize Power Down circuit; prevents processor lockup in PPI units. (-XX = -04/-05/-06)

SOLID STATE COMPONENTS USED - P/S Circuit Board Assy 302810-XX

IC's
LM320T-12V	B61
SG3524	C14
339	B43
723A (selected)	A17, C45

Diodes:
1N4002	A59, A60, A61, A62
1N4454	B12
1N5809	B2
1N5234C, 6.2V	B35
C122A (SCR)	A39

Transistors:
2N3906	A41
2N4401	B17, B18
2N6058	A29, C29
TIP120	B62

Resistor Packs:
10K (SIP, 3-pin)	B21, B47, B49, B51

Figure 7-4a.
POWER SUPPLY ASSEMBLY
302825-XX   Rev N

POWER SUPPLY ASSEMBLY
302825-XX   Rev N

For earlier revision levels of the Power Supply assembly, see Figure 7-4.

REVISION HISTORY - P/S Assy 302825-XX

REV	ECO	ACTION
N	B2818	Obsoletes -09 thru -18 assys. Issues -19 thru -24 assys with changes to meet VDE 0730 requirements. Includes cost-reduced PCB and transformer.

SOLID STATE COMPONENTS USED

Bridge Rectifier, 100V   X1, X2

REVISION HISTORY - P/S Circuit Board Assy 302810-XX (Includes heat sink)

REV	ECO	ASSY	ETCH	ACTION
K	B2818	-08/-09	-06	Releases -08/-09 assys using new -06 etch. Obsoletes earlier assys and -05 etch.

SOLID STATE COMPONENTS USED

IC's:	LM320T-12V	B61
	SG3524	C11
	339	B43
	723A (selected)	A14, C45

Diodes:	1N4002	A59, A60, A61, A62
	1N4454	B12
	1N5809	B2
	1N5234C, 6.2V	A34
	C122A (SCR)	A39

Transistors:	2N3906	A41
	2N4401	B17, B18
	2N6058	A29, C29
	TIP120	B62

Resistor Packs:	10K (SIP, 3-pin)	B50, B52

Figure 7-5.
CARRIAGE TRANSDUCER PREAMP PCB ASSEMBLY
302604-02   Rev E

NOTES:(UNLESS OTHERWISE SPECIFIED)
 1. ALL RESISTORS ARE IN OHMS
    1/4 W, 2%
 2. ALL CAPACITORS ARE IN
    MICROFARADS

CARRIAGE TRANSDUCER PREAMP ASSEMBLY
302604-02   Rev E

REVISION HISTORY

REV	ECO	ASSY	ETCH	ACTION
A	B1390	-02	-02	Releases Bill of Material (B/M).
B	B1687	-02	-02	PCB released for production. Added schematic and assembly drawings.
C	B2038	-02	-02	Documentation change only. No schematic change.
D	B2191	-02	-03	Glue joints strengthened.
E	B2744	-02	-03	Minor hardware changes. No schematic change.
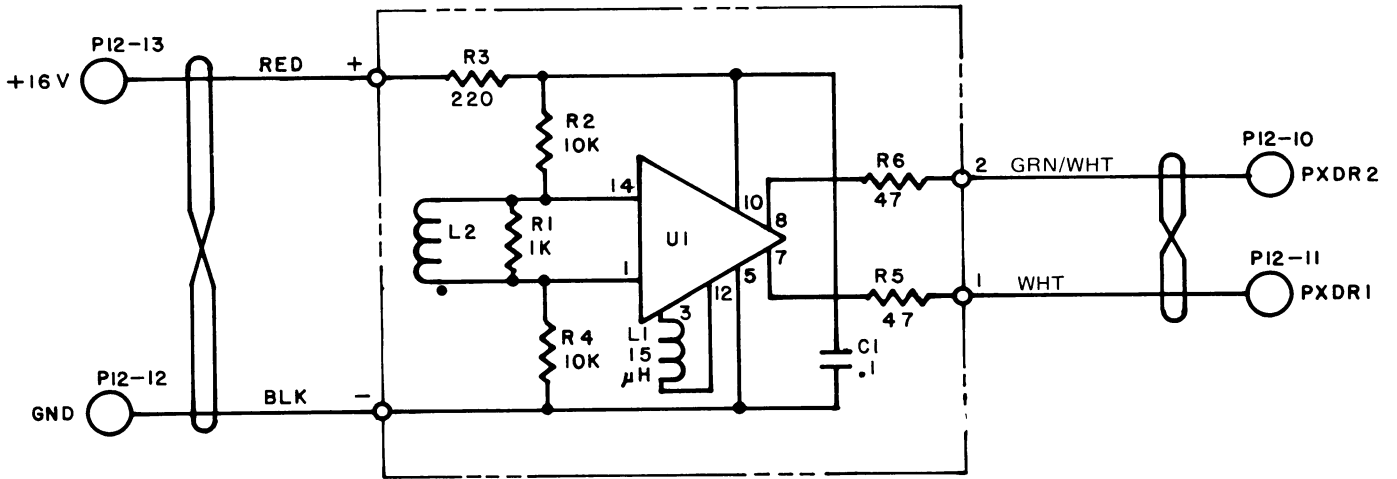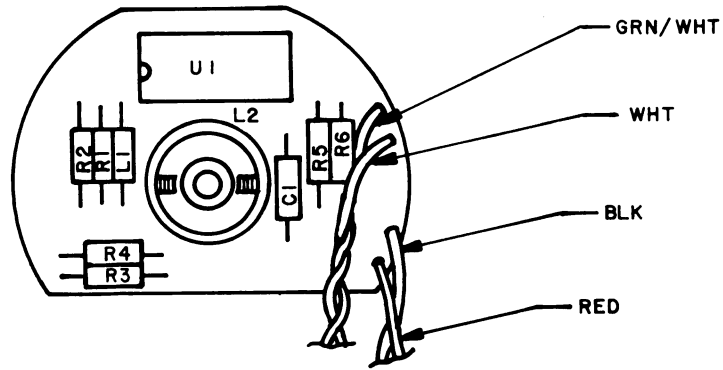
SOLID STATE COMPONENTS USED

IC's:

      592A   U1

NOTES:(UNLESS OTHERWISE SPECIFIED)
1. ALL RESISTORS ARE IN OHMS 1/4W, 2%
2. ALL CAPACITORS ARE IN MICROFARADS

Figure 7-6.
P/W TRANSDUCER PREAMP PCB ASSEMBLY
302880-01   Rev G

P/W TRANSDUCER PREAMP PCB ASSEMBLY
302880-01   Rev G

REVISION HISTORY

REV	ECO	ASSY	ETCH	ACTION
A	B1736	-01	-01	Released for production.
B	B1832	-01	-01	Change to larger pin contacts. Glue pot core to both PCB and pilot plug. Route wires out bottom of board instead of to side of board.
C	B2038	-01	-01	Documentation change only. No schematic change.
D	B2191	-01	-02	Glue joints strengthened.
E	B2325	-01	-02	Standoff changed.
F	B2468	-01	-02	Minor hardware change. No schematic change.
G	B2744	-01	-02	Minor hardware change. No schematic change.

SOLID STATE COMPONENTS USED

IC's:

592A   U1

Figure 7-7a.
SCE PCB ASSEMBLY (w/Heat Sink)
Sheet 1 of 2
302690-10   Rev L
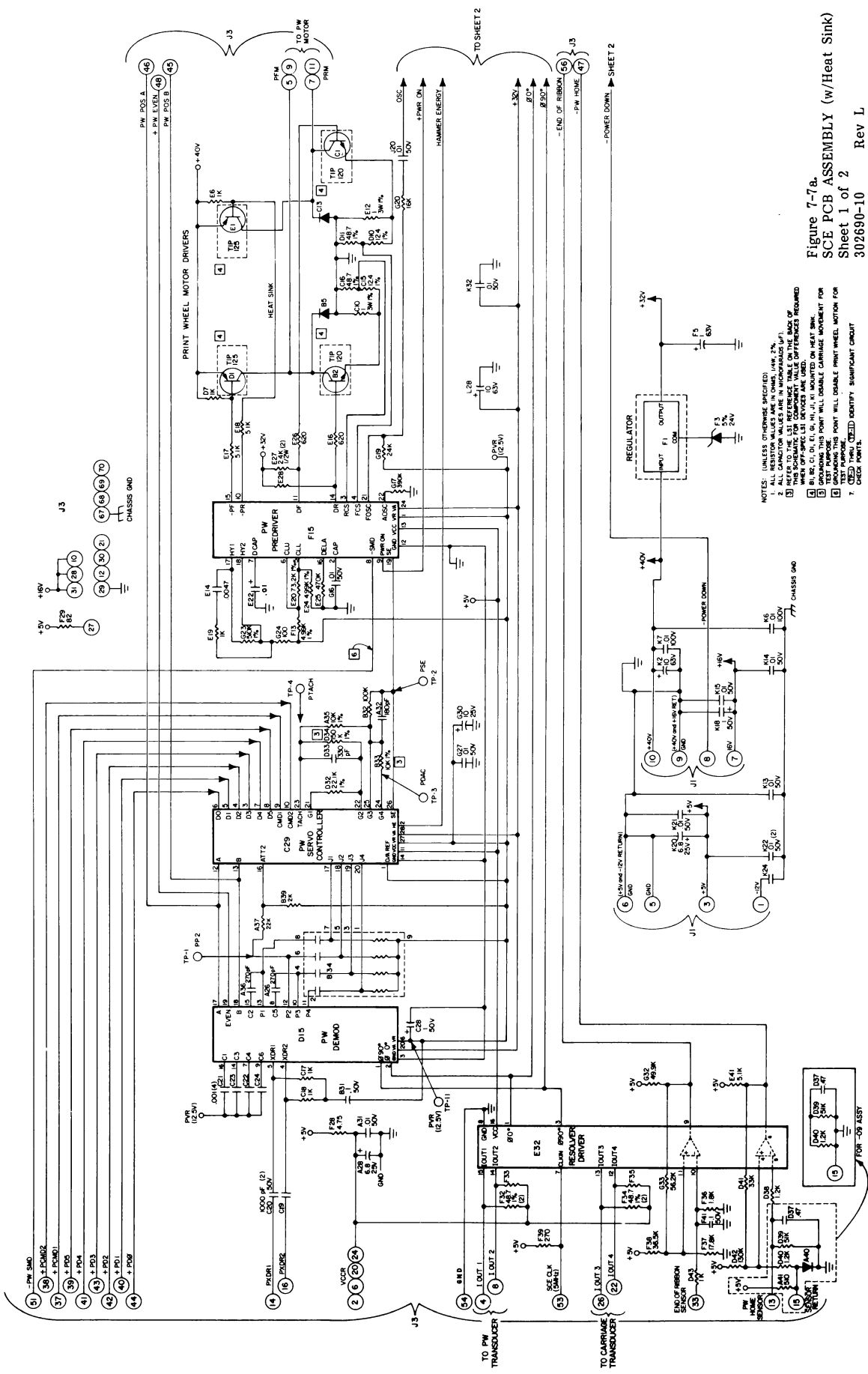
SCE PCB ASSEMBLY (with heat sink)
302690-10   Rev L

For earlier revision levels of the SCE PCB assembly, see Figures 7-7 and 7-8.

REVISION HISTORY

REV	ECO	ASSY	ETCH	ACTION
H	B2475	-09/-10	-04/-05	Combines B/M's for SCE PCB assy 302670-09 and SCE assy 302690-08 to create 302690-09 assy using -04 etch. Releases 302690-10 assy/-05 etch to replace -09 assy/-04 etch.
J	B2487	-10	-06	Releases -06 etch. Zener diode (5.1V) moved from B13 to B12 and standard diode from B12 to B13 to separate zener from hot power resistor.
K	B2572	-10	-06	Minor documentation changes. No schematic change. Capacitors E22, G14 changed from .47 to .01.
L	B2776	-10	-06	Diodes B5, C13, G4, H4 changed from 1N5809 to 1N5416.

SOLID STATE COMPONENTS USED

IC's:

78M08UC	F1
747C	A18
LM339	B15

(The remaining IC's on this circuit board are custom LSI. Refer to the Model 630 Parts Catalog for Diablo part numbers.)

Diodes:

1N4002	A6
1N5809	B5, B12 (in -09), B13 (in -10), C13, G4, H4
1N4454	B23, A40 (-10 only)
1N5416	B5, C13, G4, H4
1N5338A, 5.1V	B12 (in -10), B13 (in -09)
1N5252, 24V	F3

Transistors:

TIP120	B2, C1, G1, H1
TIP125	B1, D1, E1, J1, K1
2N3644	B28
2N4401	A10

R-C Network Pack	B34, J39

LSI REFERENCE FOR SCE CIRCUIT BOARD

DEVICE	IN-SPEC	OFF-SPEC	POSITION	ASSOCIATED RESISTORS POSITION	VALUE	PART NO.
Demodulator:						
302477-03	X		L32	J37	28K Ohm	10004-44
	X		D15	D34	150K Ohm	10005-18
302477-03X		X	L32	J37	28.7K Ohm	10004-45
		X	D15	D34	133K Ohm	10005-15
320016-01		X	L32	J37	30.1K Ohm	10004-47
		X	D15	D34	140K Ohm	10005-15
320016-02		X	L32	J37	28.7K Ohm	10004-65
		X	D15	D34	147K Ohm	10005-17
Servo Controller:						
302478-03	X		C29	B33	10K Ohm	42005-12
				B26	10K Ohm	42005-12
	X		H32	J32	10K Ohm	42005-12
302478-04	X		H32	J32	10K Ohm	42005-12
320066-01		X	C29	B33	10.7K Ohm	42005-13
				B26/B27*	10.7K Ohm	42005-13
			H32	J32	10.7K Ohm	42005-13
320066-02		X	H32	J32	10.7K Ohm	42005-13
320066-03		X	C29	B33	10.5K Ohm	10004-03
				B26/B27*	10.5K Ohm	10004-03
			H32	J32	10.5K Ohm	10004-03
320066-04		X	H32	J32	10.5K Ohm	10004-03
320066-05		X	C29	B33	11K Ohm	10004-05
				B26/B27*	11K Ohm	10004-05
			H32	J32	11K Ohm	10004-05
320066-06		X	H32	J32	11K Ohm	10004-05
320066-07		X	C29	B33	10.2K Ohm	10004-02
		X	H32	J32	10.2K Ohm	10004-02
320066-08		X	H32	J32	10.2K Ohm	10004-02
320066-09		X	C29	B33	10K Ohm	42005-12
		X	H32	J32	10K Ohm	42005-12
320066-10		X	H32	J32	10K Ohm	42005-12

* = B27 on board etches -04 and later; B26 on earlier boards.
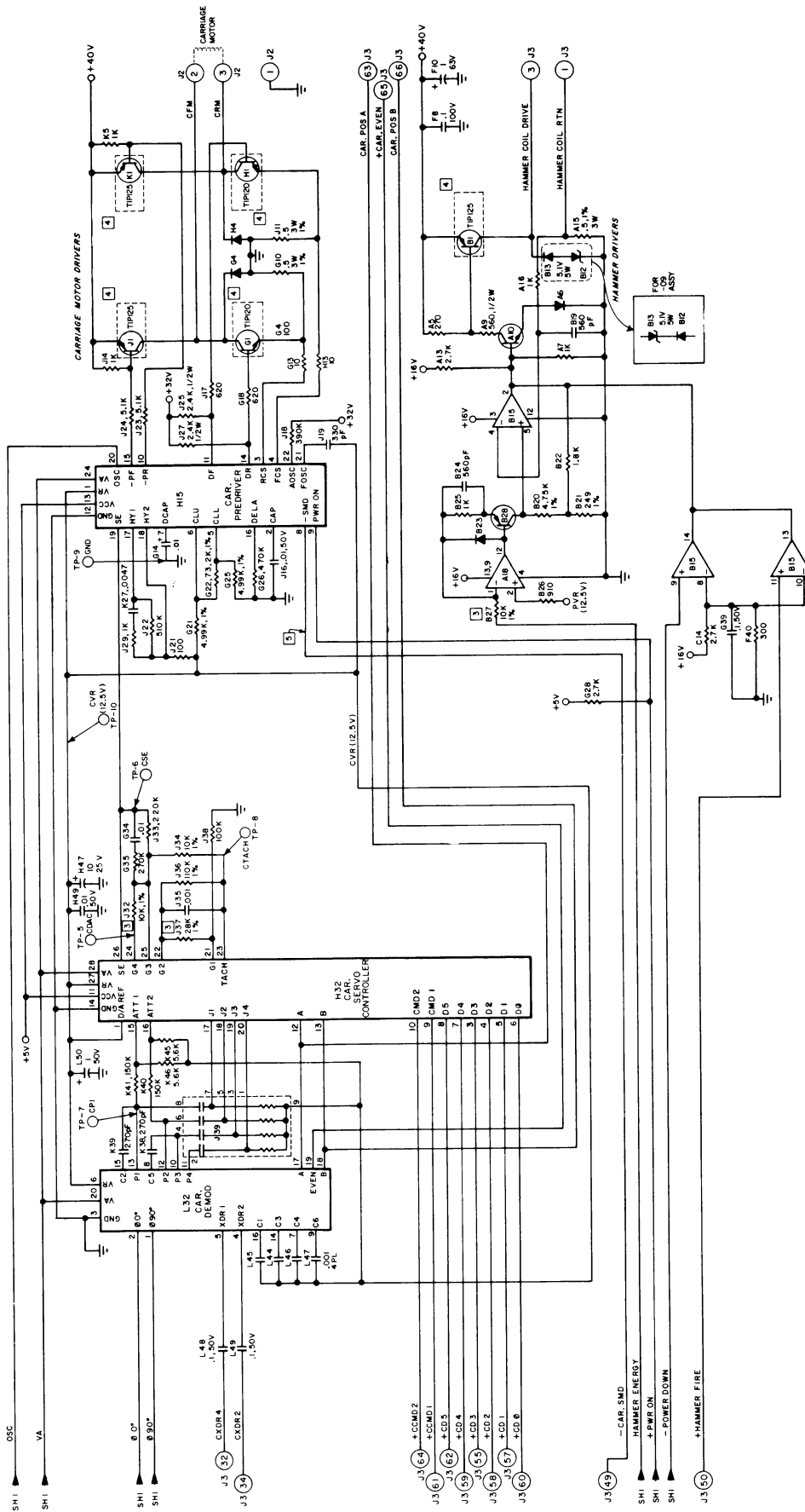
Figure 7-8a.
SCE PCB ASSEMBLY (w/Heat Sink)
Sheet 2 of 2   Rev L
302690-10
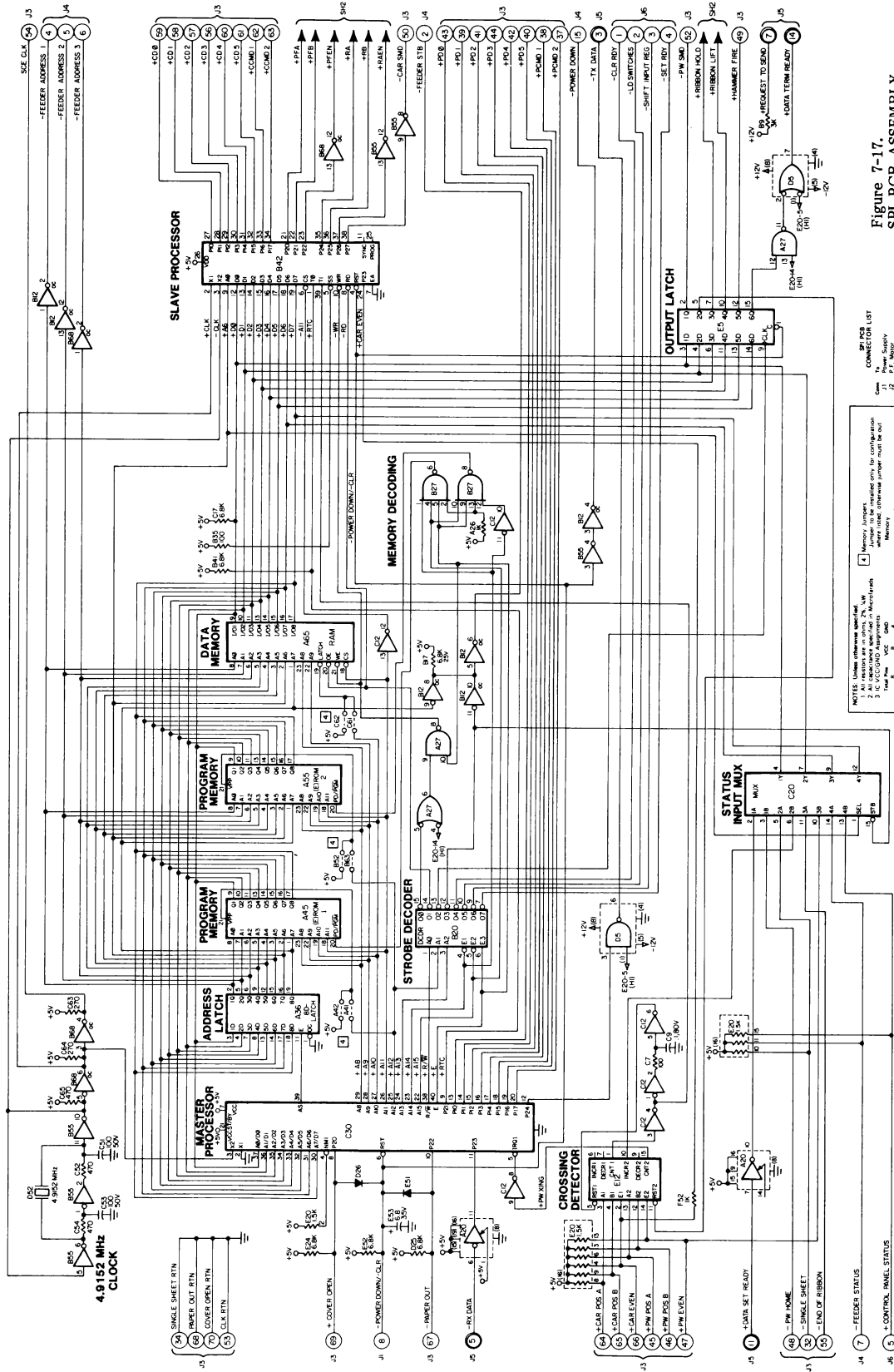
Figure 7-17.
SPI PCB ASSEMBLY
Sheet 1 of 2
320293-XX   Rev K

REVISION HISTORY

REV	ECO	ASSY	ETCH	ACTION
A	B2324	-01		Releases Bill-of-Material (B/M) to production.
B	B2437	-01	-02	Releases firmware and -02 etch.
C	B2525	-01	-02	Transistor part number 10105 replaced by 13070 for better thermal and moisture absorption properties.
D	B2628	-01	-02	Releases upgraded SPI control program firmware.
E	B2648	-03	-02	Releases -03 assembly; obsoletes -01 assembly. Adds 7.5V zener diode between resistor C73 and +12V supply as part of pullup for PFEN line.
F	B2667	-03	-02	Modifies PFEN line pullup to delete 7.5V zener diode, change resistor C73 from 1K to 9.1K, and tie top end of C73 to +16V.
G	B2701	-03	-02	Hardware changes. No schematic change.
H	B2724	-05	-02	New firmware. No schematic change.
J	B2845	-05	-02	Component changes to improve manufacturability. No schematic change.
K	B2860		-02	Special firmware change. No schematic change.

Diodes:	1N4002	D60, D62, D63, D65, D74, D76, D77, D79, G60, G62, G63, G65, G74, G76, G77, G79, G71, F70, F71, E68, E69, G82, E51, D26
	1N4454	D61, D64, D75, D78, G61, G64, G75, G78, E83
	1N5822	E66
	1N4742, 12V	D4
Transistors:	2N3644	E76, F65
	2N4401	E63, F73
	2N5322	E73, F66, F74
Resistor Pack:	1.5K	E20

SOLID STATE COMPONENTS USED

IC's:	74LS00	A27
	7404	B55
	7406	B68, E55, E80
	74LS14	C12
	74LS20	B27
	74LS138	B20
	74LS174	E5
	74LS257	C20
	74LS373	A36
	75150P	D5
	75154	A20
	75452	E62, E74
	2075 (Darlington)	D55, D80, F55, F80
	6803-1	C30
	8041A	B42
	ROM (8K byte)	A45
	RAM (2K byte)	A65

Note: The IC at location E49 is custom I²L.   Refer to the Model 630 Parts
        Catalog for part number.

(continued)
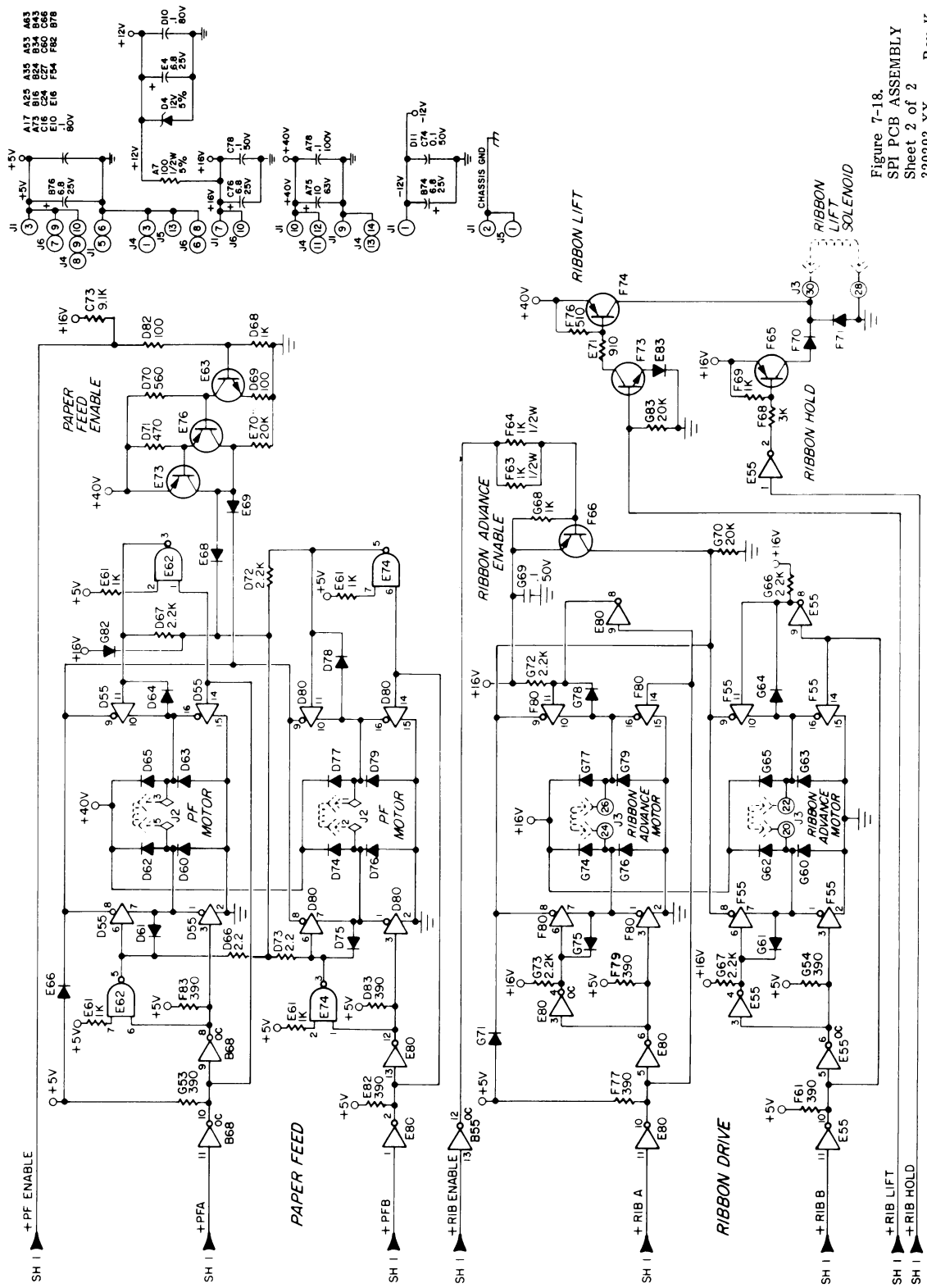
Figure 7-18.
SPI PCB ASSEMBLY
Sheet 2 of 2
320293-XX   Rev K

Figure 7-21.
LCPN (SPI) CONTROL PANEL
PCB ASSEMBLY
320294-01   Rev D
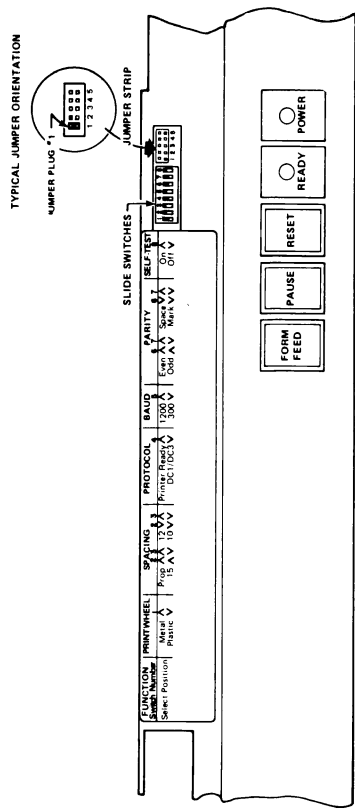
CONTROL PANEL JUMPERS

Jumper	In/Out	Function
1	In	12'' page size
	Out	11'' page size
2	In	Auto line feed enable
3	In	Auto carriage return disable
4		(Reserved)
5		(Reserved)
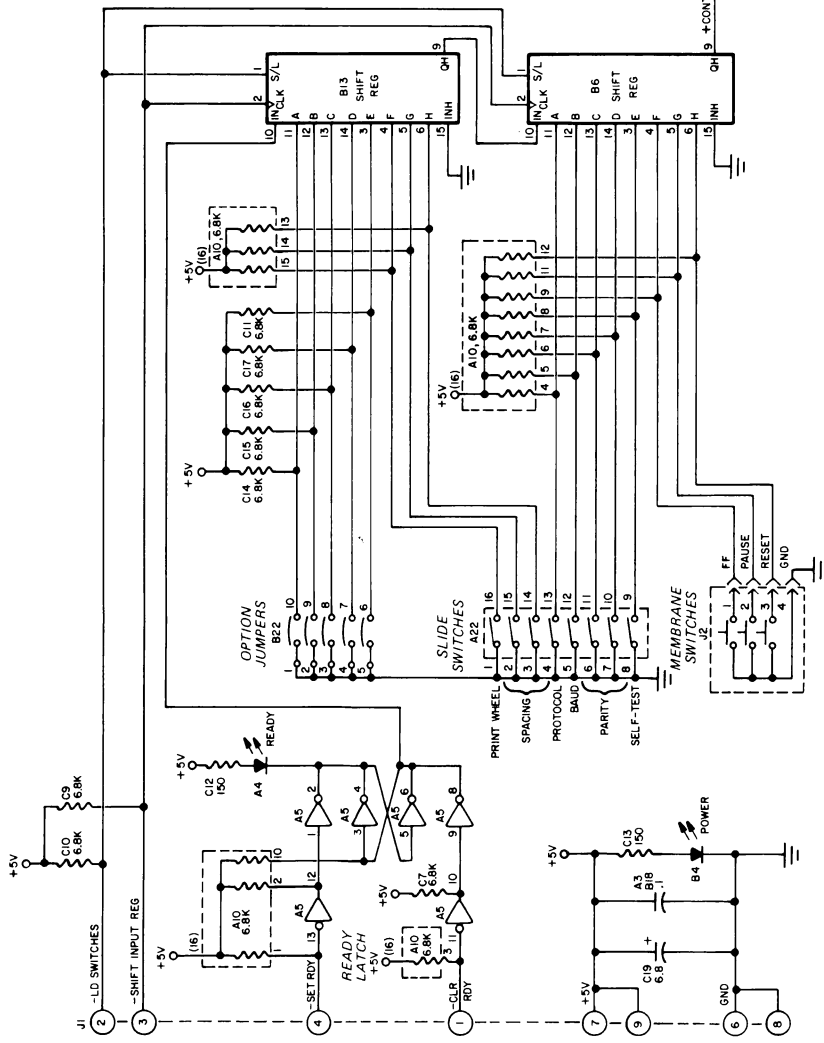
NOTES: UNLESS OTHERWISE SPECIFIED
1 RESISTANCE GIVEN IN OHMS
2 CAPACITANCE GIVEN IN MICROFARADS
3 PIN NUMBERS IN ( ) APPEAR MORE THAN ONCE ON THIS SCHEMATIC.

LCPN (SPI) CONTROL PANEL PCB ASSEMBLY
320294-01   Rev D

REVISION HISTORY

REV	ECO	ASSY	ETCH	ACTION
B	B2453	-01	-02	Releases assembly for production.
C	B2529	-01	-02	Jumper strip added at location B22 for option selection; also adds associated resistors C11, C14, C15, C16, C17.
D	B2778	-02	-03	-02 assy/-03 etch replaces -01 assy/-02 etch. New etch changes pad-to-ground plane spacing and trace-to-ground plane spacing. No schematic change.

SOLID STATE COMPONENTS USED

IC's:

7406	A5
74LS165	B6, B13

Resistor Pack:

6.8K	A10

SCHEMATIC DIAGRAM

8-19

SCHEMATIC DIAGRAM

Diablo Systems Incorporated
Hayward California 94545

PW ASSY: AP1

320462-XX

8-20

SCHEMATIC DIAGRAM

Diablo Systems Incorporated
Hayward California 94545

PW ASSY: API
320162-XX
302900-XX

NOTES: UNLESS OTHERWISE SPECIFIED,
1. ALL RESISTANCES SPECIFIED IN OHMS.
2. ALL RESISTORS ARE ±5%, ¼ WATT.
3. ALL CAPACITANCE SPECIFIED IN MICROFARADS.
4.

NUMBERS IN PARENTHESES ARE FOR INTERNAL USE ONLY.

FOR ECS USE A 56.4 1N411 XSTR IN LOCATIONS E11 AND E11; ALSO A ZENER DIODE 1N5246, 16V IN LOCATION E22 AND A 25K, 3W RESISTOR IN LOCATION GE23.

SPARES?

8-21

SCHEMATIC DIAGRAM

8-22

SCHEMATIC DIAGRAM

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Hayward California 94545

PW ASSY: AP-1

320462-XX

8-23

SCHEMATIC DIAGRAM

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Hayward California 94545

PW ASSY: API-1.5

320462-XX

3C2900-XX

NOTES: UNLESS OTHERWISE SPECIFIED.
1. ALL RESISTANCES SPECIFIED IN OHMS.
2. ALL RESISTORS ARE ± 2%, ¼ WATT.
3. ALL CAPACITANCE SPECIFIED IN MICROFARADS.

-014 - 05 VERSION ONLY

NOTES: UNLESS OTHERWISE SPECIFIED

1. MAXIMUM HEIGHT OF COMPONENT TO BE .38

2. PERMANENTLY STAMP ASSEMBLY DASH NO. AND REV. LETTER IN INDICATED AREA.

3. CUT PIN 4 OF J1 AND J2.

4. REWORK INSTRUCTIONS FOR -04/-05 VERSION ONLY:
   1. CUT TRACE TO PIN 7 OF E25 LOCATED BETWEEN F18 AND E25.
   2. INSERT DAUGHTER BOARD, P/N 320300-01 IN SOCKET AT LOCATION E41.

5. -01 AND -03 VERSIONS USE 26 PIN HEADER P/N 109110-07 AT LOCATION J4.

6. HEADER AT J7 ON ALL DASHES. CUT PIN 3 (OUTER ROW SECOND DIN FROM LEFT).

320462-XX

-04 & -05 VERSION ONLY

X4-X040
X3-X035
X2-F25

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PWA API

D   320462-XX

2 TO1