

1020™
COLOR PRINTER
FIELD SERVICE
MANUAL

ATARI



 A Warner Communications Company

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ATARI

1020TM Color Printer

Field Service Manual

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INTRODUCTION

The Atari 1020™ Color Printer Field Service Manual is a reference guide for the service technician. The information presented in this manual, when used in conjunction with ATARI training, enables you to repair and maintain the 1020 Color Printer.

This Field Service Manual is organized in eight sections:

- **THEORY OF OPERATION** - Overview of how the 1020 Color Printer works and what its basic assemblies look like.
- **SCHEMATICS AND SILKSCREENS** - Printed Circuit Board layout and electrical drawing.
- **TESTING** - Review of tests available for diagnosing 1020 Color Printer problems.
- **DIAGNOSTIC FLOWCHARTS** - Aids for troubleshooting the 1020 Color Printer.
- **SYMPTOM CHECKLIST** - Failure information to assist the experienced technician arrive at a rapid diagnosis of 1020 Color Printer problems.
- **DISASSEMBLY/ASSEMBLY** - Procedures for disassembling and assembling the 1020 Color Printer.
- **PARTS LIST** - Breakdown of parts used to repair the 1020 Color Printer.
- **SERVICE BULLETINS** - Section to be used to hold Field Change Orders, Upgrade Bulletins and Tech Tips.

SECTION I

THEORY OF OPERATION

OVERVIEW

The ATARI 1020 Color Printer is a free-standing, 40-column, 4-color printer that averages 12 characters per second and provides graphics and ATASCII character printout. It is a hard copy output peripheral intended for use under the control of the ATARI 400™, 800™ or 1200XL™ computer. It connects directly to the SIO peripheral port of the computer (no interface is required). The printer mechanism is an X-Y plotter which uses ballpoint pens as its writing instruments. All firmware is resident in the printer and executed by an on-board microprocessor which controls the functions of the printer.

Figure 1-1 is a block diagram of the functional flow of the 1020.

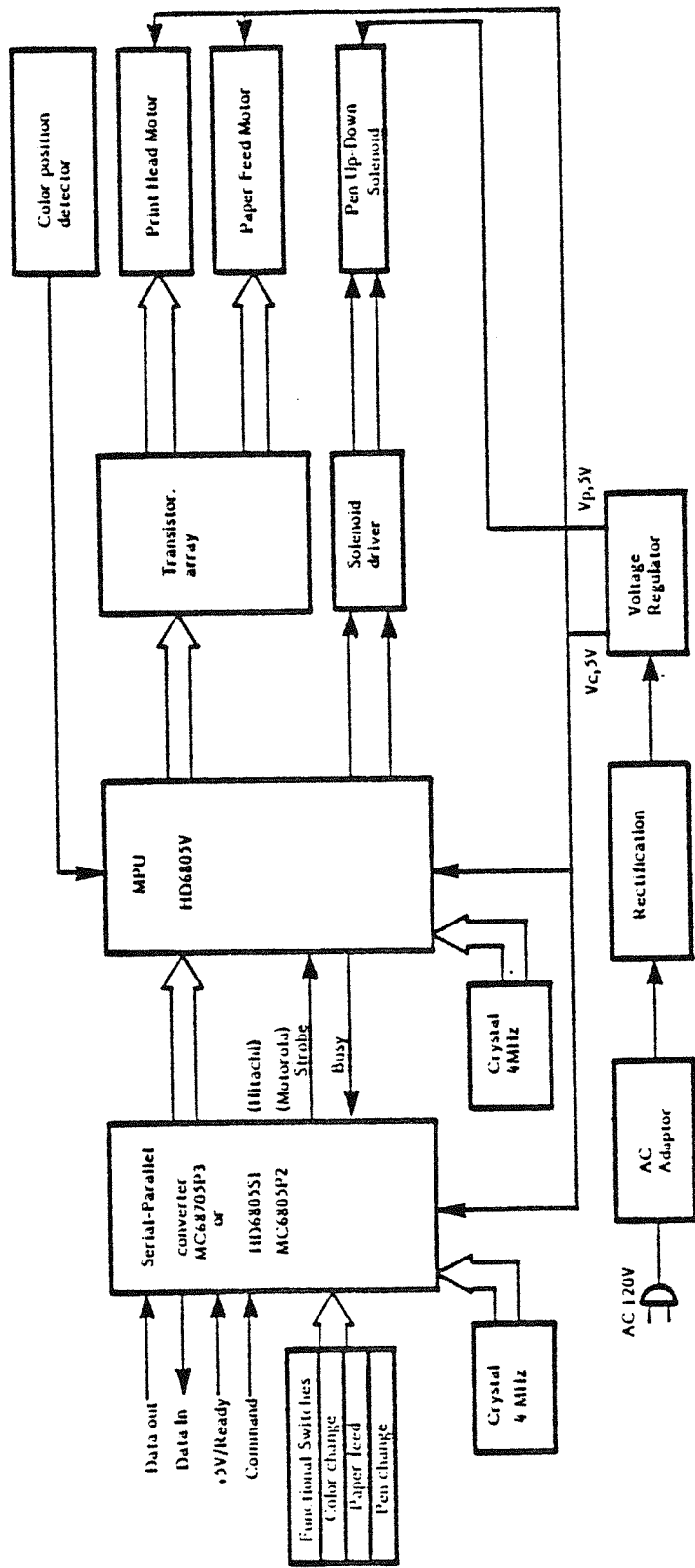


Figure 1-1. 1020 Color Printer Block Diagram

USER INTERFACE

The Controls/Indicators are located on the front and back panels of the 1020. The front panel contains the four manual (function) buttons and the LED which indicates that power to the unit is ON (see Figure 1-2).

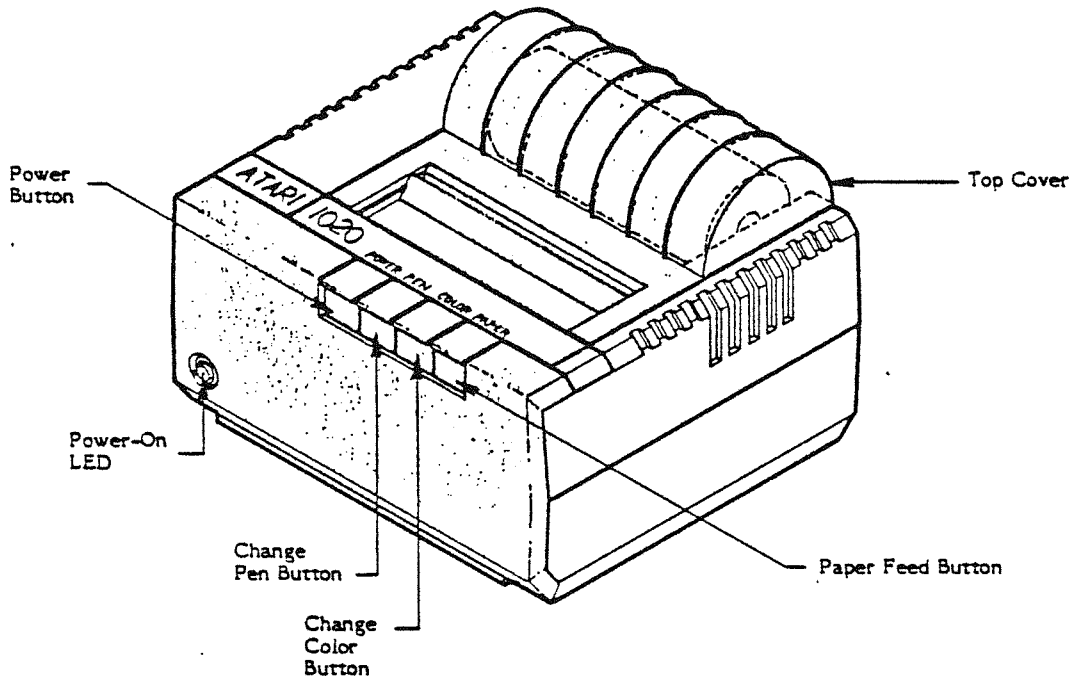


Figure 1-2. 1020 Color Printer Front View

From left to right the manual buttons and their functions are:

- POWER** - The microprocessor is reset when the POWER button is pressed.
- PEN** - This allows the pen to be changed. When this button is pressed, the carriage moves to the right, then stops. The pen can be taken out by operating the pen eject lever located at the right front of the unit.
- COLOR** - When this button is pressed, the rotary pen holder moves to the next color position.
- PAPER** - Paper is fed when this button is pressed.

The back panel contains two Input/Output (I/O) connectors and the Power Input Jack (see Figure 1-3).

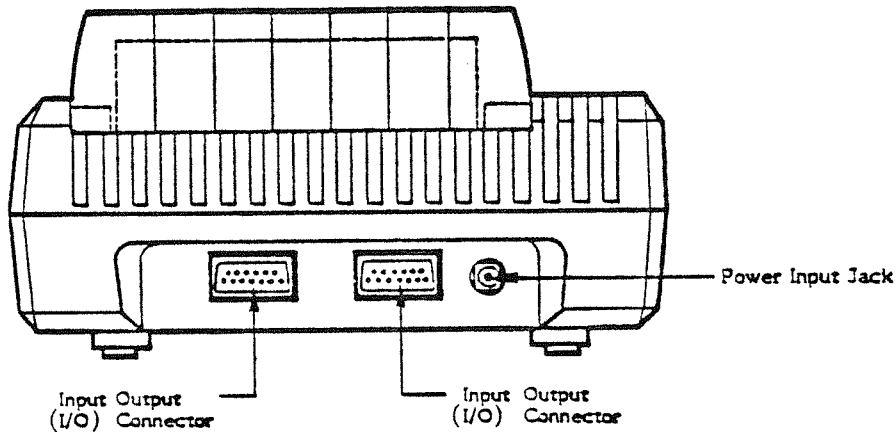


Figure 1-3. 1020 Color Printer Back View

MECHANICAL

This section describes the mechanical characteristics of the 1020 Color Printer. For an overall understanding of the 1020 printer operation, read both this section and the Electronic section which follows it.

Case

The outer case is composed of four pieces of plastic. The pieces are 1) the upper case; 2) the lower case; 3) the front bezel; and , 4) the top cover.

Use Figure 1-4 and Figure 1-5 as reference for the following discussion.

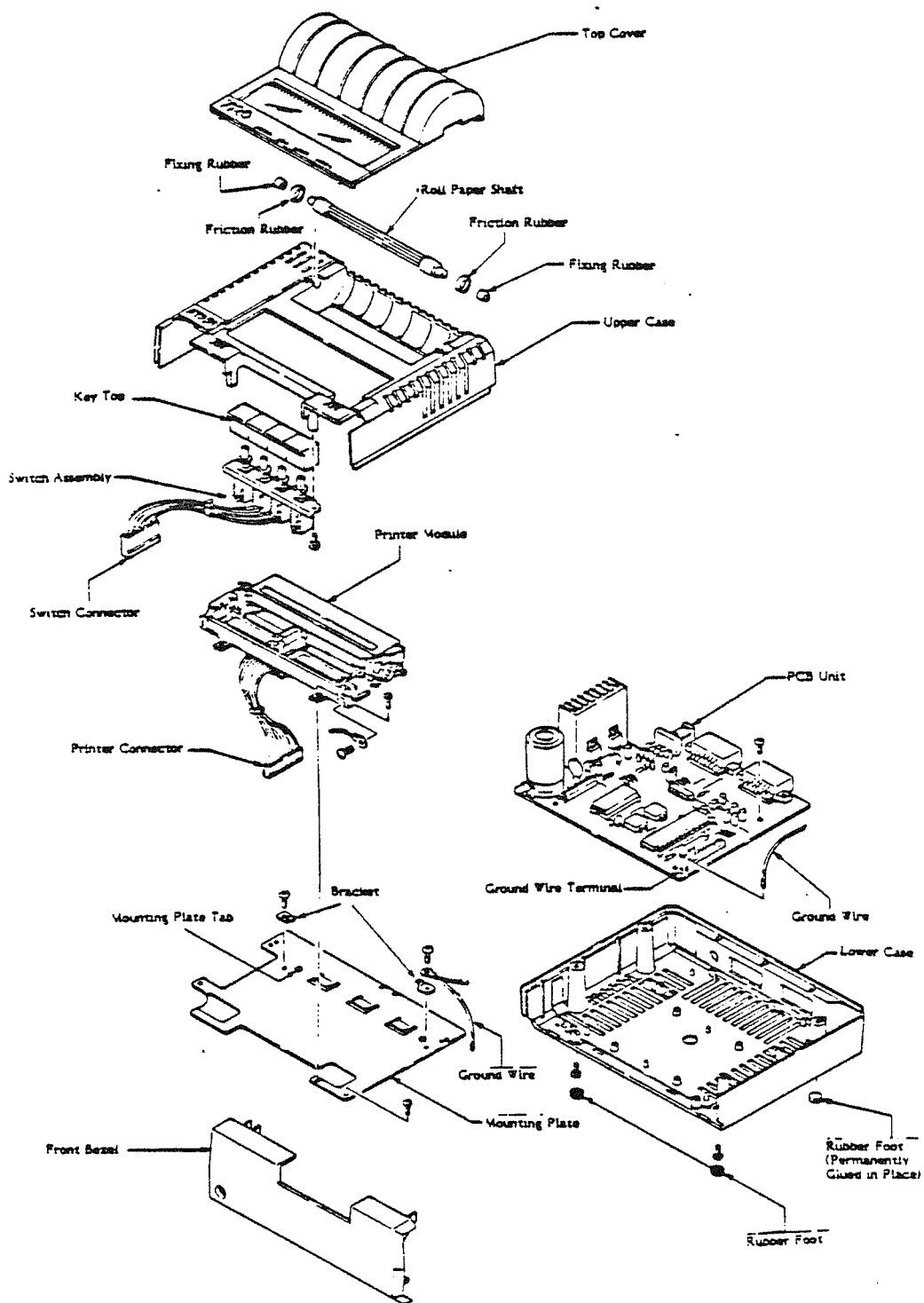


Figure 1-4. 1020 Color Printer Final Assembly

Frame

The frame has a side frame unit (right), side frame unit (left), mounting plate, and paper guide. The lower edge of the frame, bent in the shape of the letter L, acts as a mounting leg.

Print Head Mechanism

The Print Head mechanism consists of the Print Head motor, the idle gear, the bobbin gear, the pulley support base (left), the pulley support base (right), the slider unit and wire. The Print Head motor motion is transmitted to the bobbin gear via the idle gear and to the slider unit by a wire. The wire tension is maintained by a coil spring.

Paper Feed Mechanism

The Paper Feed mechanism consists of the Paper Feed motor, the idle gear, the platen, the paper holding roller (right) and the paper holding roller (left). The Paper Feed motor motion is transmitted to the platen via the double idle gear.

Pen Up-Down Mechanism

The pen up-down mechanism consists of the electromagnet (solenoid) assembly (actuator, actuator spring, coupling lever and permanent magnet), an ejection lever, a roller lever, and four ballpoint pens. The up-down position of the pen is determined by the direction of the electric current going through the electromagnet assembly.

Pen-up State (pen off paper/no write):

The condition when the actuator is open (and the pen is lifted from the paper) is called the pen-up state. This state is held by the actuator spring over-riding the pen down pressure of the ejection lever spring. The open position of the actuator is limited by the stopper screw.

Pen-down State (pen on paper/write):

A 5.4 msec impulse in the pen-down direction attracts the actuator, causing the pen-down state. Under this state, the force of the permanent magnet is greater than the actuator spring. This condition is maintained by the permanent magnet after the power is cut. The pen pressure on the paper is maintained by the ejection lever spring. During the pen-down state, there should be clearance between the actuator and the coupling lever.

Color Change Mechanism

The color change mechanism consists of the Print Head drive mechanism, the rotary pen holder, the slider unit, and the projection on the left side frame unit. The operating principle is:

- The slider moves to carriage left.
- By repeating the movement of the Print Head motor for 30 pulses to the left, pen 1 changes to pen 2.

Pen Ejection Mechanism

The pen ejection mechanism consists of the pen ejection lever mounted on the side plate (right). The slider unit moves to the side plate (right) and stops. Pull the pen ejection lever forward, and the pen ejects.

Detection Mechanism for Color Position and Home Position

A magnet is built into one part of the rotary pen holder. A reed switch is placed on the left side of the frame unit. The switch is turned on when the pen holder repeats a color change operation and the magnet comes close to detect the home position of the color location.

ELECTRONIC

The 1020 Color Printer Electronics consists of 12 elements which are discussed in the following paragraphs:

- the Power Supply Circuit
- the Noise Limit Capacitors
- the Serial/Parallel Microprocessor (A1) Circuit
- the Printer Controller Microprocessor (A2) Circuit
- the Print Head and Paper Feed Motor Drive Circuit
- the Pen Up-Down Solenoid Drive Circuit
- the Color Detect Switch Circuit
- the Paper Feed Switch Circuit
- the Color Change Switch Circuit
- the Pen Change Switch Circuit
- the Power ON Reset Circuit
- the Oscillator Circuits

NOTE: Electromagnet Assembly and solenoid refer to the same assembly.

Power Supply Circuit

The unit is powered with an external AC Adaptor. The AC voltage is stepped down in the adaptor. The voltage is internally rectified by a diode bridge (D1-D4), smoothed by capacitors and regulated by voltage regulators (A5 & A6) to obtain a stable power output. The Power ON-OFF switch completes the AC circuit to the bridge rectifier.

The Power Supply provides the following voltages for use in the system:

V_c 5V +/- 5% for driving the motor and control circuits

V_p 5V +/- 5% for driving the pen up-down solenoid

Figure 1-6 illustrates the Power Supply Circuit.

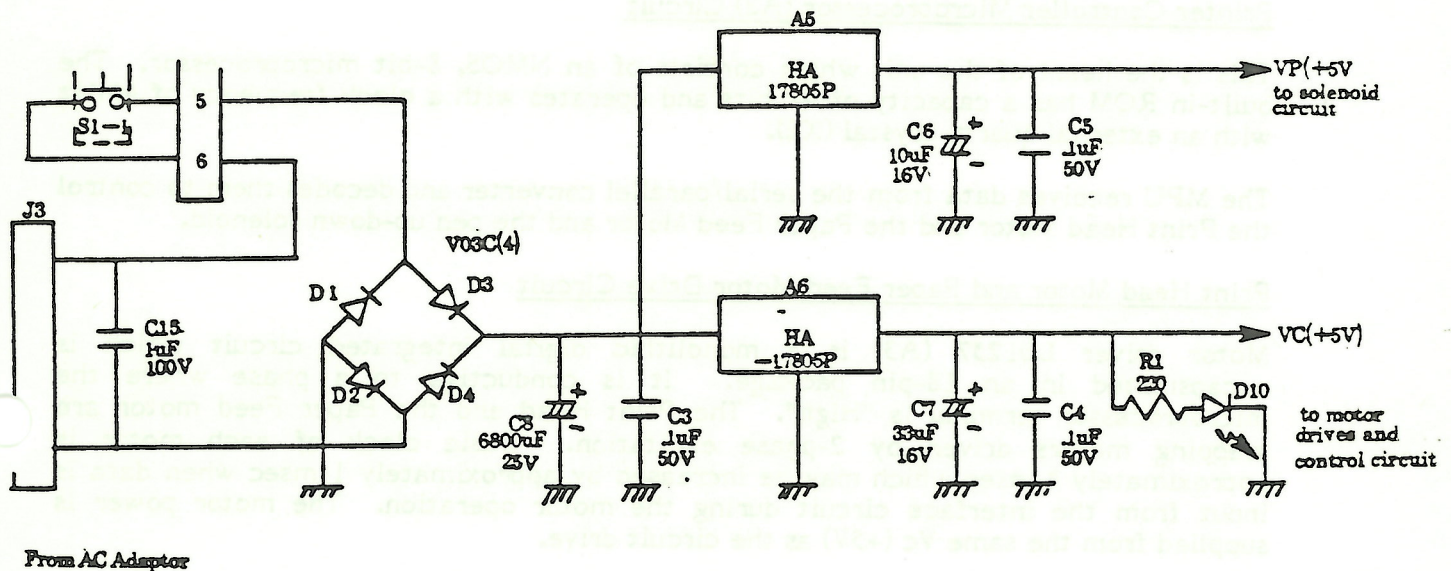


Figure 1-6. Power Supply Circuit

Noise Limit Capacitors

In order to suppress induction noise to the power line, a 1µF film capacitor (C15) is attached to the secondary AC circuit and 0.1µF ceramic capacitors (C9, C10 & C11) are used near the power terminal of IC's A1, A2 and A3. In addition, capacitors (C4 & C5) are on each output leg of the Power Supply (C4 - Vc; C5 - Vp).

Serial/Parallel Microprocessor (A1) Circuit

Data communication with the computer is made via a 19,200 bps serial system. The DATA OUT terminal is the output terminal from the computer which is, at the same time, the input terminal for the printer unit. Similarly, the DATA IN terminal is the output terminal from the printer unit. The COMMAND terminal is the output from the computer, indicating that transmitted data are commands.

Data transmitted from the computer is converted to parallel data and transferred to the Printer Controller microprocessor.

The serial/parallel converter uses an NMOS, 8-bit, one-chip microprocessor which operates with a clock frequency of 4MHz controlled with an external quartz crystal (X1).

Brief Description of Serial Port Signals:

- | | | |
|----|----------|--|
| 3. | DATA IN | - 19,200 Baud data line to the computer (from printer) |
| 4. | GND | - Ground (Digital Common) |
| 5. | DATA OUT | - 19,200 Baud data line from the computer (to printer) |
| 6. | GND | - Ground (Digital Common) |

- 7. COMMAND - Goes to zero when a command frame is being sent
- 10. +5V/READY - Indicates that the computer is turned on and ready.
Restricted use as a +5 volt supply.

Printer Controller Microprocessor (A2) Circuit

This is the heart of the unit which consists of an NMOS, 8-bit microprocessor. The built-in ROM has a capacity of 4k bits and operates with a clock frequency of 4MHz with an external quartz crystal (X2).

The MPU receives data from the serial/parallel converter and decodes them to control the Print Head Motor and the Paper Feed Motor and the pen up-down solenoid.

Print Head Motor and Paper Feed Motor Drive Circuit

Motor driver LBI257 (A3) is a monolithic digital integrated circuit which is encapsulated in an 18-pin package. It is conductive to a phase where the microprocessor terminal is "High". The Print Head and the Paper Feed motor are stepping motors driven by 2-phase excitation. Basic clock of each motor is approximately 4 msec which may be increased by approximately 1 msec when data is input from the interface circuit during the motor operation. The motor power is supplied from the same Vc (+5V) as the circuit drive.

Pen Up-Down Solenoid Drive Circuit

Up-Down of the ball point pen is controlled from C0 and C1 terminals of the microprocessor so that Pen UP or DOWN status is held thereafter by giving a single pulse input of approximately 5.4 msec.

Up-Down action of the solenoid is determined by the current direction in the solenoid.

The Pen-Up current flows as (See Figure 1-7):

Vp → Transistor Q6 → Solenoid Pen Down Terminal (No. 13) →
Solenoid Pen Up Terminal (No. 12) → Transistor Q5 → Gnd

The Pen-Down current flows as (See Figure 1-8):

Vp → Transistor Q7 → Solenoid Pen UP Terminal (No. 12) →
Solenoid Pen DOWN Terminal (No. 13) → Transistor Q4 → Gnd

Transistor Q3 is to force transistor Q7 to be OFF when both C0 and C1 terminals output signals simultaneously for any cause. A surge voltage generated at the solenoid ON/OFF is suppressed to approximately 16V by the bridge circuit which consists of diodes D9 through D6 and a zener diode D7. The solenoid drive power is supplied from Vp (5V).

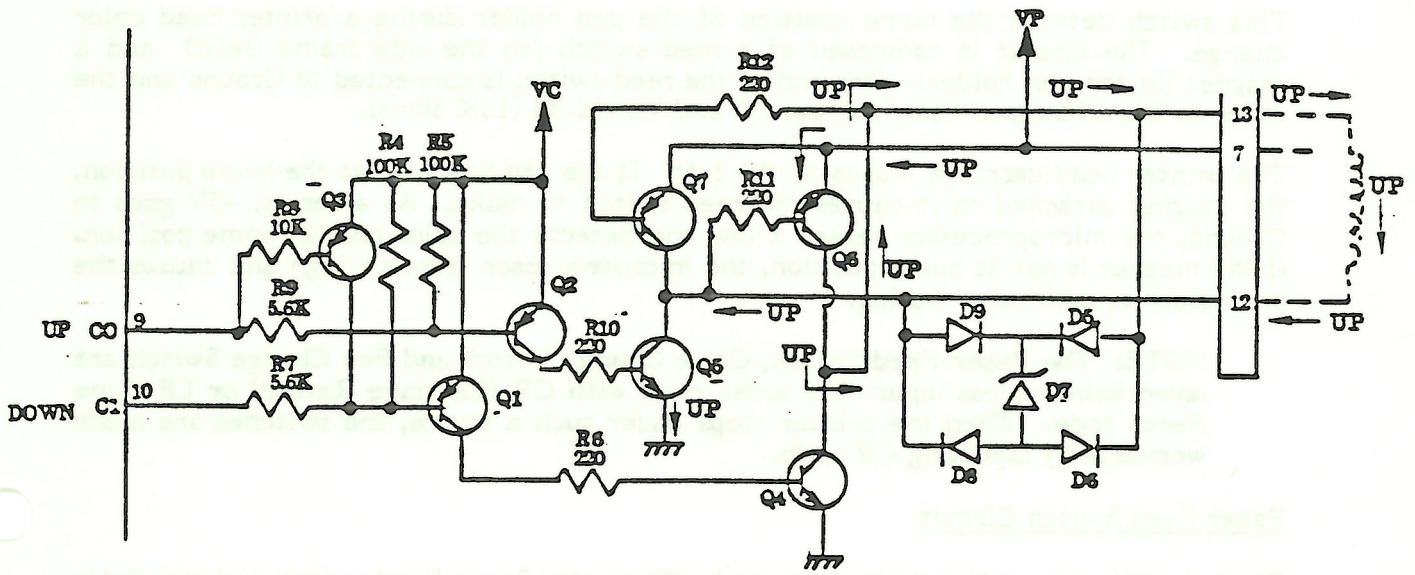


Figure 1-7. Pen-Up Circuit

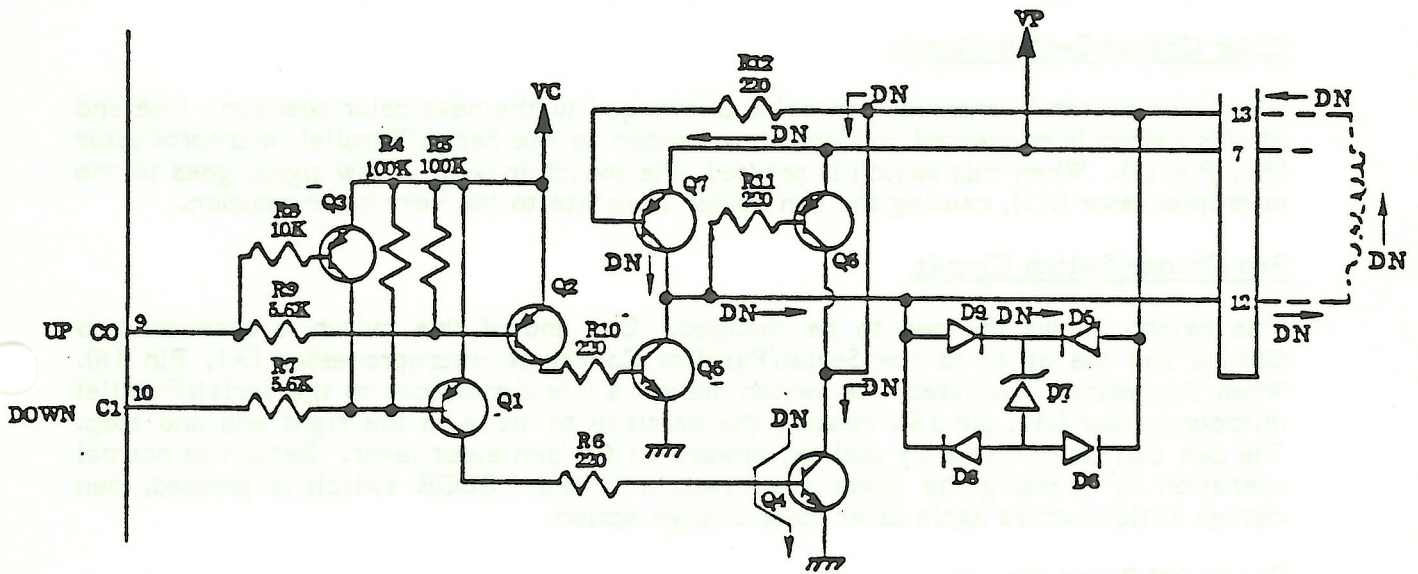


Figure 1-8. Pen-Down Circuit

Color Detect Switch Circuit

This switch detects the home position of the pen holder during a printer head color change. The circuit is composed of a reed switch (on the side frame (left)) and a magnet (in the pen holder). One end of the reed switch is connected to Ground and the other to the microprocessor (A2, pin 12) and Vc via R6 (10K ohms).

The printer head carriage moves to the left. If the pen holder is at the home position, the magnet attached to it causes the reed switch to make. As a result, +5V goes to Ground, the microprocessor senses a low and detects the color change home position. If the magnet is not at home position, the microprocessor senses a high and causes the pen holder to continue rotating.

NOTE: The Paper Feed Switch, Color Change Switch and Pen Change Switch are unworkable unless input data array ends with CR (Carriage Return) or LF (Line Feed) code. When the printer stops under such a status, the switches are made workable by inputting CR code.

Paper Feed Switch Circuit

Paper is fed when this switch is pressed. When the Paper Feed switch and the Color Change switch are pressed simultaneously, software reset works to set the printer to the text mode and the carriage moves to the left end. One end of this switch is connected to Ground and the other to the Serial/Parallel Converter microprocessor (A1, Pin 15). When this switch is pressed, the switch makes, a low signal goes to the Serial/Parallel converter microprocessor, causing the paper feed action.

Color Change Switch Circuit

When this switch is pressed, pen color is changed to the next color position. One end of this switch is connected to Ground and other to the Serial/Parallel microprocessor (A1, Pin 14). When this switch is pressed, the switch makes, a low signal goes to the microprocessor (A1), causing the pen holder to rotate to the next color position.

Pen Change Switch Circuit

This switch allows the pen to be changed. One end of this switch is connected to Ground and the other to the Serial/Parallel Converter microprocessor (A1, Pin 16). When this switch is pressed, the switch makes, a low signal goes to the Serial/Parallel microprocessor (A1, pin 16), causing the carriage to move to the right end and stop. The pen can be removed by pulling forward on the pen eject lever. Return to normal operation by pressing the paper feed switch. If the COLOR switch is pressed, pen change action occurs again after color change action.

Power ON Reset Circuit

When the printer power switch is turned on, the microprocessor is reset internally by the function of C13 (A2) and C14 (A1) to Ground.

Oscillator Circuits

The Serial/Parallel microprocessor (A1) and the Printer Controller microprocessor (A2) each incorporates a quartz oscillator (X1 & X2) which determines the operation frequency (4MHz +/- 700 Hz).

SECTION 2

SILKSCREENS AND SCHEMATICS

Attached to the front cover are representative silkscreens and schematics for the 1020. Remove them and place them in this section. Minor variations in design may be encountered depending on the production date of the unit, but these schematics provide all details required for an in-depth understanding of all 1020 Color Printer units.

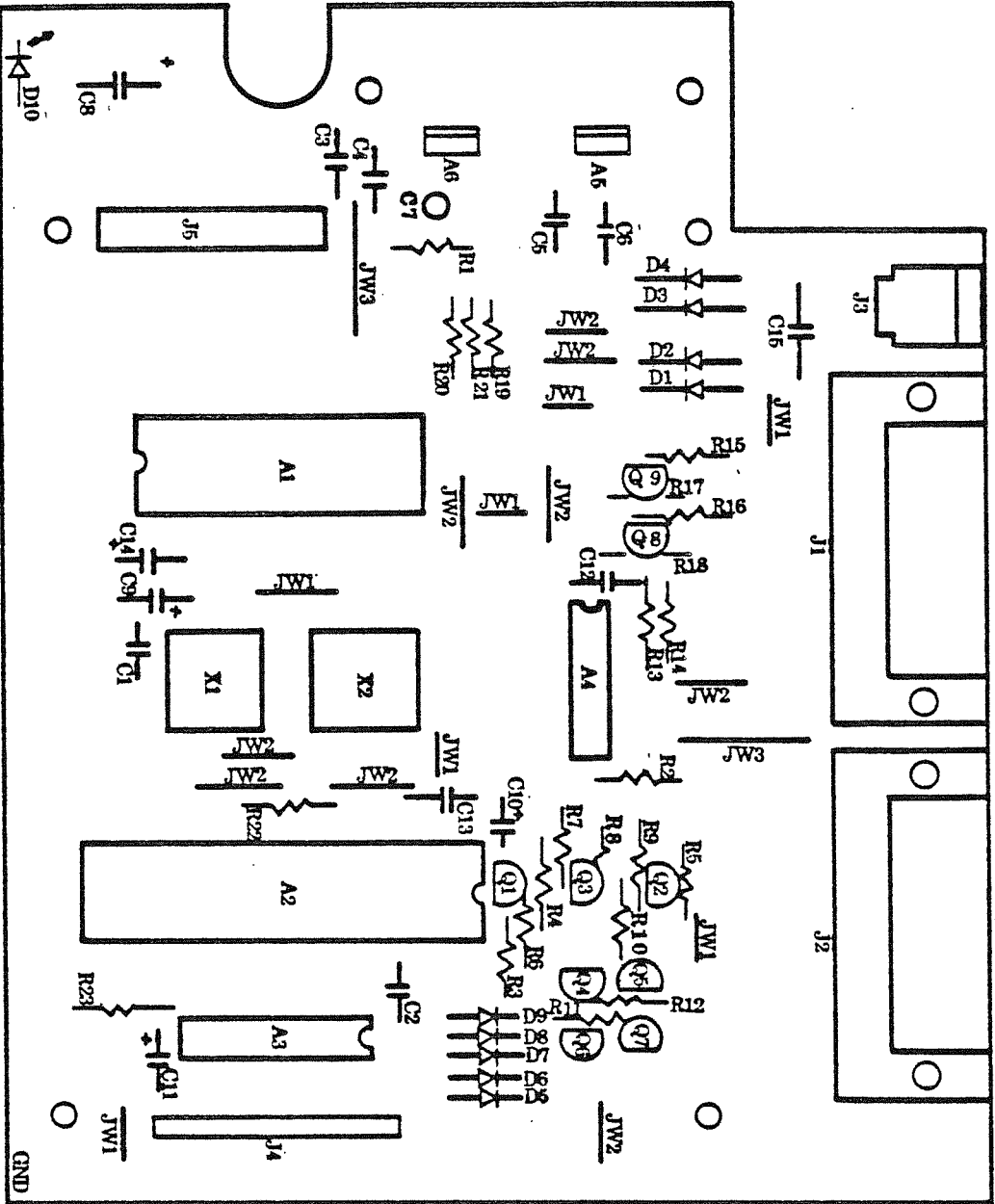


Figure 2-1. 1020 Color Printer Silkscreen.

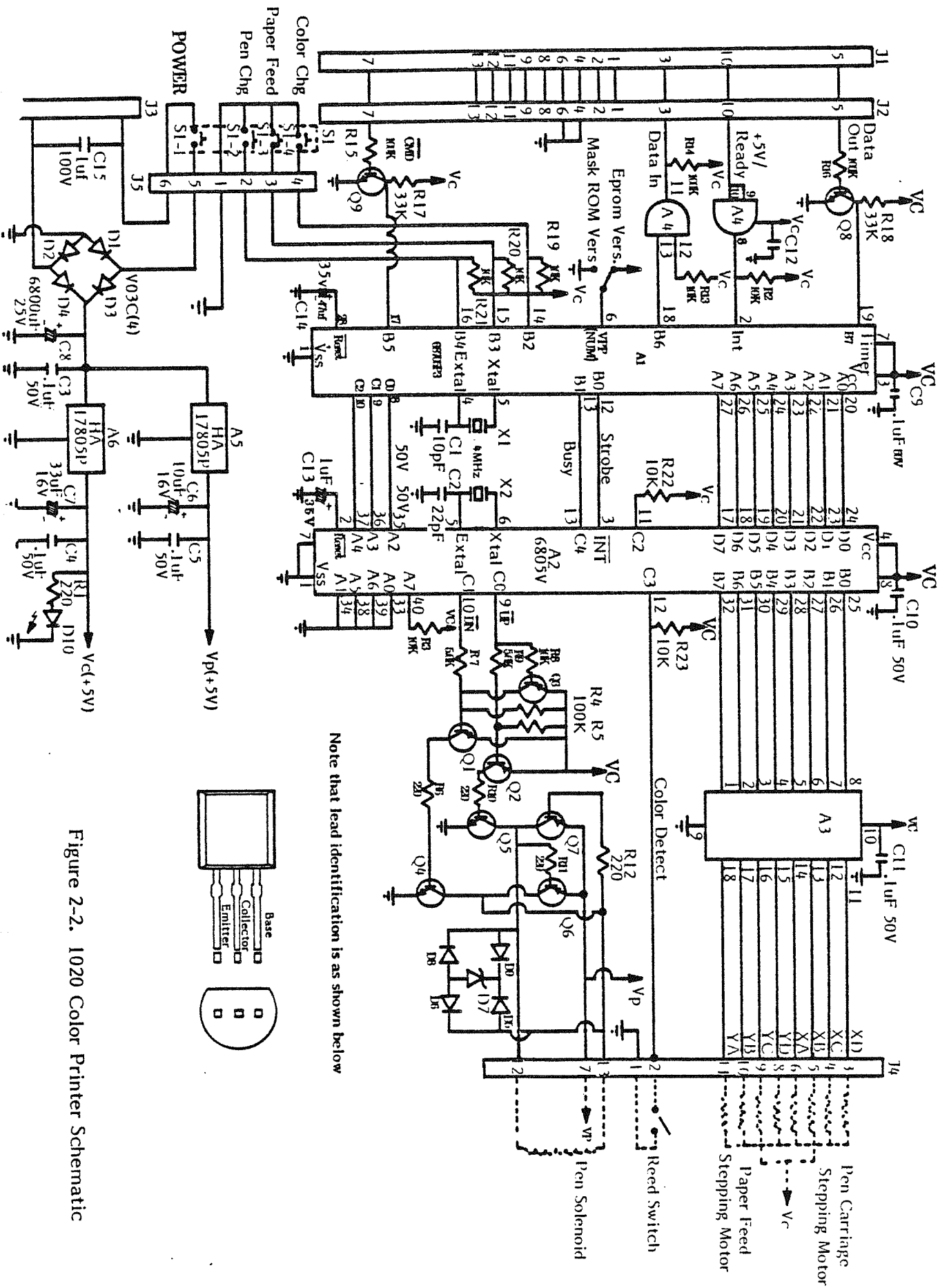


Figure 2-2. 1020 Color Printer Schematic

SECTION 3

TESTING

Equipment Required

- An Atari Computer and accessories
- A BASIC language cartridge
- CPS Diagnostic Diskette with the file T1020.BAS (FD100577)
- A Jewelers screwdriver kit
- A Standard tool kit
- A Volt/Ohmmeter
- A 15 MHz oscilloscope

Diagnostic Procedure

The testing procedures available for the 1020 are:

- An Internal Test which occurs at Initial Power-Up
- CPS Diagnostic Diskette with the file T1020.BAS
- An Operator Test which consists of a BASIC Program which you will type in. **This test should be used only if CPS Diagnostic Diskette with the file T1020.BAS is not available.**

The following pages explain how to set up the 1020 for testing and contain procedures and sample printouts for each test.

Setting up the 1020 for testing and using CPS Diagnostic Diskette with the file T1020.BAS

1. Connect the computer to the TV set as shown in the computer owner's manual.
2. Plug the 1020 into the power adaptor.
3. Plug an I/O cable into the computer and the 1020.
4. Connect the disk drive to the computer as shown in the owner's manual.
5. Power up the 1020 Printer. The Internal Test occurs when power is supplied to the 1020.
6. Power up the disk drive. Wait for the disk drive to complete its initialization.
7. Insert the CPS Diagnostic Diskette with the file T1020.BAS into the disk drive and close the door.
8. Insert the BASIC cartridge into the computer (if applicable).*

***NOTE:** This program requires the use of BASIC to execute, later model computers may have BASIC already installed.

9. Power up the computer. Wait for the computer to complete its initialization. Display device should exhibit "READY" in white letters on a blue background.
10. Enter the command RUN "D1:T1020.BAS" and terminate with the RETURN key.
11. The program will now load and execute.
12. The following menu appears:

Test Facility
for the
1020 Plotter/Printer

Rev 1

- 1) All Function Test
- 2) Pen Up/Down
- 3) Platen Up/Down
- 4) Draw Right/Left
- 5) Pen Change

Q) Stop test and return to menu

Please Select an Option

Select 1) for the printout illustrated in Figure 3-1 and Figure 3-2.

Select 2) to provide a signal for Pen Up/Down troubleshooting. The printout for this option is a straight line drawn across the page.

Select 3) for Platen Up-Down operation.

The following menu appears:

Selection Test
Options for The
1020 Plotter/Printer

- 1) Platen Up
- 2) Platen Down
- 3) Return to Exec Menu

Q) Stop test and return to menu.

Please Select an Option

NOTE: Platen-Up spins the paper roll forward; Platen-Down reverses the paper roll. Platen-Up pulls the paper in when paper is loaded. To avoid paper waste, execute Platen-Down or remove paper when executing Platen-Up.

Select 4) to move the carriage right and left.

NOTE: The carriage should go to the right, then to the left. It may stop at this point. You may have to restart this test in order to continue.

Select 5) to rotate the rotary pen holder.

The following menu appears:

- 1) Change in increments of 1
- 2) Change in increments of 2
- 3) Change in increments of 3
- 4) Return to Exec Menu

Q) Stop Test and Return to Menu

Please Select an Option

NOTE: Option 3 rotates the pen holder in the following sequence: holder rotates 3 increments, then rotates 1 increment (to return to Home Position). This is normal operation for this option and not a problem in your printer.

Figure 3-1 is a black and white representation of the Diagnostic Diskette printout.

```
* TEXT MODE
  FULL CHARACTER SET IN 20-CHAR MODE

áùÑÉÇôò ì£ïüäöúóöÛâûî
èèñêääÀ↑↓←→  !"#%&' (
) * + , - . / 0 1 2 3 4 5 6 7 8 9 : ; <
=> ? @ A B C D E F G H I J K L M N O P
Q R S T U V W X Y Z [ \ ] ^ _ ¡ a b c d
e f g h i j k l m n o p q r s t u v w x
y z Ä | 5 4 D

      FULL CHARACTER SET IN 40-CHAR MODE

áùÑÉÇôò ì£ïüäöúóöÛâûîèèñêääÀ↑↓←→  !"#%&' (
) * + , - . / 0 1 2 3 4 5 6 7 8 9 : ; <=> ? @ A B C D E F G H I J K L M N O P
Q R S T U V W X Y Z [ \ ] ^ _ ¡ a b c d e f g h i j k l m n o p q r s t u v w x
y z Ä | 5 4 D

      FULL CHARACTER SET IN 80-CHAR MODE

áùÑÉÇôò ì£ïüäöúóöÛâûîèèñêääÀ↑↓←→  !"#%&' (
) * + , - . / 0 1 2 3 4 5 6 7 8 9 : ; <=> ? @ A B C D E F G H I J K L M N O P
Q R S T U V W X Y Z [ \ ] ^ _ ¡ a b c d e f g h i j k l m n o p q r s t u v w x y z Ä | 5 4 D
```

Figure 3-1. CPS Diagnostic Diskette sample printout (Text mode)

Figure 3-2 is a black and white representation of the Diagnostic Diskette printout.

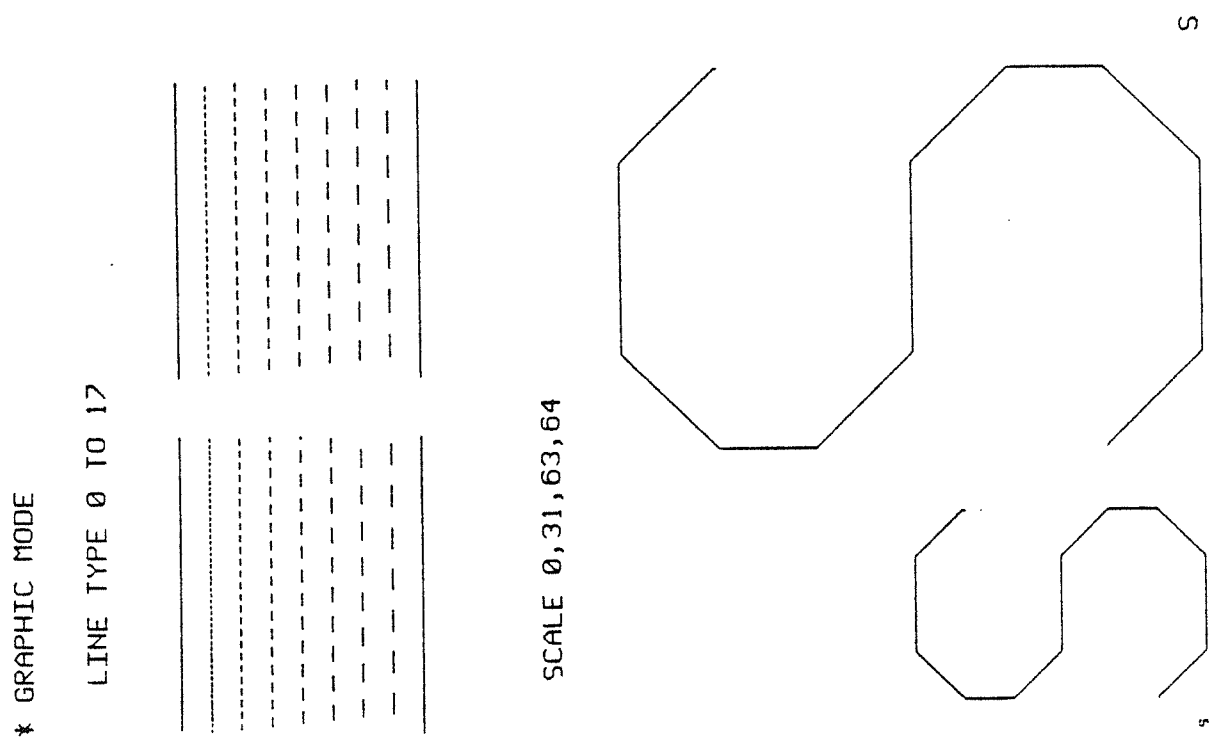


Figure 3-2. CPS Diagnostic Diskette sample printout (graphic mode)

Internal Test

- 1) Press the POWER switch on the 1020. The switch should stay down and the LED should come on.
- 2) The print head should move to the far left, stop there for 2-3 seconds then draw four colored boxes on the screen (see Figure 3-3).
- 3) The print head should then stop near the left margin.

Figure 3-3 is a black and white representation of the Internal Test printout.



Figure 3-3. Internal Test Sample Printout

Operator Test

NOTE: Use only if CPS Diagnostic Diskette with the file T1020.BAS is not available.

The 1020 has several different command codes. During this test we will test the major character types. If the customer complains of other character types not working, check page 3-10.

NOTE: It is possible you may enter the wrong command. Before Troubleshooting, be sure that you made the correct entries.

To test the 1020:

1. Type in the following program in BASIC, making sure that you press the RETURN key after each line that you type in. If you receive an ERROR message after pressing RETURN, retype the line making sure that it is typed exactly like the model at the top of page 3-7.

```

10 OPEN #1,8,0,"P"
20 DIM A$(8)
30 ? #1: ? #1
40 INPUT A$
50 IF A$="SKIP" THEN GOTO 30
60 ? #1;A$
70 FOR X=0 TO 126
80 IF X=27 THEN 100
90 ? #1;CHR$(X);
100 NEXT X
110 ? #1;CHR$(127)
120 GOTO 40

```

2. Type RUN and press RETURN.
3. A question mark will appear on the screen asking you for the command code.
4. When the computer is ready to accept a command the white cursor appears to the right of the question mark. When the instructions tell you to type in a certain code, refer to the Character Command Code Table (Table 3-1) on page 3-9.
5. The above program checks text mode. For Pen Up-Down Troubleshooting, Print Head (Carriage) Motor Troubleshooting or Paper-Feed (Platen) Motor Troubleshooting, use the following instructions.

Pen Up-Down Troubleshooting Program

Use above program with (See Table 3-1): 80 Columns per line
 Enable International character set

This provides rapid pen up/down movement.

To repeat test, press RETURN.

Print Head (Carriage) Motor Troubleshooting Program

Enter the following. Remember to press RETURN at the end of each line.

```

10 OPEN #1,8,0,"P"
20 ?#1;" ESCAPE, ESCAPE, CONTROL G"*
30 ?#1;"M480,0;0,0
40 GOTO 30

```

Type RUN and press RETURN.

To stop program, press <BREAK>

*Press the CONTROL key and the letter key at the same time.

Paper Feed (Platen) Motor Troubleshooting Program

Enter the following. Remember to press RETURN at the end of each line.

```
10 OPEN #1,8,0,"P"  
20 ?#1;" ESCAPE, ESCAPE, CONTROL G"*  
30 ?#1;"M0,999;0,-999  
40 GOTO 30
```

Type RUN and press RETURN.

To stop program, press <BREAK>

TABLE 3-1
CHARACTER COMMAND CODE TABLE

TEXT MODE:

<u>YOU TYPE IN</u>	<u>FUNCTION</u>
ESCAPE, ESCAPE, CONTROL P *	20 column printing
ESCAPE, ESCAPE, CONTROL S *	80 column printing
ESCAPE, ESCAPE, CONTROL N *	40 column printing (normal)
ESCAPE, ESCAPE, CONTROL W *	Enable International Char. Set.
ESCAPE, ESCAPE, CONTROL X *	Disable International Char. Set.

GRAPHICS MODE:

<u>YOU TYPE IN</u>	<u>FUNCTION</u>
ESCAPE, ESCAPE, CONTROL G*	Enter Graphics Mode
?#1;"A"	Return to Text Mode.
?#1;"MX,Y"	Move Cursor

*Press the CONTROL key and the letter key at the same time.

When entering the character command codes, do not insert spaces or commas between the commands or press RETURN. Type them in consecutively on the screen.

NOTE: The maximum number of characters that can be entered is eight.

Although you press the ESCAPE key twice, only one character appears on the screen.

6. Press RETURN. The printer prints the default character set.
7. Press the COLOR button on the 1020.
8. Type in the code for (See Table 3-1): 20 columns per line
Enable International character set
and press RETURN.
9. Press the COLOR button on the 1020. The print head should advance a step.
10. Type in the code for (See Table 3-1): 80 columns per line
Disable International character set
and press RETURN.

11. Press the COLOR button on the 1020. The print head should advance one step.
12. Type in the code for (See Table 3-1): 40 columns per line and press RETURN.
13. Using the sample printout as a model (See Figure 3-4), examine the characters to determine if they are the correct shape. If they are not the correct shape, proceed to the Diagnostic Flowchart, page 4-2.

If the printout is correct, check for the following problems:

- Is the print lighter on one side of the lines than the other? If so, replace either: 1) the pens
2) the rotary pen holder.

Specific Command Code Failures

If the customer complains of a specific code failure (Example: won't draw in graphics mode), verify the complaint, then check chips A1 and A2. Swap these out one by one using procedures on page 4-1.

Figure 3-4 is a black and white representation of the Operator Test printout.

```
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGH
IJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnop
qrstuvwxyz |
```

```
áùñéçôò ìéíüäöúóöüâûî
èèñêääâ↑↓←→ !"#$%&'(
)*+, -./0123456789:;<
=>?@ABCDEFGH-IJKLMNOP
QRSTUVWXYZ[\]^_`abcde
fghijklmnopqrstuvwxyz
yzä|ñ<>
```

```
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGH
IJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnop
qrstuvwxyz |
```

```
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGH
IJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnop
qrstuvwxyz |
```

Figure 3-4. Operator Test Sample Printout

SECTION 4

DIAGNOSTIC FLOWCHARTS

OVERVIEW

The Diagnostic Flowchart is intended to be easy to use and the primary aid when troubleshooting the 1020. Follow the prompts in the order presented. When a question is asked, follow the line from the box that best applies to your unit's condition. When that line terminates with a letter inside a circle, locate the letter on a different page and continue the diagnosis. The flowchart leaves nothing to chance, it tells you when to perform a specific test and when to replace components. Refer to Section 6, Disassembly/Assembly for adjustments and replacements discussed in the flowcharts. Refer to Section 3 for Tests which are referenced in the flowcharts.

SWAPOUT PROCEDURE

At many places in the diagnostic flowchart, a box tells you to "swapout" a component, a chip, or a number of chips in a particular order. The "swapout" instruction means that you should replace the indicated components (one at a time) with a known-good component of the same type. The unit should then be tested with the new, known-good component in place to see whether the swapout solved the problem being checked. If the swapout did not fix the problem, leave in the new chip and swapout the next. Repeat this procedure for the rest of the swapout. Once the unit properly functions, reinstall the removed IC's to determine which are actually defective.

REPLACE IN ORDER

The "replace in order" instruction means that you should replace the components indicated in the order listed until the result called out in the previous block is obtained.

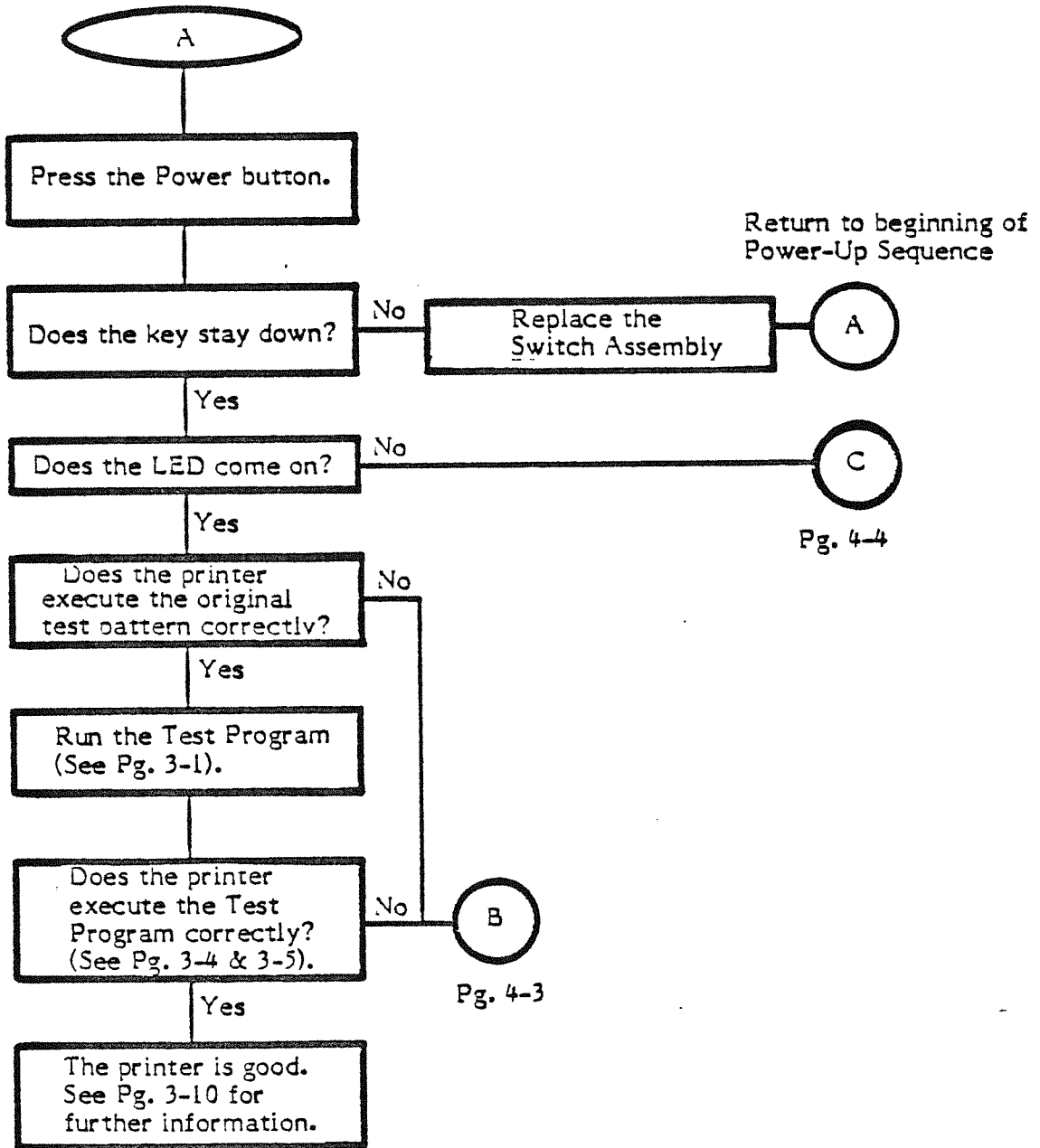
A - Some lines terminate with an **A** inside a circle. When this occurs return to the beginning of the Power-up sequence, Page 4-2.

If you need further clarification, call your Atari Repair Hotline.

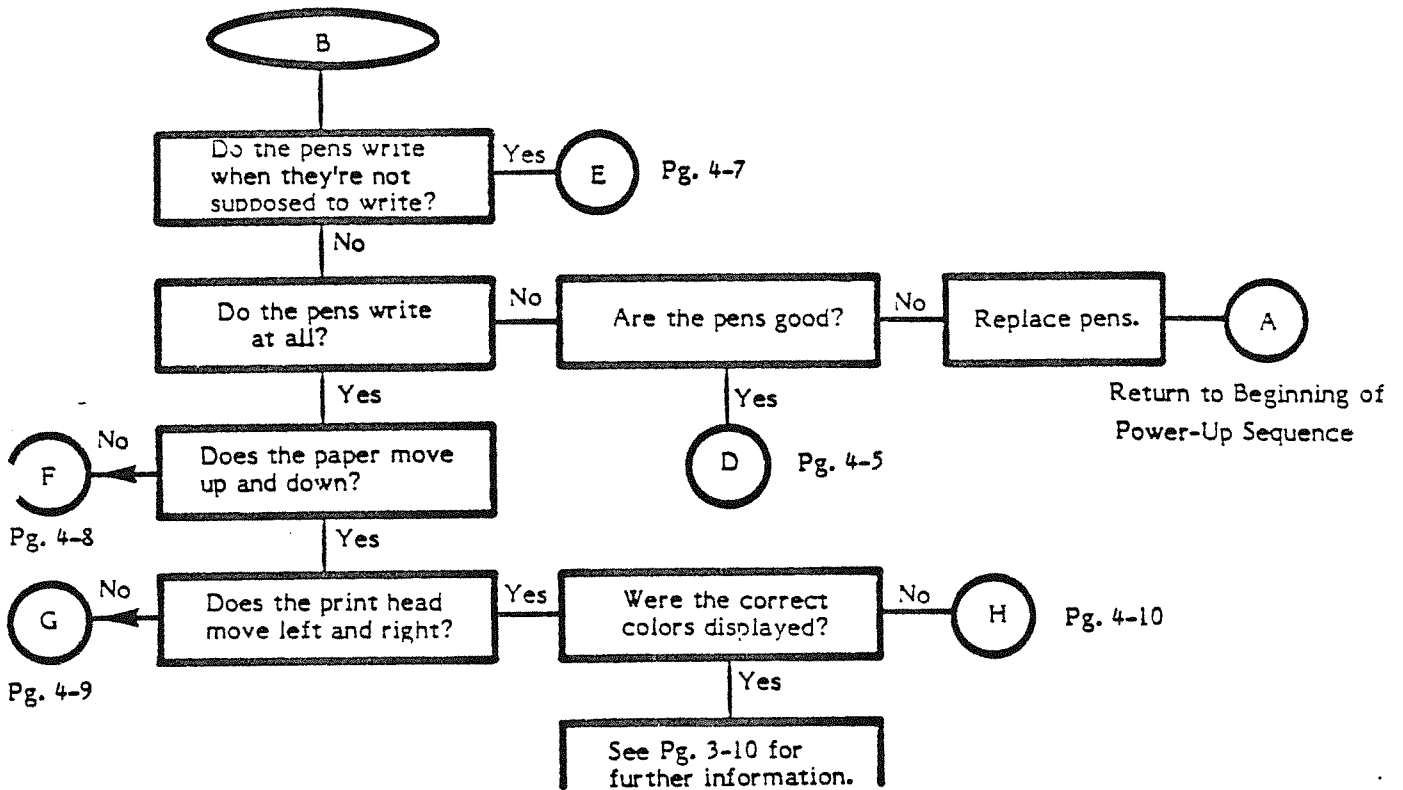
Inside California
(800) 672-1466

Outside California
(800) 538-1535

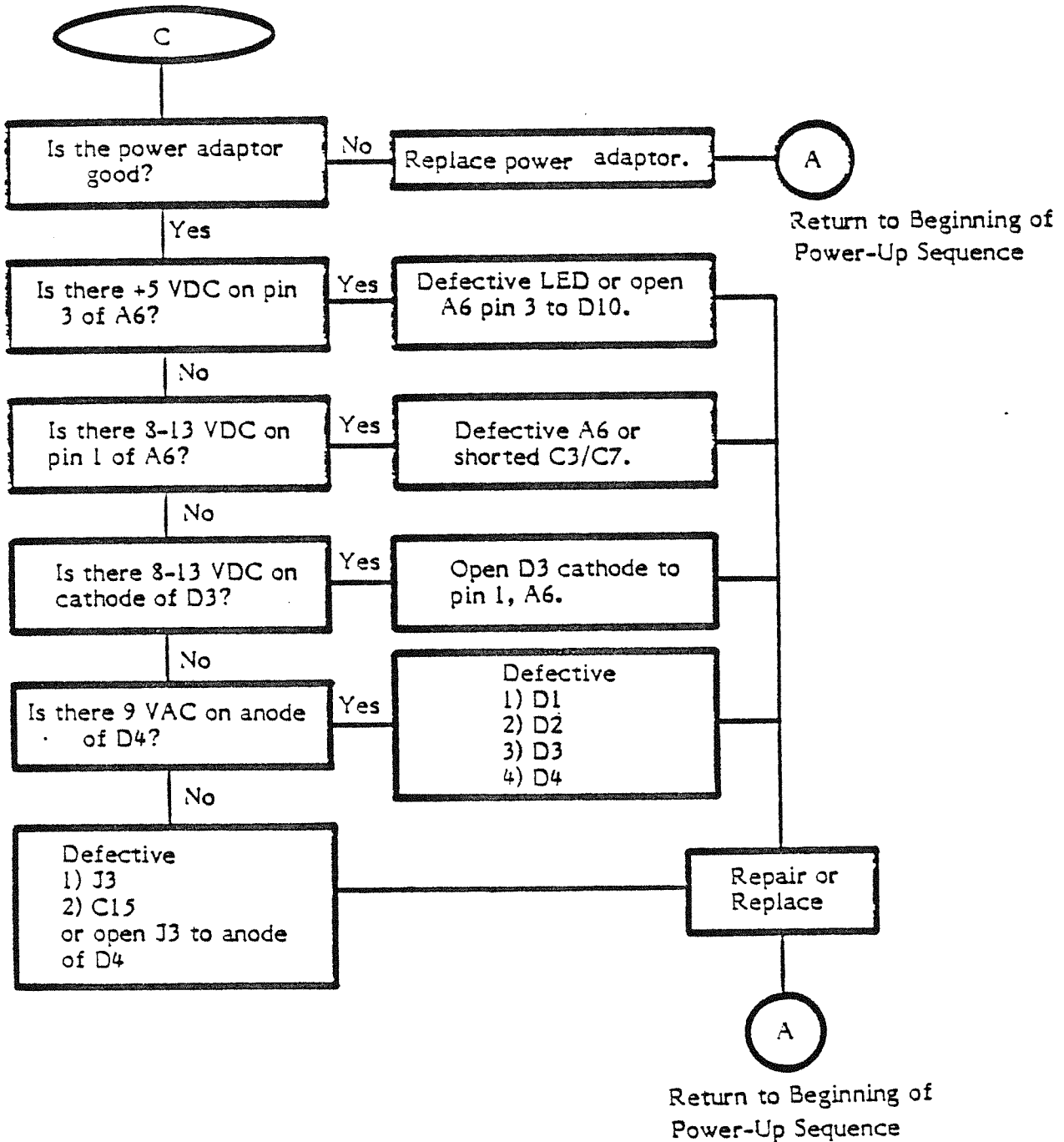
POWER-UP SEQUENCE



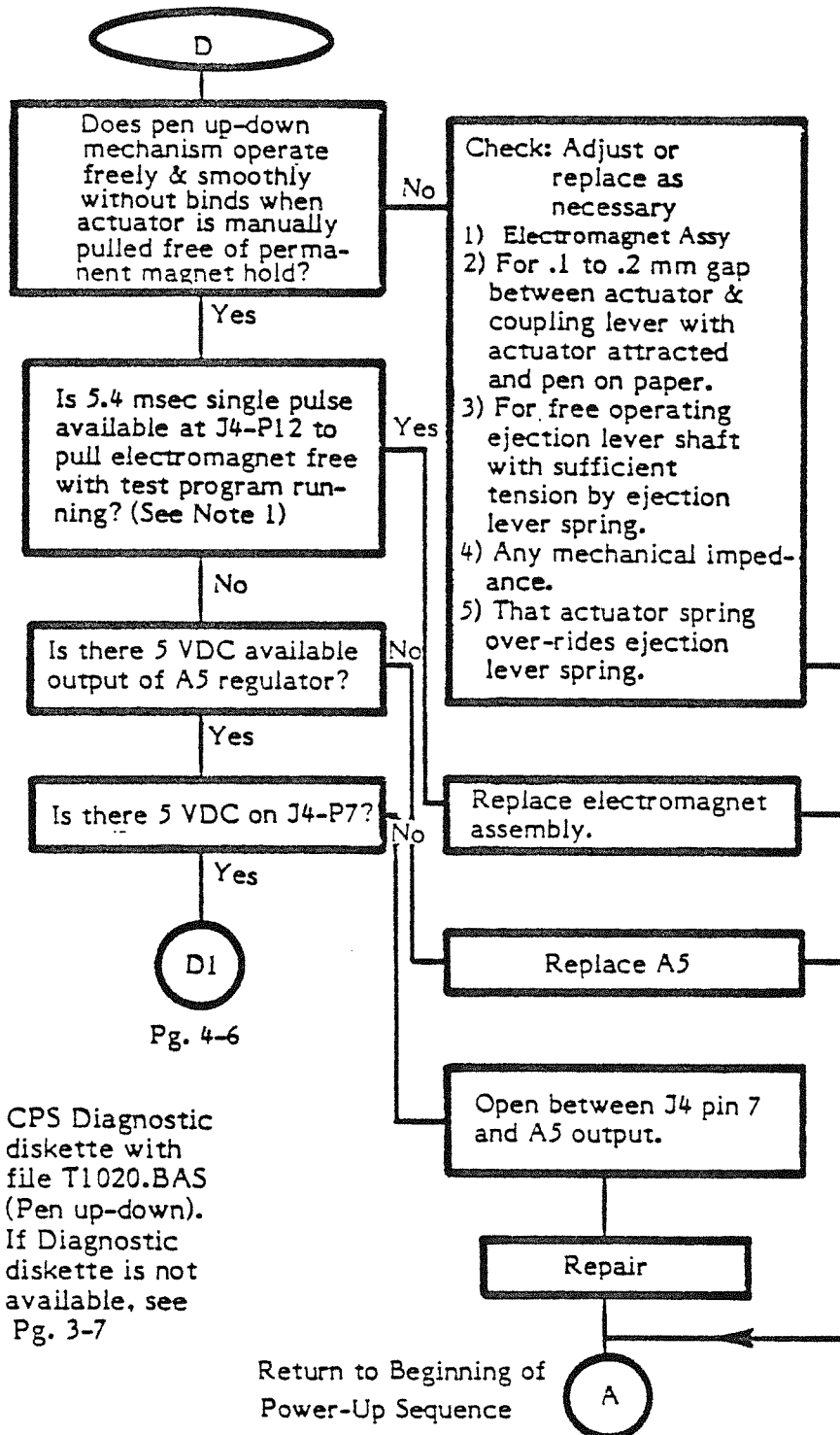
POWER-UP SEQUENCE (cont.)



NO POWER TROUBLESHOOTING



PEN-DOWN TROUBLESHOOTING



Note 1: CPS Diagnostic diskette with file T1020.BAS (Pen up-down). If Diagnostic diskette is not available, see Pg. 3-7

PEN-DOWN TROUBLESHOOTING (cont)

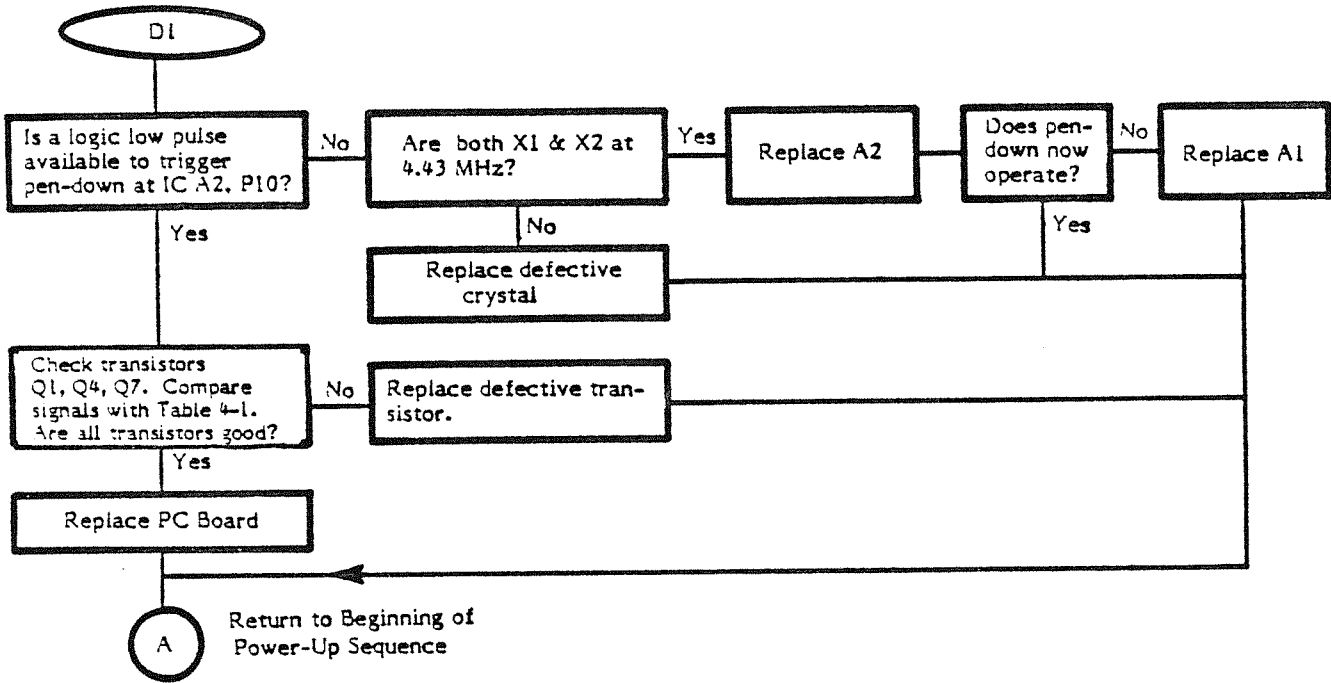
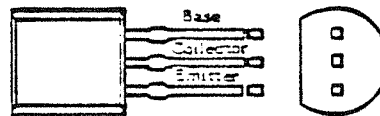


Table 4-1
Pen Up-Down Transistor Check
(All signals should be approx. 5 msec pulse while pen up-down test is running)

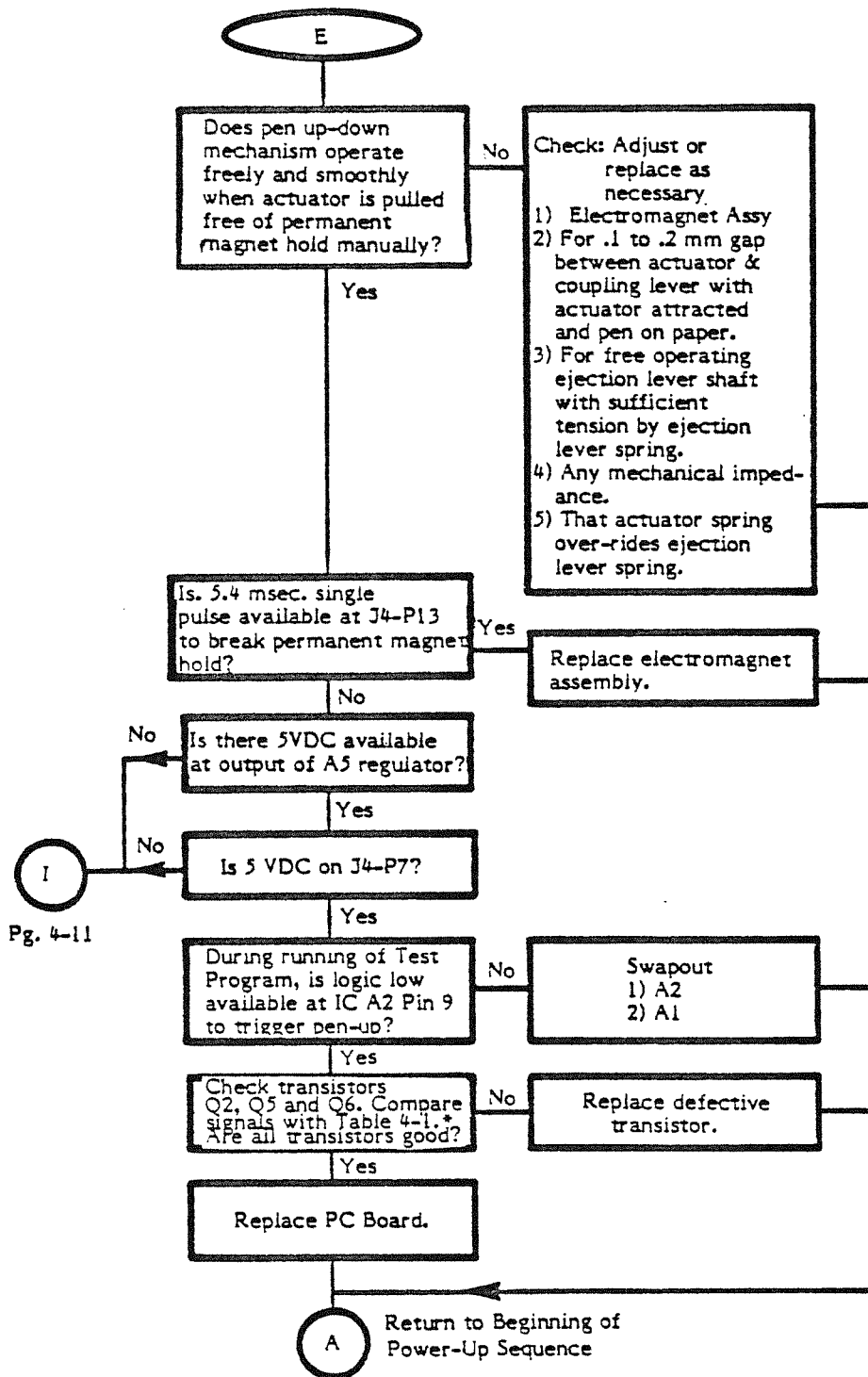
UP TRANSISTOR		DOWN TRANSISTOR	VOLTAGE from to	
A2 pin 9	A2 pin 10		5V	0V
Q2	Q1			
E	E	connected to Vc	5V	4V
B	B		0V	3V
C	C			
Q5	Q4			
E	E	connected to GND	0V	1V
B	B		5V	0V
C	C			
Q6	Q7			
E	E	connected to Vp	5V	4V
B	B		5V	0V
C	C			

Note that lead identification is as shown below.



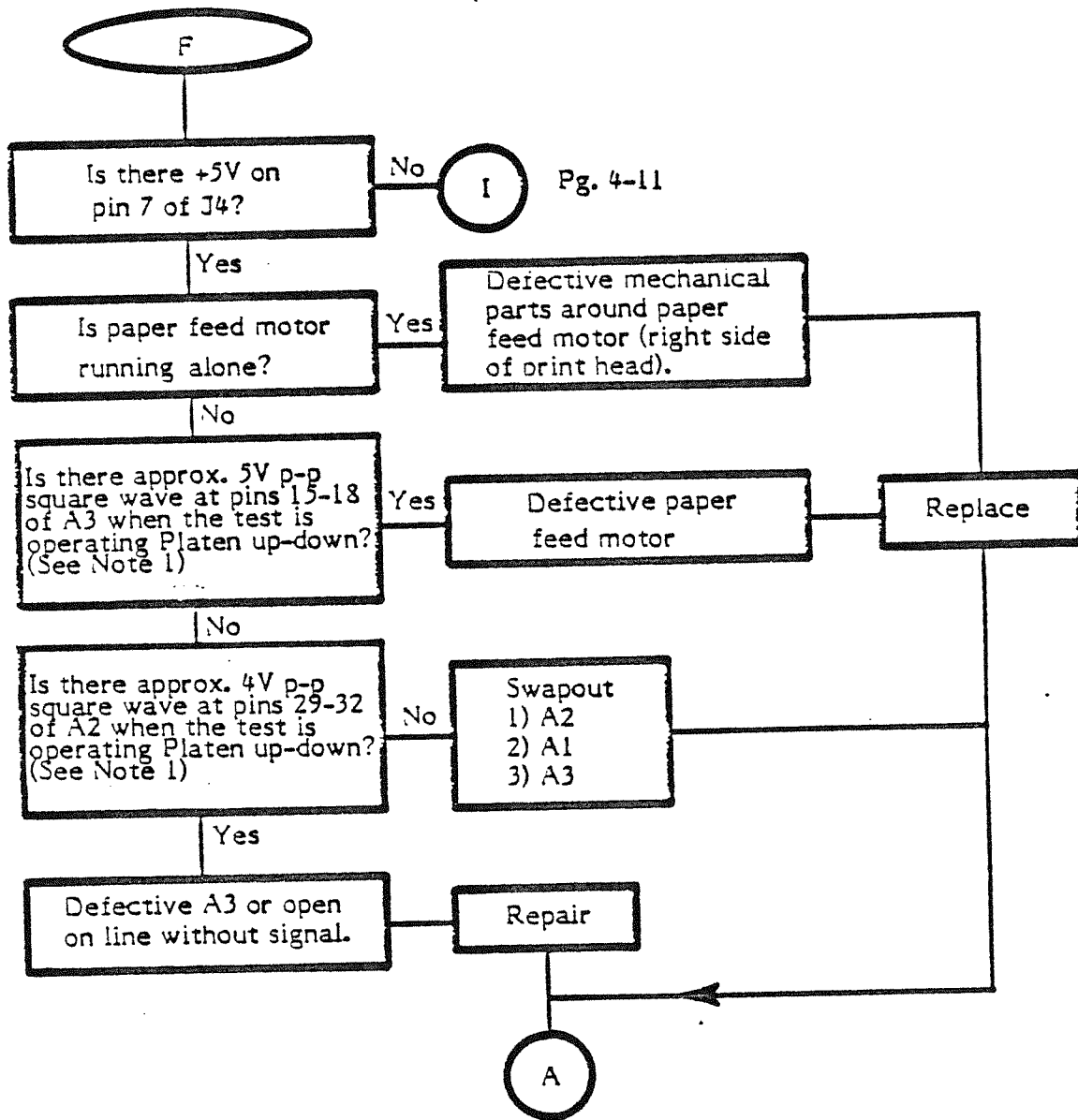
NOTE: Printer mechanism does not have to be connected to check for pulse.

PEN-UP TROUBLESHOOTING



*Page 4-6

NO PAPER FEED TROUBLESHOOTING

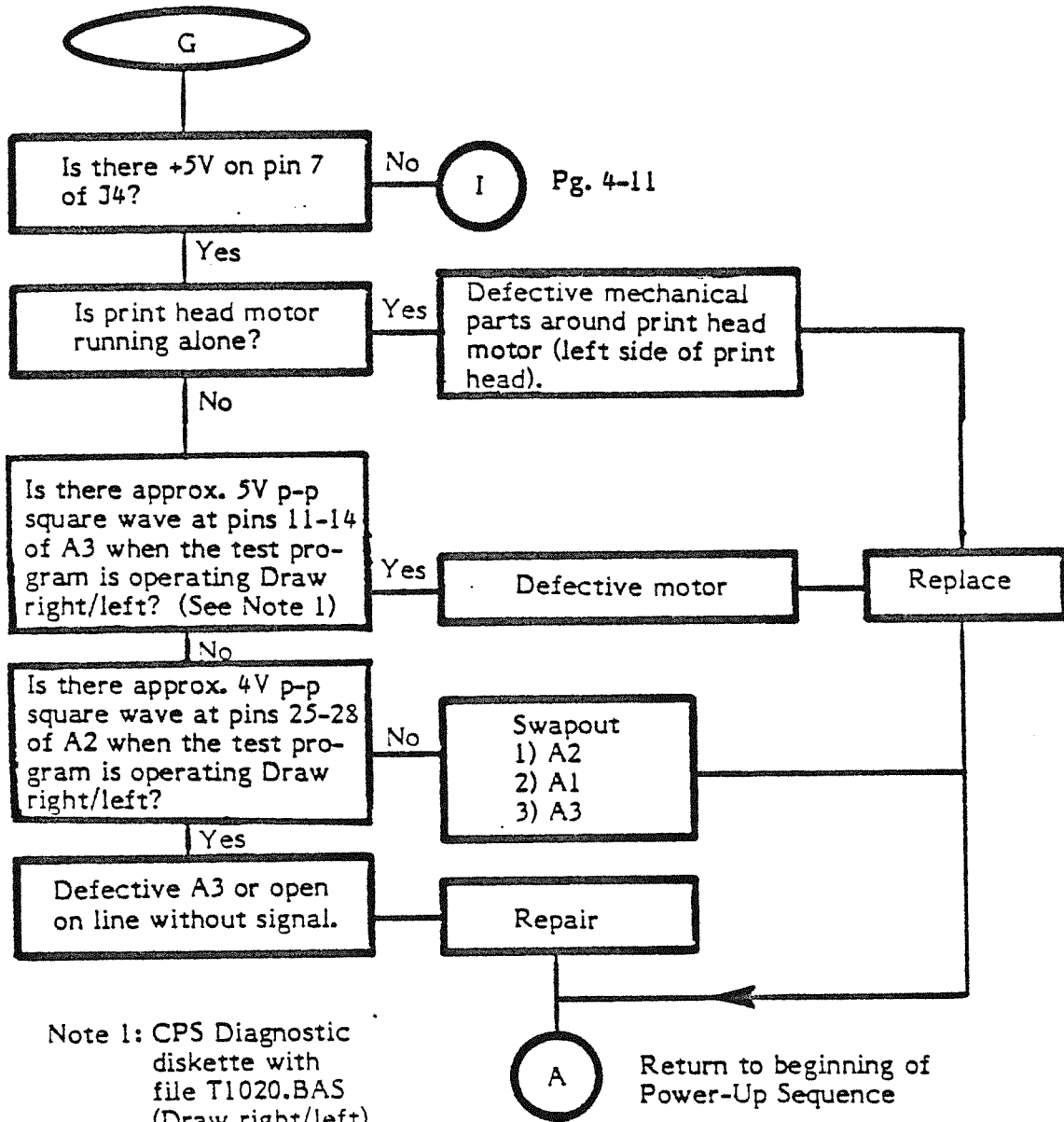


Return to Beginning of
Power-Up Sequence

Note 1: CPS Diagnostic diskette with file T1020.BAS (Platen up-down). If Diagnostic diskette is not available, see Pg. 3-8

NOTE: Platen-up pulls paper in when paper is loaded. To avoid paper waste, execute Platen-down or remove paper when executing Platen-up.

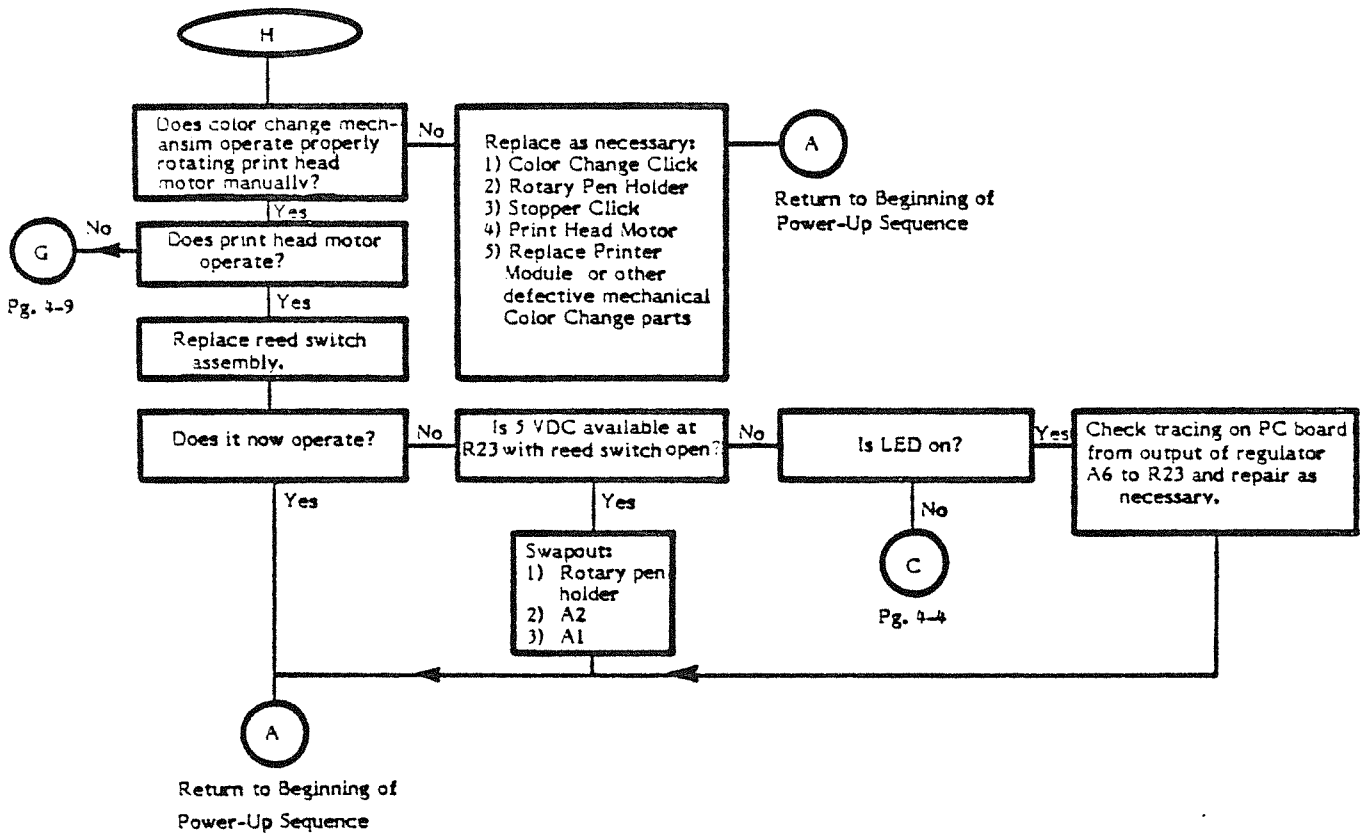
PRINT HEAD DOES NOT MOVE



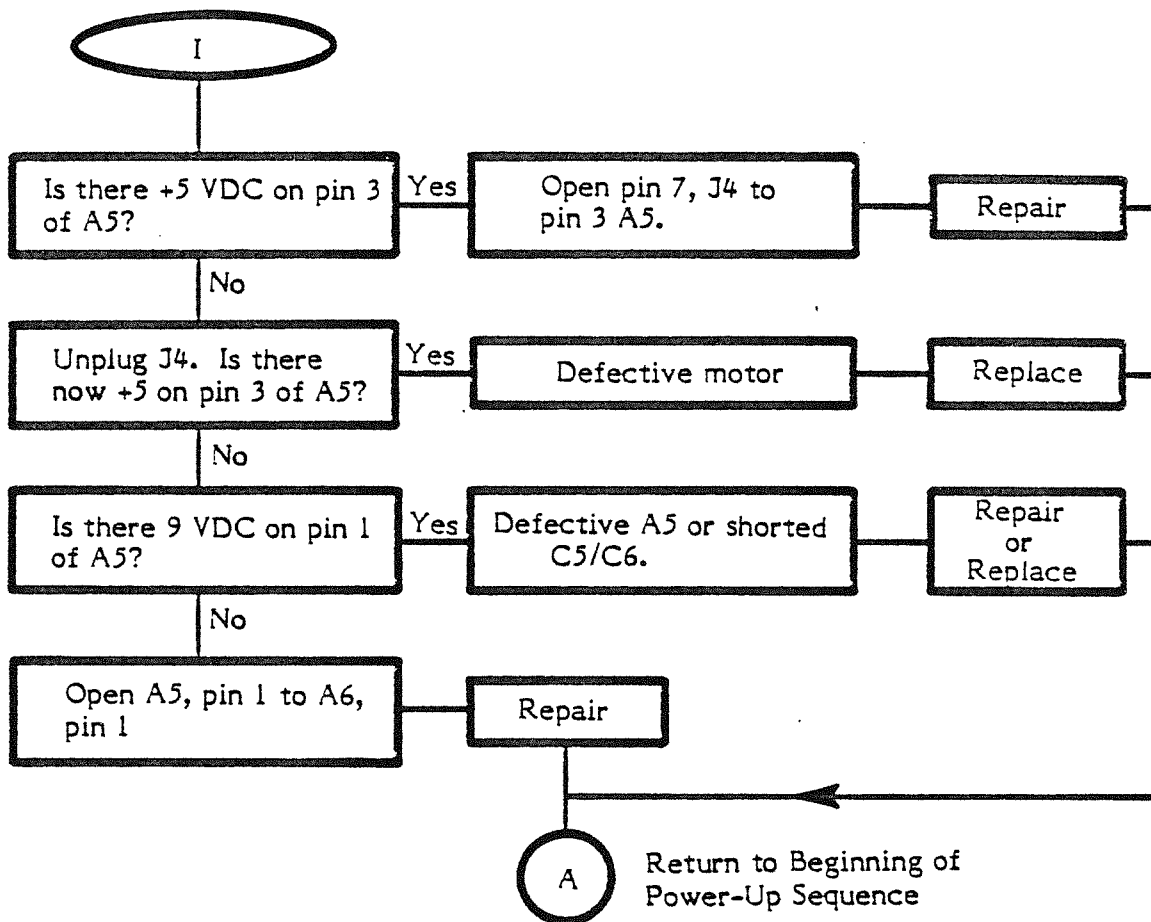
Note 1: CPS Diagnostic diskette with file T1020.BAS (Draw right/left). If Diagnostic diskette is not available, see Pg. 3-7

NOTE: Draw right/left moves the pen carriage right and left. The pen may not be down, therefore no line will be drawn.

COLOR CHANGE TROUBLESHOOTING



NO UP OUTPUT



SECTION 5

SYMPTOM CHECKLIST

<u>Symptom</u>	<u>Possible Cause</u>	<u>Flowchart Entry Point</u>
LED No Power	D10, A6, D1-D4, J3	C, Page 4-4
No Initialization	A1, A2, A3, Motors, Pens	B, Page 4-3
Pens Do Not Write	Pens, J4, Print Mech, A1, A2, A3	E, Page 4-7
Pens Always Write	J4, Print Mech, A1, A2, A3	D, Page 4-5
No Paper Feed	Print Mech, A1, A2, A3	F, Page 4-8
Print Head Does Not Move	Print Mech, J4, A1, A2, A3	G, Page 4-9

SECTION 6

DISASSEMBLY/ASSEMBLY

Equipment Required

- a precision screwdriver set
- a solder iron
- pliers
- tweezers
- a small can of light weight oil
- Snap Ring Tool (optional)
- a feeler gauge

Preventive Maintenance

Each Atari 1020 Color Printer which is disassembled must have the following Preventive Maintenance performed:

- Carefully clean any dust or dirt from inside the unit - use a dry, soft cloth.
- Use alcohol or benzene to remove any stains. Do not use thinner, trichloroethylene or ketone solvents — they may damage the plastic parts.
- Lubricate each of the following points with one small drop of light weight oil: Use Figure 6-1 as reference for these points.
 - the pivot point of the ejector shaft (left front of printer module)
 - the ejection roller (move the slider unit back and forth a few times to distribute the oil evenly along the shaft)

Adjustments

Before returning the unit to the customer be certain that the following adjustments are correct.

- Actuator and Coupling Lever Adjustment (See Page 6-5)
- Pen and Paper Platen Adjustment (See Page 6-6)

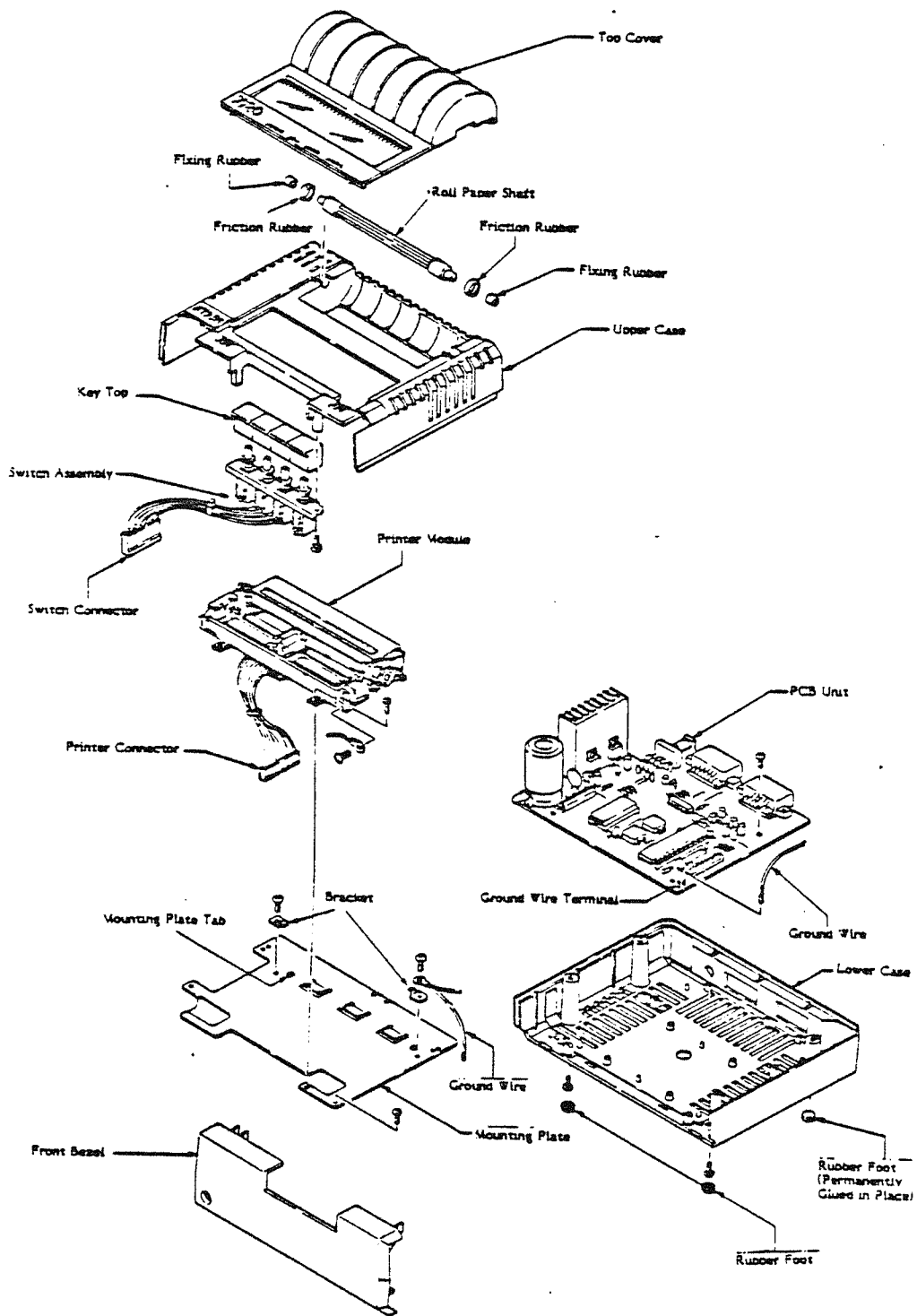


Figure 6-2. 1020 Color Printer Final Assembly.

DISASSEMBLY

WARNING: Be sure unit is unplugged from AC power before disassembly to any level.

Use Figure 6-1 and Figure 6-2 as reference for 1020 Color Printer Disassembly/Assembly.

Case Disassembly/Switch Assembly Removal

- Slide the top cover back to disengage the tabs from the bezel. Lift off the top cover and remove the paper roll.
- Turn the printer upside down and remove the two front rubber feet (back rubber feet are permanently glued in place).
- Remove the two machine screws under the feet.
- Remove the three wave screws.
- Turn the unit right side up. Disconnect the upper case from the lower case by slightly lifting the back portion of the upper case.
- Pull the lower front portion of the bezel forward and disengage the hooks on the upper side of the bezel from the upper case.
- Set the bezel aside.
- Set the upper case upside down in front of the lower case.
- Remove the two screws which hold the switch assembly in place.
- Remove the upper case.
- To access the switch assembly harness, loosen the mounting plate screw (right front) and swing the plate aside.

Printer Module Removal

- Remove the screw (right front) which holds the mounting plate to the lower case. Lift the mounting plate with printer module attached.
- Remove the ground wire from the PC board (right front).
- To remove the printer module from the mounting plate:
 - remove the two front screws which hold the printer module to the mounting plate.
 - Loosen, but do not remove the two rear screws and brackets. Loosen them enough to slide the rubber pads on the printer module out from under the brackets.

The following pages contain instructions for printer module component removal and replacement. These include:

- the Electromagnet Assembly (Solenoid)
- the Reed Switch
- the Color Change Click
- the Motor Cover, Print Head Motor and Paper Feed Motor
- the Rotary Pen Holder
- the Stopper Click
- the Paper Feed Idle Gear
- the Ejection Lever Spring
- the Paper Holding Rollers
- the Print Head Idle Gear

Electromagnet Assembly (Solenoid) Removal and Replacement

NOTE: Do not use magnetic substance near the electromagnet assembly.

- Remove the Phillips-head screw which holds the electromagnet assembly to the printer module frame (right front, under electromagnet assembly).
- Desolder the two electromagnet assembly wires from the PC Board. Note where each is attached - you will need to recheck this during re-assembly.

To replace the electromagnet assembly:

- Insert the holding pin on the electromagnet assembly into the frame unit.
- Insert, but do not yet tighten the Phillips-head screw which holds the electromagnet assembly to the frame. You will tighten it when you make the actuator/coupling lever adjustment.

NOTE: The following adjustments must be made when the electromagnet assembly is replaced.

Actuator and Coupling Lever Adjustment

- Place a pen in the rotary pen holder and pull the actuator of the electromagnet assembly out to make the pen down condition.
- Adjust the gap between the actuator and coupling lever to 0.1-0.2 mm (See Figure 6-3).
- Tighten the screw which holds the electromagnetic assembly to the frame unit.

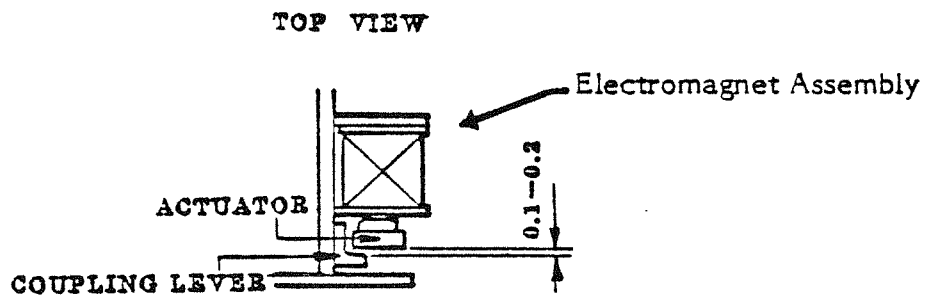


Figure 6-3. Actuator/Coupling Lever Adjustment

Pen and Paper Platen Adjustment

- Pull the actuator to make the pen up condition.
- Adjust the gap between the ball-point pen and paper platen by turning the stopper screw (see Figure 6-4). The gap should be within the range of 0.6-0.7 mm. (For reference: turning the screw counter-clockwise widens the gap.)
- Solder the two electromagnet assembly wires (one black; one red) to the PC board. Be sure that each wire is attached to the correct point on the PC board.

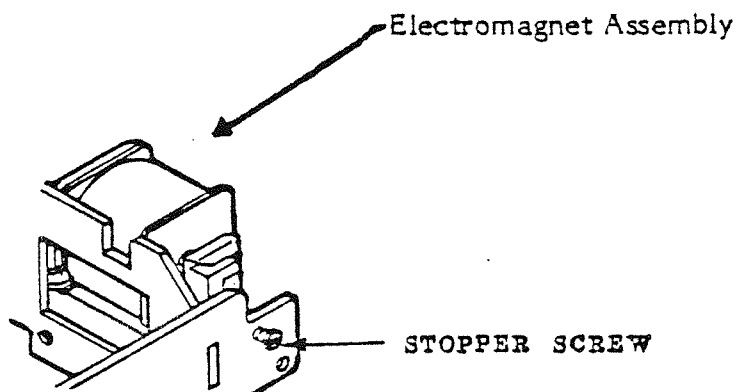


Figure 6-4. Pen and Paper Platen Adjustment

Reed Switch Removal and Replacement

- Remove the Phillips-head screw and dust shield.
- Desolder the two wires (one yellow; one grey) from the PC board.

To replace the Reed Switch:

- Align the hole in the Reed Switch over the holding pin on the frame unit.
- Insert and tighten the Phillips-head screw which holds the switch to the frame unit.
- Solder the two wires (one yellow; one grey) on the PC board.

Color Change Click Removal and Replacement

Before starting to disassemble, note the threading of the wiring harness. You will need to recheck that it is threaded correctly during reassembly. **CAUTION:** Be sure that the wiring harness is not rubbing on the cable or pinched underneath the printer mechanism.

- Carefully insert a flat blade screwdriver between the frame unit and the Pulley Support Base (Left) unit. Exert pressure to push the Pulley Support Base unit away from the frame unit and slide the mounting tab out of the frame unit hole.

Be sure that the wire does not unwind from the pulley.

- Carefully slide the Pulley Support Base unit to the left and back to expose the screw holding the Color Change Click to the frame.
- Loosen the screw and remove the color change click. Be careful, the slider shaft (B) can slide out easily at this point.

To replace the Color Change Click:

- Align the hole in the Color Change Click over the holding pin in the frame unit.
- Insert and tighten the Phillips-head screw which holds the Color Change Click to the frame.
- Reposition the Pulley Support Base over the screw on the outside of the frame. Align the base with the frame unit (mounting tab over the hole in frame; pulley in frame unit opening). Move the bobbin gear to get more slack if the wire is too tight.
- Gently push (with needle nose pliers, if necessary) the Pulley Support Base into position. Be sure that the horizontal and vertical planes are level.
- Check that the slider shaft (B) cannot slide out of the holes in the frame unit.

- Check that the wiring harness is threaded correctly (not rubbing against the wire or pinched under printer module).

Motor Cover, Print Head Motor and Paper Feed Motor Removal and Replacement

- Insert a flat blade screwdriver between the motor cover and frame unit (see Figure 6-5). Gently push the cover up and slightly forward to remove it.

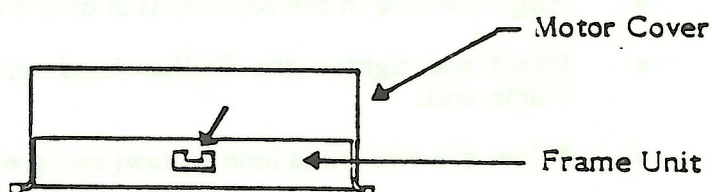


Figure 6-5. Motor Cover Removal

Be sure to note the threading of the motor wiring harness. You will need to recheck that it is threaded correctly during reassembly. Be sure that the motor wiring harness is not rubbing on the cable or pinched underneath the printer mechanism.

NOTE: Removal procedure is identical for either motor (first five steps below). Step six below identifies the wires to de-solder for each motor.

- To access the screw holding the motor to the frame, disconnect the spring attached to the Paper Holding Roller Support Plate from the frame. Remove the Phillips-head screw which holds the motor to the frame.
- Insert a flat blade screwdriver under the motor, between the frame unit and motor. Gently pry with enough pressure to disengage the motor. Be careful not to bend the frame unit.
- Desolder the jumper wire between the PC board attached to each motor.
- Remove the screw which attaches the PC board to the frame unit.
- Unthread the wiring harness from the frame unit and remove the motor.
- If you are removing the Print Head motor, desolder the two reed switch wires (one yellow; one grey) from the PCB. Note where each is attached - you will need to re-check this during re-assembly.

If you are removing the Paper Feed motor, desolder the two electromagnet assembly wires (one black; one red) from the PCB. Note where each is attached - you will need to recheck this during re-assembly.

To replace the Print Head and the Paper Feed Motors and the Motor Cover:

- Insert the gear and the motor shaft through the hole in the frame unit (behind the Roller Support Plate Spring).
- Rotate the motor body so that the flange is even with the hole in the frame unit.

- Align the motor bushing with the hole in the frame unit.
 - Check that the gears are engaged correctly.
 - Insert and tighten the screw which holds the motor to the frame.
 - Reconnect the spring from the Paper Holding Roller Support Plate to the frame unit.
 - Insert and tighten the screw which holds the PC board to the frame unit.
 - Solder the jumper wire in place between the Print Head motor PC board and the Paper Feed motor PC board.
 - If you are replacing the Print Head motor, solder the two wires (one yellow; one grey) connected to the Reed Switch.
- If you are replacing the Paper Feed motor, solder the two wires (one red; one black) connected to the electromagnet unit.
- Check that the motor wiring harness is threaded correctly.
 - Replace the motor cover. Tab at right front of cover fits over side frame, in front of screw which holds Paper Feed Motor. Then back of cover slides inside frame unit (Refer to Figure 6-5).

Rotary Pen Holder Removal and Replacement

- **Be sure the rotary pen holder is empty when you remove it.**
- Push the rotary pen holder slightly toward the platen to remove it. Lift the pen holder out (front end first). Be sure the pen holder is empty when you remove it.

To replace the Rotary Pen Holder

- Insert the tip of the rotary pen holder through the hole in the pen-return spring on the slider unit.
- Push the rotary pen holder slightly toward the platen. This allows the hole in the front (opposite platen) portion of the holder to fit over the tab in the slider unit.

Stopper Click Removal and Replacement

- Slide the rotary pen holder to carriage left.
- Remove the Phillips-head screw which holds the stopper click to the slider unit.

To replace the Stopper Click:

- Slide the rotary pen holder to carriage left.

- Align the hole in the stopper click with the holding tab on the slider unit.
- Insert and tighten the screw which holds the stopper click to the slider unit.

Paper Feed Idle Gear Removal and Replacement

- Remove the 1.5 E-ring from the idle gear.
- Slide the idle gear off the shaft.

To replace the idle gear:

- Slide the new gear onto shaft. Be sure that teeth mesh properly with adjacent gears.
- Clamp the 1.5 E-ring in place over the end of the shaft.

Ejection Lever Spring Removal and Replacement

- Move the slider unit to the center of the carriage.
- Remove the Phillips-head screw which holds the electromagnet assembly to the printer module frame (right front, under electromagnet assembly).
- Be sure to note how one leg of the spring fits over the frame and the other leg fits over the ejection lever shaft.
- Remove the 1.5 E-ring from the end of the ejection lever shaft.
- Slide the shaft to the right to allow access to the spring.
- Remove and replace the spring. Be sure that the legs of the new spring are placed properly over the frame and the ejection lever shaft.
- Place the ejection lever shaft through the hole in the left frame and replace the 1.5 E-ring.
- Replace the electromagnet assembly (See Page 6-5).

CAUTION: BE SURE TO MAKE THE FOLLOWING ADJUSTMENTS WHEN REPLACING THE ELECTROMAGNET ASSEMBLY:

- ACTUATOR AND COUPLING LEVER ADJUSTMENT (SEE PAGE 6-5).
- PEN AND PAPER PLATEN ADJUSTMENT (SEE PAGE 6-6).

Paper Holding Roller (Upper) Removal and Replacement

- Move the slider unit away from the side where you are working.

Note that the right paper holding roller has a groove in it and the left roller is smooth.

**CAUTION: BE CAREFUL NOT TO DAMAGE THE WIRE OR GEARS
WHEN REPLACING THE ROLLERS.**

- Disconnect the spring attached to the paper holding roller support plate from the frame. This allows easier access to the rollers.
- Remove and replace the roller.
- Reconnect the spring from the paper holding roller support plate to the frame.

Print Head Idle Gear Removal and Replacement

You will need to move the Bobbin gear aside in order to access the gear near the print head motor. Do not remove the Bobbin gear. Be careful not to cross or unwind the Bobbin gear wire.

- Remove the 1.5 E-ring from the Bobbin gear.
- Move the Bobbin gear far enough out of the way to allow access to the Print Head Idle gear.
- Remove the 1.5 E-ring from the gear.
- Slide the gear off the shaft.

To replace the Print Head Idle Gear:

- Slide the new gear onto the shaft. Be sure that the teeth mesh properly with adjacent gears.
- Clamp the 1.5 E-ring in place over the end of the shaft.
- Place the Bobbin gear over the shaft. Be sure the gear meshes correctly with adjacent gears.
- Clamp the 1.5 E-ring over the shaft.

PC Board Removal

- Remove the four screws which hold the PC board to the lower case.
- Disconnect the Ground wire from the PC board.
- Disconnect the switch assembly wiring harness.

ASSEMBLY

PC Board Replacement

- Align the four screw holes on the PC board with the holes in the lower case. Check that the power jack and the I/O connectors are properly aligned with the cut-outs in the lower case back.
- Insert and tighten the four screws.
- Replace the switch assembly wiring harness (J5).

Printer Module Replacement

To replace the printer module on the mounting plate:

- Slide the rubber pads on the printer module against the two tabs on the mounting plate. Place the brackets over the rubber pads and tighten the Phillips-head screws.
- Insert and tighten the two front screws which hold the printer module to the mounting plate.
- Connect the wiring harness to the PC board (J4).
- Align the mounting plate holes with the support post holes (the rear posts have holding tabs).
- Insert and tighten the screw which holds the Ground wire in place (right front support post).
- Connect the Ground wire to the Ground wire terminal on the PC board.

Switch Assembly Replacement/Case Assembly

- Place the upper case upside down on the table (front of case toward front of unit).
- Position the switch assembly upside down over the two screw holes at the front of the upper case. (Key extensions should be toward the front of the case.)
- Insert and tighten the two screws which hold the switch assembly to the upper case.
- Fit the upper case over the lower case.
- Slide the bezel tabs under the upper case and lock in place by pushing the bottom of bezel against the lower case.
- Turn the unit upside down.
- Insert and tighten the three wave screws.

- Insert and tighten the two machine screws.
- Insert the two front rubber feet over the machine screws.
- Turn the unit right side up and replace the paper roll.
- Insert the top cover (insert back first):
 - Fit the top cover tabs into the upper case (holes at back).
 - Slide the front tabs into place.

SECTION 7

PARTS LIST

<u>ITEM</u>	<u>LOCATION</u>	<u>DESCRIPTION</u>	<u>PART NO.</u>
1	PCB Unit	Printed Circuit Board, Loaded, Atari Spec	CA060459
2	A1	6805P ROM Version	FC100346
3	IS1	IC Socket (28P)	C014386-08
4	A2	6805V ROM Version	FC100347
5	IS2	IC Socket (40P)	C014386-09
6	A3	LB1257 Octal Power Driver	FC100348
7	A4	Two Input AND gate O.C HD74LS09	FC100632
8	A5, A6	Voltage Regulator +5V HA17805P	FC100350
9	Q1,2,3	PNP Transistor 2SA844(C) or (D)	FC100351
10	Q4,5	NPN Transistor 2SD788(C) or (D)	FC100352
11	Q6,7	PNP Transistor 2SB739(C) or (D)	FC100353
12	Q8,9	NPN Transistor 2SC945 Q, P or K	FC100354
13	D1,2,3,4	Diode, Rectifier V03C 1.3A	FC100355
14	D5,6,8,9	Diode, Signal 1S2076FA 250MW	FC100356
15	D7	Diode, Zener HZ11AFAVZ=9.9V	FC100358
16	D10	LED SLP-136C-50	C014776
17	X1,2	Crystal PX-1 4 MHz	FC100357
18	S1	Switch Module SUF-43	FC100359
19		Connector, Switch	FC100360
20		Connector, Printer	FC100361
21		Ballpoint Pen (std. Pack)	C061420-01
22		Roll Paper (Atari Spec)	C061533
23		Roll Paper Shaft	FC100365
24		Bezel Unit	FC100366
25		Cover Unit	FC100367
26		Rubber Foot (Front)	FC100369
27	Printer Unit	Mechanical Module	FC100385
28		Print Head Motor Unit (Carriage)	FC100370
29		Paper Feed Motor Unit (Platen)	FC100371
30		Paper Feed Idle Gear	FC100372
31		Paper Holding Roller (Upper Left)	FC100373
32		Paper Holding Roller (Upper Right)	FC100374
33		Electromagnet Assy (Solenoid)	FC100375
34		Rotary Pen Holder Set	FC100376
35		Stopper Click	FC100377
36		Reed Switch Unit	FC100378
37		Color Change Click	FC100379
38		Ejection Lever Spring	FC100380
39		Type E Stopper Ring 1.5	FC100381
40		Type E Stopper Ring 2.0	FC100382
41		Type E Stopper Ring 1.2	FC100383

SECTION 8

SERVICE BULLETINS

This section is to be used by you to file the three classifications of service bulletins that are periodically released by the Director of Technical Support.

The following are brief descriptions of each classification:

FIELD CHANGE ORDER

A Field Change Order describes mandatory hardware or software changes to ATARI products and instructs how to implement these changes. The changes must be performed on all units serviced or repaired.

UPGRADE BULLETIN

An Upgrade Bulletin describes product improvements or modifications that the consumer may wish to purchase. These bulletins allow you to modify the customer's unit to add capabilities which may not have been available when the unit was originally manufactured.

TECH TIP

A Tech Tip is a document of a general nature which transmits routine service or repair information. By communicating methods developed since you attended training classes, Tech Tips aid to continuously improve repair skills and increase knowledge of ATARI products.

Other times, Tech Tips alert you to units that have been modified and are now standard for ATARI Manufacturing, but are different from many existing units and require different repair techniques.

