
LNO3
SERIES

LN03 Series
Problem Determination Guide

Order Number EK-OLN03-DG-001

Digital Equipment Corporation

1st Edition, March 1991

The postpaid Reader's Comment Card included in this document requests the user's critical evaluation to assist in preparing future documentation.

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About This Manual

OVERVIEW

Use this manual with the appropriate LN03 IPBs and pocket service guides to provide a total solution to LN03 problem solving. This manual supersedes the *LN03 Series Maintenance Advisory* (EK-LN03A-MA).

This manual consolidates much of the information found in other LN03 service and maintenance publications, with an emphasis on troubleshooting and problem determination.

NOTE
The maintenance procedures described in this manual are not to be performed by anyone other than Digital Customer Services engineers who have successfully completed the Digital Equipment Corporation LN03 maintenance course; course number EY-2895E-IV.

HOW TO USE THIS MANUAL

This manual is organized to present the basic symptoms, problems, and solutions that a Customer Services engineer is likely to encounter on an LN03 service call.

Symptoms

Symptoms are grouped into categories which are charted in Chapter 1. These symptoms are listed by category in the table of contents found at the front of this manual. The symptoms are also listed alphabetically in the index found at the back of this manual.

To find a symptom, first define or categorize the symptom using the charts in Chapter 1. Once this is done, locate that symptom in the table of contents. The table of contents leads to the *section number* where the symptom can be found. The symptom can also be found in the index by looking under *Symptom*. The index points to the *page number* where the symptom can be found.

Problems and Solutions

Problems and solutions are found in Chapter 2 and are listed in the order of their most likely occurrence for the particular symptom that is being investigated.

To find a problem, first define or categorize the problem. Once this is done, search for that problem in the table of contents. The table of contents leads to the *section number* where the problem can be found. The problem can also be found in the index by looking under *Problems and solutions*. The index points to the *page number* where the problem can be found. Solutions follow the problems in each symptom section.

NOTE
The index is cross-referenced, so look for subjects related to a specific symptom, problem, or solution. For example, "Print" or "Error codes" contain alphanumerical cross-references to the major symptoms, problems, and solutions.

Manual Layout

Chapter 1 presents charts that categorize the various symptoms encountered by LN03 printers. The problems are grouped according to their symptoms.

Chapter 2 lists problems, provides a brief description of each problem and its cause, and recommends logical solutions. It also contains model descriptions, preventive maintenance tips, and the development drawer cleaning procedure.

Chapter 3 describes and provides the Total Call Checklist (TCC) for use when performing maintenance procedures on the LN03 Series printers. Appendices A through D contain excerpts from the *LN03 Series Maintenance Advisory* (EK-LN03A-MA) which describe the various versions of the LN03. These include:

- Appendix A: LN03A
- Appendix B: LN03 PLUS
- Appendix C: ISO/PC Cartridge
- Appendix D: LN03Q

These product descriptions discuss (as applicable):

- Associated documentation
- Field replaceable units (FRUs)

- Theory of operation
- Diagnostics and testing
- Installation
- Model and option part numbers

Appendix E lists the part numbers for the various LN03 models.

Appendix F provides a folded Maintenance Log. Prior to filling out this log, make numerous blank copies for future use.

ASSOCIATED DOCUMENTATION

Refer to the associated documentation listed in Table 1.

Table 1 Documentation

Order Number	Title
EK-OLN03-UG	*Installing and Using the LN03*
EK-OLN03-PS	*LN03 Pocket Service Guide*
EK-OLN03-MA	*LN03R ScriptPrinter Maintenance Advisory*
EK-LASER-GD	*Digital Laser Printers: Guide to Paper and Other Media*
EK-LN03A-TM	*LN03A Technical Manual*

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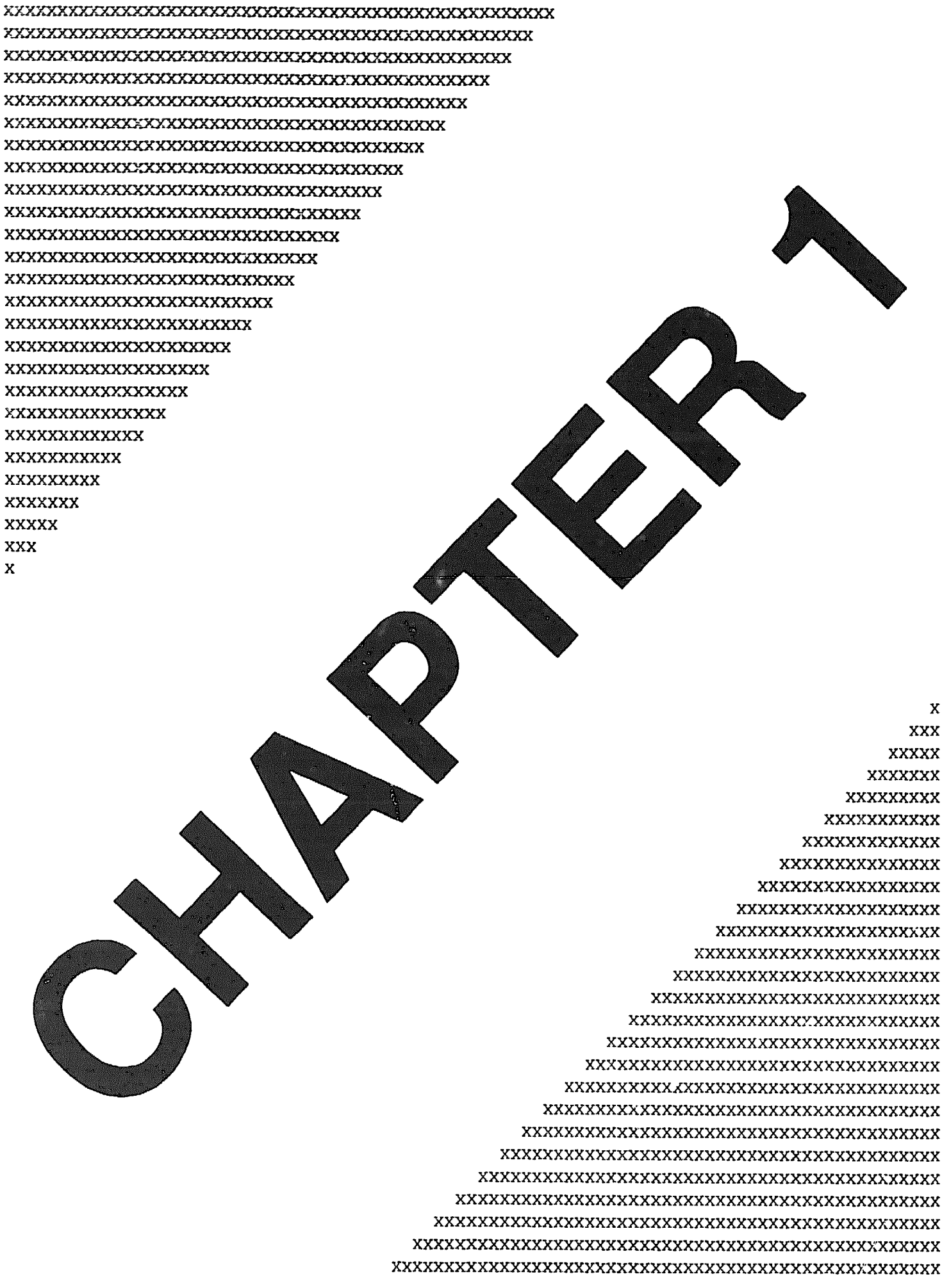

CHAPTER 1

1
PROBLEM IDENTIFICATION

1.1 INTRODUCTION

This chapter groups and (when practical) prioritizes the problems found in the LN03 Series printers. The charted items reference sections of this manual in which the corresponding problem/solutions can be found.

To use this chapter, turn to the chart that most closely groups the symptoms you are observing. Locate the block that lists the particular symptom of interest. Turn to the table of contents listing for Chapter 2 to find an entry named in the block. The index, located at the back of this book, can also be used to find the symptom listed alphabetically under *Symptoms* and under *Problems and solutions*. Items in the index are cross-referenced. For example, **error code** is not only listed under *Error code*, but under *Symptoms* and under *Problems and solutions* as well.

The problem identification charts found in this chapter are as follows:

- Poor Print Quality
- Incorrect Imaging
- Paper Jam
- Inoperative Printer or Component
- Audible Symptoms
- Incorrect Operating Temperature
- Error Code Indications

1.2 POOR PRINT QUALITY

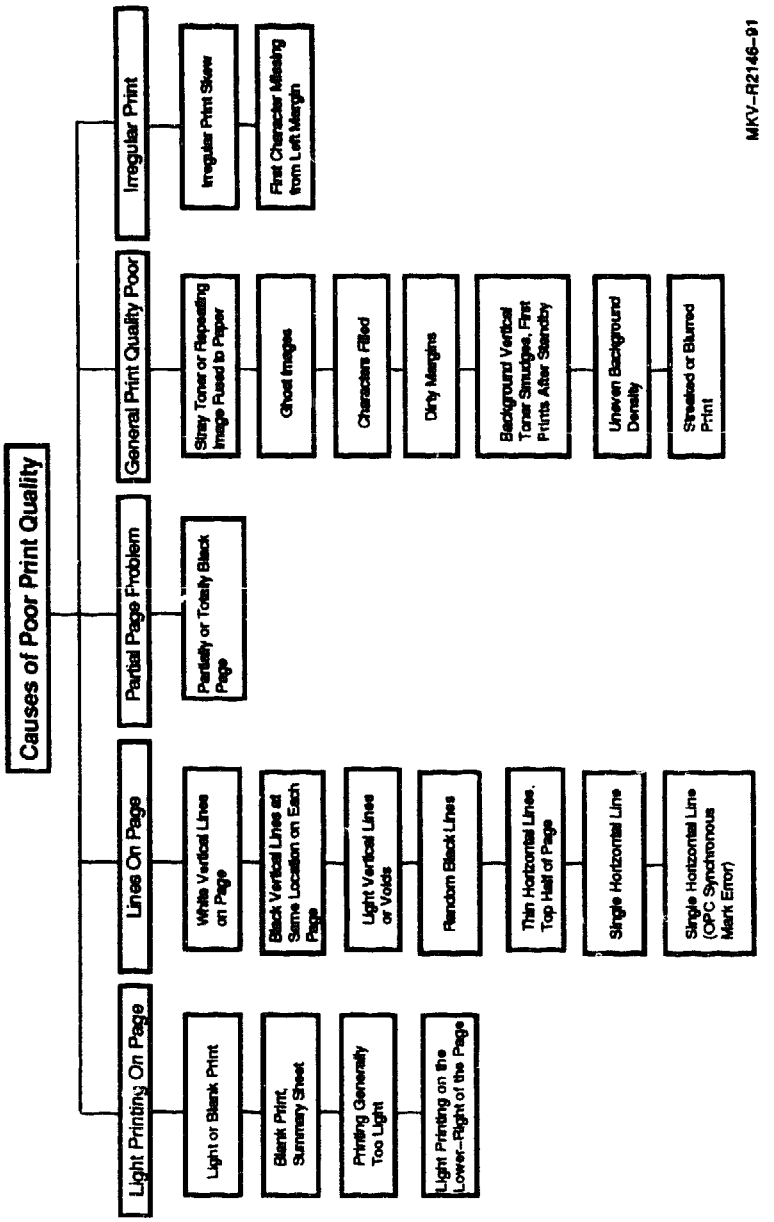


Figure 1–1 Poor Print Quality

1.3 INCORRECT IMAGING

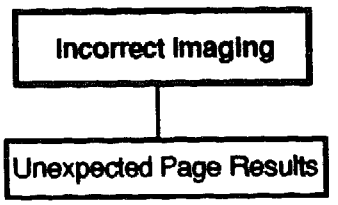


Figure 1–2 Incorrect Imaging

1.4 PAPER JAM

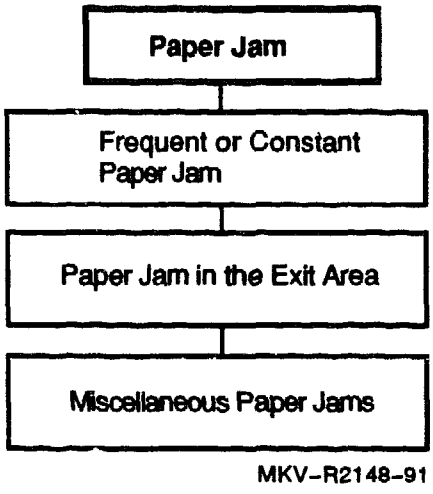


Figure 1–3 Paper Jam

1.5 INOPERATIVE PRINTER OR COMPONENT

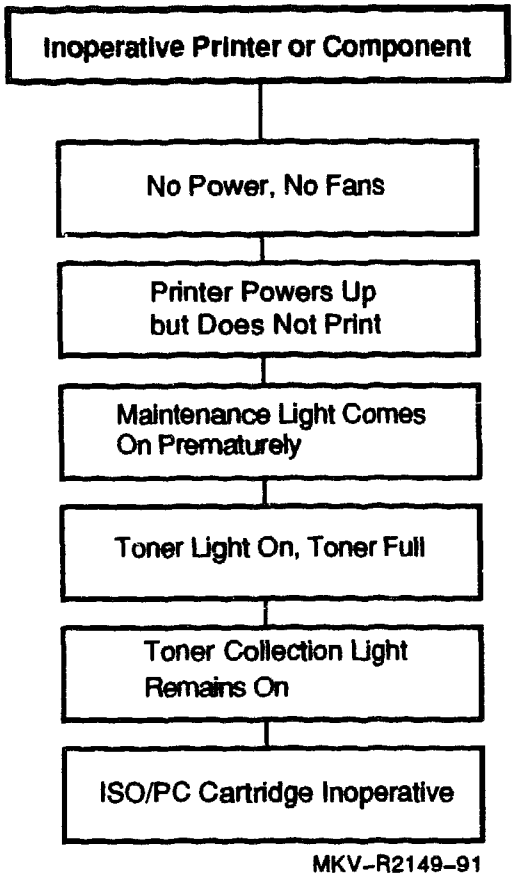


Figure 1–4 Inoperative Printer or Component

1.6 AUDIBLE SYMPTOMS

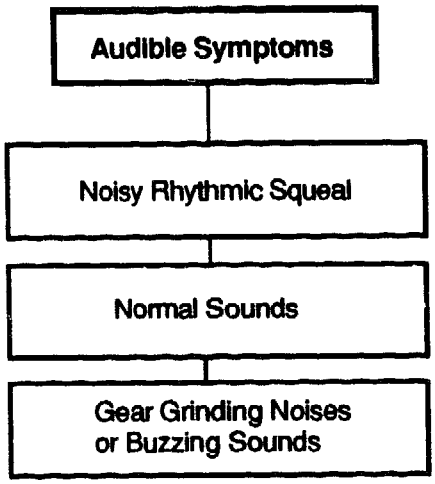


Figure 1–5 Audible Symptoms

1.7 INCORRECT OPERATING TEMPERATURE

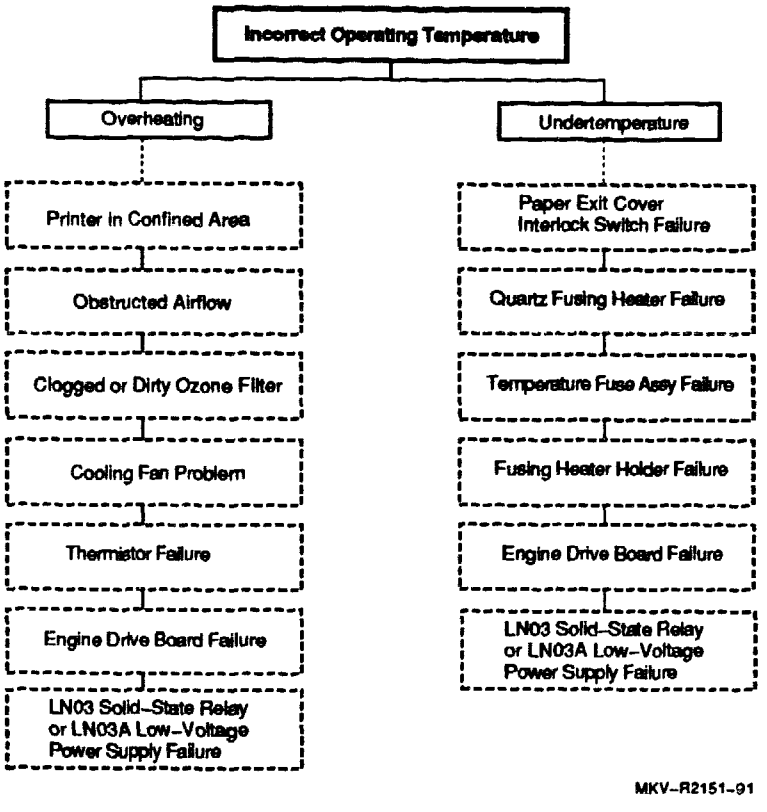


Figure 1–6 Incorrect Operating Temperature

1.8 ERROR CODE INDICATIONS

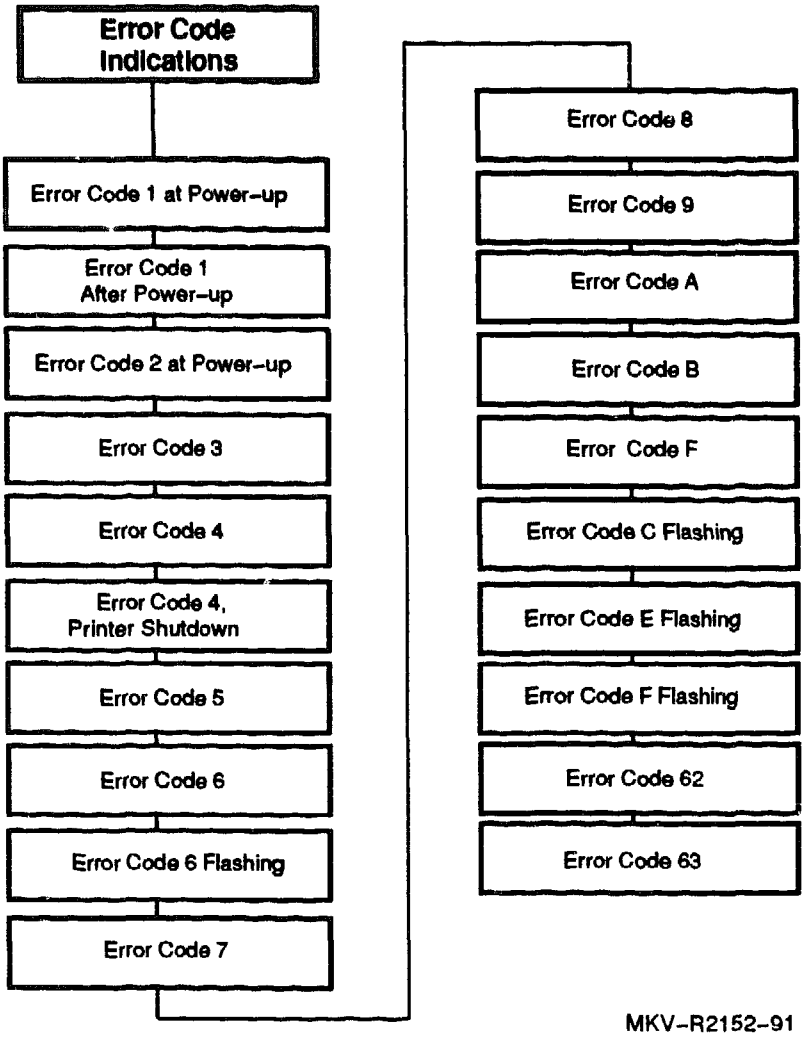
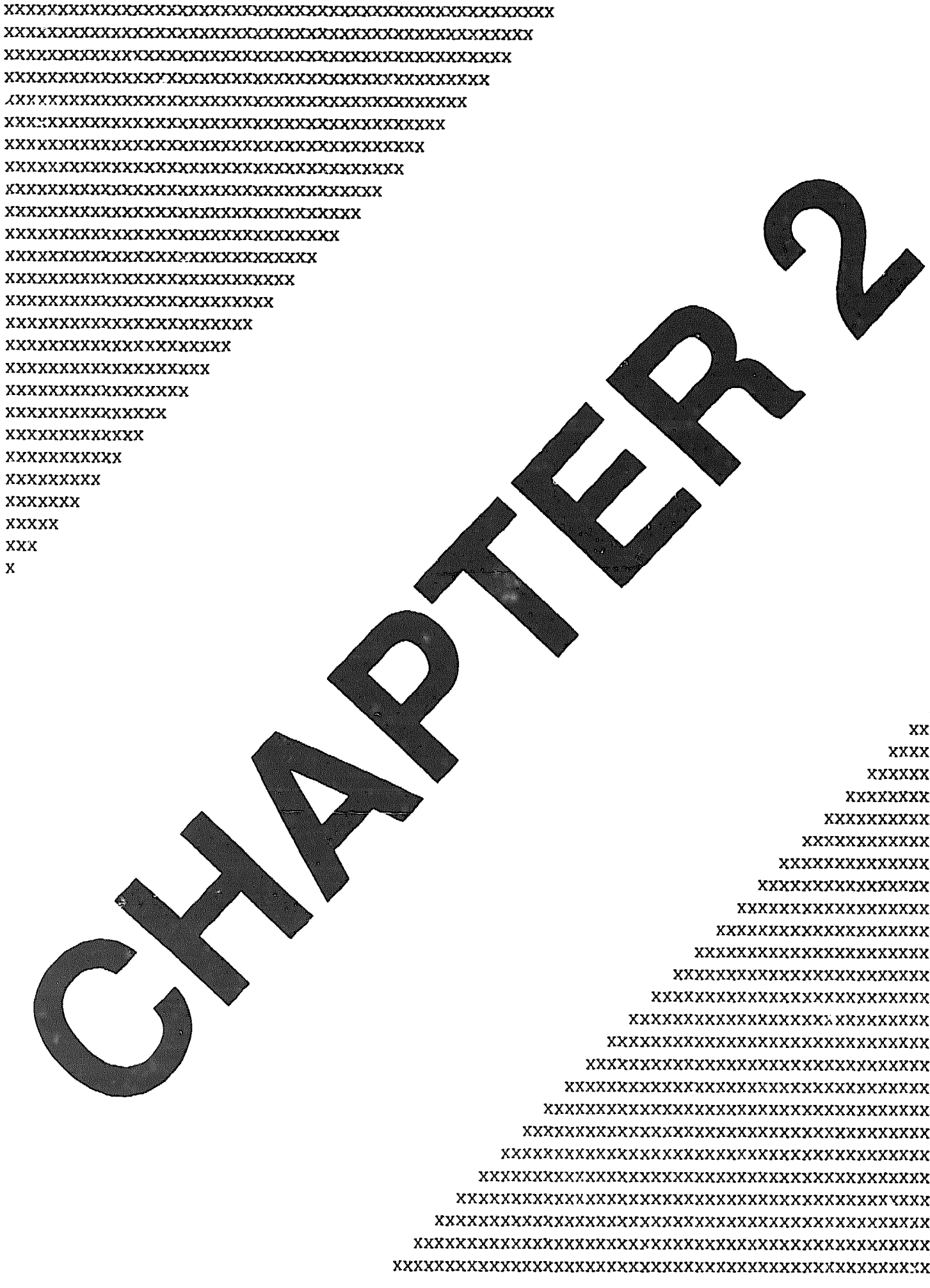


Figure 1–7 Error Code Indications


CHAPTER 2

2
LN03 PROBLEMS AND SOLUTIONS

2.1 IDENTIFYING LN03 MODELS

Two basic types of LN03 printers must be considered. The first type is the ANSI LN03 printers from which all variations evolve. The second type is the PostScript® LN03 printers. The models can be purchased off the shelf or upgraded in the field using the appropriate upgrade kits.

2.1.1 LN03 and LN03A ANSI Printers

The original LN03 was released as an ANSI machine supported by the *LN03 Illustrated Parts Breakdown* (EK-OLN03-IP) and the *LN03 Pocket Service Guide* (EK-OLN03-PS). The original LN03 was redesigned, resulting in the cost-reduced LN03A. Despite the relocation of FRUs, fans, and some change in the mechanical layout, the LN03A is functionally the same as the original LN03. Both units operate identically, and they troubleshoot in the same way.

All ANSI variants evolved from either the original LN03 or the LN03A. These variants are either purchased directly or they are upgraded.

For example: The LN03, LN03-A, and LN03-A-A models are modeled after the illustrated parts breakdown found on page 3 of the IPB (EK-OLN03-IP). These models are the basic ANSI machines. For more information on the LN03A, see Appendix A.

2.1.2 LN03S

The LN03S (also called LN03 PLUS) is like the basic ANSI machines; however, it provides graphics functionality. The difference is that the LN03 PLUS contains the 54-16943-01 Bit-map Option board. For more information on the LN03 PLUS, see Appendix B.

2.1.3 ISO/PC

The ISO/PC is derived from the LN03 PLUS. ISO is the standard ANSI and PC means IBM® PC. The ISO/PC font cartridges give the ISO/PC ISO-compatibility or PC-compatibility. For more information on the ISO/PC, see Appendix C.

2.1.4 LN03Q

The LN03Q (LN03 Image) printer is an LN03A print engine with a Video Interface Module (VIM). The high-speed VIM capability allows bit-mapped data to be sent directly to the LN03Q for printing. For more information on the LN03Q, see Appendix D.

2.1.5 LN03R PostScript Printers

For LN03R (PostScript) versions, the ANSI controller board is replaced by a PostScript controller board. See Figure 11, item 11 in the LN03R IPB (EK-LN03R-IP). Also, the LN03R does not use font cartridge receptacles.

The ScriptPrinter serves as a local printer for a VMS, ULTRIX, or MS-DOS® applications, accepting PostScript page description language without translation. A PostScript interpreter on the LN03R produces a bit-map image. The LN03R operates at speeds reaching eight pages per minute, but can be slower, depending upon page complexity.

The LN03R generates pages that integrate text and complex graphics, using a variety of fonts. Along with PostScript, the LN03R supports DDIF bitonal images and the ANSI/Sixel, ReGIS, and TEKTRONIX® 4010/4014 protocols through host-based translators that convert those protocols into PostScript code.

For further details, refer to the *LN03R ScriptPrinter Maintenance Advisory* (EK-LN03R-MA).

2.1.6 Upgrade Kits

LN03 printers can be upgraded in the field. The LN03R-UA kit upgrades an LN03 printer to PostScript. The LN03S-UA kit upgrades an LN03 printer to an LN03 PLUS (LN03S).

NOTE
An LN03S can be upgraded to an LN03R, but not necessarily vice-versa. The LN03S-UA does not have a controller, only a bit-map option.

2.2 PREVENTIVE MAINTENANCE TIPS

Educating the user as to the proper use and care of the LN03 Series printers can prevent a great deal of the problems encountered on service calls.

2.2.1 Non-Digital Specified Toner

This could be a third-party toner or other toner not designed to be used on the LN03 printer. If you suspect this, check for signs of toner not adhering to the magnetic roller in the development unit.

CAUTION
Using improper toner can result in unspecified printer performance, including poor print quality. Digital takes no responsibility for print quality problems resulting from the use of non-Digital specified toner.

2.2.2 Media Specifications

Users often employ custom letterhead, envelopes, and paper. This custom media can have inferior toner, embossed logos, and sundry other qualities that interfere with the operation and/or longevity of the LN03. Make sure that these customers are aware of the Digital specifications outlined in the *Digital Laser Printers: Guide to Paper and Other Media* (EK-LASER-GD).

2.2.3 Cleaning and Maintenance

NOTE
The Customer Services engineer can resolve many problems by thoroughly vacuuming the development unit and toner drawer, using the proper cleaning procedures listed in Section 2.2.6.

Customers are responsible for routine cleaning and maintenance of their LN03 Series printers. This includes adding toner, providing LN03X-AD Maintenance Kits and OPC cartridges, replacing toner-collection bottles, cleaning fusing unit separation pawls, and maintaining a suitable and clean environment for the printer(s).

Failure to follow the correct maintenance procedures can result in poor print quality and accelerated component wear. Correct maintenance is the customer's responsibility.

The customer should be advised of the following:

- Use only toner kits that Digital recommends for use with the LN03.

- Cleaning pads should be replaced each time a toner cartridge is installed.
- Toner overloading:
  - — Toner spills can affect OPC performance and cause other component damage.
  - — Except for the initial filling of the toner reservoir, only one toner cartridge should be added to the hopper when the low-toner light illuminates. Notify Customer Services if the maintenance light remains on after adding one cartridge.
- Agitate the toner before adding it to the reservoir.
- Properly latch the toner hopper after adding toner.
- All maintenance kit items should be replaced when the OPC belt is replaced.

Customers should be advised not to bypass interlocks, low-toner indicators, or page counters. Likewise, they should be made aware of the printer's maximum operating capacity and be advised not to operate the printer beyond its specified limits of 10,000 pages per month. Typical use is 3,000–6,0 ') pages per month.

Advise the cust ner not to defeat the OPC page counter to achieve additional output, and to report any accidental reset of the counter. Total page count can be tracked by making the appropriate entries in the maintenance log on each service call. Then, if the page count is accidentally reset, the count can be estimated from the last log entry.

2.2.4 Adequate Cooling

Proper and adequate cooling is of particular importance. Advise the customer to maintain proper clearances for sufficient airflow, and to perform complete customer maintenance. Inadequate cooling causes many of the print-quality problems and can result in overheating and premature failure of the OPC and fusing unit. Advise the customer to always install the *entire* LN03 Maintenance Kit in a timely fashion. Not installing some of the kit items can affect adequate cooling and other performance factors.

2.2.5 Maximizing OPC Life

The OPC counter is reset when the tabs break on a new OPC belt as it is inserted. The customer should be advised that a previously used belt will not reset the counter.

The customer should replace the OPC every 10,000 pages or when the maintenance light illuminates, whichever comes first. If the OPC life appears to be short, it may be the result of using a previously used belt. OPC life is also impacted by the following:

- Length of print jobs. Continuous printing, rather than intermittent short jobs, prolongs OPC life. Maximum life is approximately 10,000 pages.
- Excess exposure to light. Cover the OPC when it is removed from the printer.
- Inadequate cooling. Maintain proper airflow and install maintenance kits when prompted.

2.2.6 Development Drawer Cleaning Procedure

PREREQUISITES

Customer Services engineers must have completed proper training to service the LN03 Series printers. The minimum requirements are:

- Laser Safety Course (EY-2423E-IV)
- Introduction to Laser Printers Course (EY-2424E-IV)
- IVIS LN03 Course (EY-2598E-IV)

The development drawer cleaning procedure should be accomplished as written, using only the tools specified. Ensure that all cleaning efforts have been exhausted before replacing the development drawer.

CAUTION

Do not use any other vacuum to clean the LN03 Series printers. Ordinary vacuum cleaners are not capable of trapping 2-micron toner particles, and would contaminate the customer's environment, possibly damaging nearby equipment.

Table 2–1 Cleaning Tools Required

Tool	Part Number
Vacuum cleaner	29-25526
Vacuum bag and filter kit	29-26017
LN03 cleaning kit	29-26234

The vacuum cleaner listed in Table 2–1 is required for cleaning toner from around the printer and development drawer.

CAUTION
Be certain that the vacuum cleaner bag is empty before performing this cleaning procedure to protect the equipment and surrounding environment from toner dust.

VACUUM CLEANING PROCEDURE

There are three reasons for cleaning a development drawer.

- As part of the Total Call Concept (TCC) process.
- To prepare a failed development drawer for shipment after replacing it with a new development drawer.
- To eliminate causes for poor quality printing.

During the cleaning, all of the dirt, dust, toner, hair, and particles must be cleaned from the development drawer. Studies conclude that this debris accounts for nearly all of the problems reported with the development drawer.

Use the following procedure to clean the development drawer:

1. Prepare an adequate working area and assemble the vacuum cleaner (P/N 29-25526).
2. Power down the printer and unplug the power cord from the wall receptacle.

   CAUTION
   Do not remove the paper tray. It supports the development drawer and prevents it from falling.

3. Pull the development drawer out firmly, letting it slide on the tracks until it stops, resting on the paper tray.

4. Lift out the OPC cartridge by the green handles located on each side and inspect it for damage, marks, or contamination. Shake toner off the OPC belt and place it in a dark plastic bag or cover it with several sheets of paper to protect it from overexposure to ambient light.

5. If marks or other evidence of damage is observed, or toner voids appear on the magnetic roller, there may be particles trapped between the doctor blade (metal bar) and the magnetic roller. Clear these particles by sliding a strip of paper between the doctor blade and the magnetic roller and sweeping the particles to one side. Turn the roller to verify that voids are eliminated.

   CAUTION
   The OPC cannot withstand exposure to light without subsequent loss of its operational characteristics.

6. Remove the development drawer from the printer and place it in the prepared work area.

   NOTE
   Perform the next three steps only if the toner is contaminated or suspected of causing a problem, or if the development unit is being prepared for shipment. Otherwise, proceed to Step 10.

7. Open the toner cartridge on the development drawer, remove the toner cartridge, and use the vacuum cleaner to thoroughly clean all of the parts and the entire area.

8. Vacuum the toner from the toner reservoir. Be sure to remove excess toner from around the agitator, located at the bottom of the reservoir. Also remove all toner, dirt, hair, and particles from the area around the doctor blade, located below the agitator.

9. Thoroughly clean along the entire length of the magnetic roller while using your thumb to rotate the roller in a clockwise direction. Repeat as necessary, until no traces of toner remain. Then clean the excess toner from the reservoir once again.

10. If toner overfilling is apparent, vacuum excess toner from the reservoir to eliminate potential buildup on the magnetic roller.

11. Clean the OPC drive gear assembly, located below the development drawer.

12. Replace the toner collection bottle, if required.

13. If the development drawer is being prepared for return credit, use the following checklist. Credit will be denied if this checklist is not followed.

    The following is the development drawer return checklist.

    a. Thoroughly clean the unit.

    b. Install an empty toner cartridge and secure it with tape.

    c. Place the unit in a plastic bag (P/N 99-06104-12) and secure it with a tie-wrap.

    d. Return to the stockroom for credit.

14. If the development drawer is not being returned, place it in the printer, resting on the paper tray.

15. Inspect and ensure that the *low toner* indicator functions properly from the low-toner actuator arm and microswitch.

16. Add fresh toner (if required), reinstall the OPC cartridge (using the green handles), and slide the development drawer into place in the printer.

17. Plug the power cord into the wall receptacle, power up the printer, and evaluate the printer performance. Run several pages through the printer to clean the OPC belt.

2.3 CAUSES OF POOR PRINT QUALITY

Print quality is affected by many seemingly unrelated problems. Among other things, poor print quality can be caused by the following conditions:

- Toner or dirt accumulation inside the printer
- Improper user maintenance
- Inadequate maintenance schedule
- Component misaligned
- Electromechanical and board failures
- Incorrect operating temperature
- Worn or damaged components
- OPC damaged or beyond life expectancy
- Power supply voltages out of specification

NOTE
Normal OPC life should approach 10,000 pages. If poor-quality printing occurs at less than 6,000 pages, investigate the reasons. For example, look for poor cooling, obstructed intake, clogged filters and screens, bad fans, and so forth.

2.3.1 Blank Print, Summary Sheet

SYMPTOM

There is blank print on the summary sheet when the unit is first installed, or after the unit was moved.

PROBLEM

The charge corona is electrically disconnected. The corona may no longer be fully seated after shipping or moving the printer.

SOLUTION

The solution you choose depends upon the problem in your unit. Solutions are presented in logical sequence: most likely to least likely.

- Remove and reseat the corona.
- Replace the corona.

Make the appropriate entry in the maintenance log.

2.3.2 Background Vertical Toner Smudges, First Prints After Standby

SYMPTOM

Background toner lines appear on the first prints after the unit has been in the standby mode.

PROBLEM

- The cleaning pad has toner buildup.
- The cleaning-pad has uneven pressure. The spring-loaded cover over the cleaning pad in the fusing unit may be warped.

SOLUTION

The solution you choose depends upon the problem in your unit. Solutions are presented in logical sequence: most likely to least likely.

- Check the cleaning unit for toner buildup.
- If the cleaning pad cover is warped, replace the fusing unit to correct toner line problem caused by uneven cleaning pad pressure.
- Clean the fans and screens, and ensure their proper operation.
- Replace the zener diode.

Make the appropriate entry in the maintenance log.

2.3.3 Light Printing on the Lower-Right of the Page

SYMPTOM

Light printing appears on the lower-right side of the page *only*. This condition progressively worsens.

PROBLEM

- The ozone wire screen is clogged.
- The LN03 fan motor has failed or is running slowly.
- The OPC is damaged.
- The development drawer is out of alignment.

SOLUTION

The solution you choose depends upon the problem in your unit. Solutions are presented in logical sequence: most likely to least likely.

- Replace the upper-rear ozone fan screen assembly with the following parts:
  - — LN03 parts:
    - Screen (P/N 12-30568-01)
    - Screws (P/N 90-10925-02) (two)
  - — LN03A screen kit (P/N 29-27658-01)

  Ensure that the printer has a minimum of .3 m (1 foot) clearance for proper cooling.
- Replace the fan assembly with the following parts:
  - — LN03 (P/N 29-26054-00)
  - — LN03A (P/N 29-25096-00)
- Replace the OPC, if damaged.
- Adjust the development drawer and replace if needed.
- If the printer is an LN03A, install Maintenance Kit LN03X-AD.

Make the appropriate entry in the maintenance log.

2.3.4 Light or Blank Print

SYMPTOM

The print is extremely light or completely blank.

PROBLEM

- Non-Digital specified toner is used (see Section 2.2.1).
- The toner is low.
- The shield glass is dirty.
- The OPC belt is not being charged.
- The development drawer is faulty.
- The short drive belt is broken.
- The OPC belt is continuously exposed to the laser beam.

SOLUTION

The solution you choose depends upon the problem in your unit. Solutions are presented in logical sequence: most likely to least likely.

- If non-Digital specified toner is suspect, clean the development drawer and vacuum toner (see Section 2.2.6). Advise the customer on the use of proper toner.
- If the toner is low, add toner, but do not overfill.
- Replace the shield glass as necessary.
- If the OPC belt is not being charged:
  - — Ensure that the charge and transfer corona units are intact and seated correctly.
  - — If the problem persists, try the following in the order presented:
    - Replace the charge corona unit.
    - Replace the transfer corona unit.
    - Clean the development drawer (see Section 2.2.6).
    - Replace the zener diode.
    - Replace the high-voltage power supply.
    - Replace the engine drive board.

— If the short drive belt is broken, replace the short drive belt.

— If the OPC is continuously exposed to the laser beam:

- Replace the optical housing unit (OPC).
- Replace the engine drive board.

Make the appropriate entry in the maintenance log.

2.3.5 Partially or Totally Black Page

SYMPTOM

A page is partially or totally black.

PROBLEM

- Non-Digital specified toner is used (see Section 2.2.1).
- The OPC cartridge is not grounded.
- The grounding brush is bent.
- The laser beam is not being fully exposed to the OPC belt.
- The optical housing unit is faulty.
- The engine drive board is faulty.

SOLUTION

The solution you choose depends upon the problem in your unit. Solutions are presented in logical sequence: most likely to least likely.

- If non-Digital specified toner is suspect, clean the development drawer and vacuum toner (see Section 2.2.6). Advise the customer on the use of proper toner.
- If there is a clean white edge around the borders of the paper, check for a faulty engine drive board.
- Ensure that the OPC cartridge is seated correctly.
- If the problem persists, try the following in the order presented:
  - — Realign or replace the grounding brush.
  - — Replace the OPC with a customer-supplied OPC cartridge.
- If the laser beam fails, replace the scanner motor drive board.
- If the problem persists, replace the following in the order presented:
  - — The optical housing unit.
  - — The engine drive board.

Make the appropriate entry in the maintenance log.

2.3.6 Printing Generally Too Light

SYMPTOM

The printing on the page is uniformly too light.

PROBLEM

- The toner quality has deteriorated due to non-Digital specified toner or contamination caused by used toner or paper particles.
- The OPC belt is worn.
- The current applied to the OPC belt is too low as a result of:
  - — Dirty/faulty corona wires
  - — Faulty zener diode
  - — Faulty high-voltage power supply

SOLUTION

The solution you choose depends upon the problem in your unit. Solutions are presented in logical sequence: most likely to least likely.

- If the toner quality is suspect, clean the development drawer and vacuum out the old toner and replace with fresh toner (see Section 2.2.6).
- If required, advise the customer on the use of proper toner.
- If less than 3000 pages are on the OPC counter, verify with the customer that the counter has not been reset with the original OPC placed back in use. If OPC life has been exceeded, replace the OPC with a customer-supplied OPC cartridge.
- If more than 3000 pages are on the OPC counter, perform user maintenance, using the entire contents of the customer-supplied LN03X-AD kit.
- Inspect the corona wires for dust/toner buildup. Replace, if necessary.
- Replace the zener diode, if suspected.
- Replace the high-voltage power supply.

Make the appropriate entry in the maintenance log.

2.3.7 Uneven Background Density

SYMPTOM

The background density on a page is uneven.

PROBLEM

- The quenching lamp is dirty.
- The OPC belt is worn.
- The toner quality has deteriorated due to non-Digital specified toner or contamination caused by used toner or paper particles.
- The magnetic roller in the development unit is misaligned.

SOLUTION

The solution you choose depends upon the problem in your unit. Solutions are presented in logical sequence: most likely to least likely.

- Clean the quenching lamp.
- Replace the customer-supplied OPC cartridge.
- If the toner quality is suspect, clean the development drawer and vacuum out the old toner and replace with fresh toner (see Section 2.2.6).
- If required advise the customer on the use of proper toner.
- Align the magnetic roller in the development drawer.
- If the problem persists, replace the development drawer.

Make the appropriate entry in the maintenance log.

2.3.8 Streaked or Blurred Print

Refer to Section 2.8.1 for a description of symptoms, problems, and solutions for this particular condition.

2.3.9 Characters Filled

SYMPTOM

The characters (O, D, Q, 0, 8, P, and so on) are filling in.

PROBLEM

- The aged or non-Digital specified toner is not fusing properly.
- The development drawer is faulty.

SOLUTION

The solution you choose depends upon the problem in your unit. Solutions are presented in logical sequence: most likely to least likely.

- If the toner quality is suspect, clean the development drawer and vacuum out the old toner and replace with fresh toner (see Section 2.2.6).
- If required, advise the customer on the use of proper toner.

Make the appropriate entry in the maintenance log.

2.3.10 Ghost Images

SYMPTOM

The images printed on a previous page appear in the same location on the next page.

PROBLEM

- The quenching lamp is dirty.
- The OPC belt is not being cleaned correctly.
- The engine drive board has failed.
- The high-voltage power supply has failed.

SOLUTION

The solution you choose depends upon the problem in your unit. Solutions are presented in logical sequence: most likely to least likely.

- Clean or replace the quenching lamp.
- Replace the OPC belt cleaning unit.
- Replace the engine drive board.
- Replace the high-voltage power supply.

Make the appropriate entry in the maintenance log.

2.3.11 Dirty Margins

SYMPTOM

The margins on the paper are dirty.

PROBLEM

- The quenching lamp is dirty.
- The OPC belt is not being cleaned correctly.
- The development drawer is faulty.

SOLUTION

The solution you choose depends upon the problem in your unit. Solutions are presented in logical sequence: most likely to least likely.

- Clean or replace the quenching lamp.
- Replace the OPC belt cleaning unit.
- Clean the development drawer and replace only if cleaning is ineffective (see Section 2.2.6).

Make the appropriate entry in the maintenance log.

2.3.12 Stray Toner or Repeating Image Fused to Paper

SYMPTOM

Stray toner or a repeating image is fused to the paper.

PROBLEM

- The toner spilled in the unit.
- The quenching lamp is dirty.
- The cleaning pad is dirty.
- The development drawer is faulty.

SOLUTION

The solution you choose depends upon the problem in your unit. Solutions are presented in logical sequence: most likely to least likely.

- Clean/vacuum the inner spaces of the printer as required.
- Clean or replace the quenching lamp.
- Replace the cleaning pad.
- Clean the development drawer and replace only if cleaning is ineffective (see Section 2.2.6).

Make the appropriate entry in the maintenance log.

2.3.13 Black Vertical Lines at Same Location on Each Page

SYMPTOM

Black vertical lines appear at the same location on each page.

PROBLEM

- The shield glass is dirty.
- The OPC belt is damaged or has an obstruction in the OPC exposure slot.
- The optical housing unit has failed.

SOLUTION

The solution you choose depends upon the problem in your unit. Solutions are presented in logical sequence: most likely to least likely.

- Inspect/replace the shield glass from the customer maintenance kit.
- Remove the obstruction from the OPC exposure slot.
- Replace the OPC with a customer-supplied OPC cartridge.
- Replace the optical housing unit.

Make the appropriate entry in the maintenance log.

2.3.14 White Vertical Lines on Page

SYMPTOM

White vertical lines appear on the page.

PROBLEM

- A blockage in the development unit is preventing even toner distribution.
- The charge corona wire is dirty.
- The shield glass is scratched.

SOLUTION

The solution you choose depends upon the problem in your unit. Solutions are presented in logical sequence: most likely to least likely.

- Clean the development drawer (see Section 2.2.6).
- Replace the charge corona unit.
- Replace the shield glass.

Make the appropriate entry in the maintenance log.

2.3.15 Light Vertical Lines or Voids

SYMPTOM

White lines appear down either side of the image area.

PROBLEM

- The OPC exposure slot is obstructed.
- The development drawer contains foreign matter.
- The optical housing unit is dirty.

SOLUTION

The solution you choose depends upon the problem in your unit. Solutions are presented in logical sequence: most likely to least likely.

- Remove the obstruction from the OPC exposure slot.
- Check for uniformity of toner on the development roller and:
  - — If toner voids are found along the roller, clean the development drawer and vacuum out the old toner and replace with fresh toner (see Section 2.2.6).
- Replace the optical housing unit.

Make the appropriate entry in the maintenance log.

2.3.16 Random Black Lines

SYMPTOM

Random black lines appear on the paper.

PROBLEM

- The shield glass is dirty.
- The heat roller on the fusing unit is scarred. This is most likely due to improper installation of the separation pawls or improper customer maintenance.

SOLUTION

The solution you choose depends upon the problem in your unit. Solutions are presented in logical sequence: most likely to least likely.

- Replace the shield glass.
- Inspect the fusing unit heat roller for scarring and replace the fusing unit if required. Advise the customer on proper maintenance.

Make the appropriate entry in the maintenance log.

2.3.17 Thin Horizontal Lines, Top Half of Page

SYMPTOM

Multiple thin lines appear with a density ranging from one light line on one of several pages, to multiple lines on every page. These lines *always* appear on the top half of the page. Any binding during the printing process will exhibit these symptoms.

PROBLEM

- The short and long drive belts are loose.
- The three gears located between the fusing unit and white fusing drive pulley are failing.
- The OPC unit drive gear assembly is binding.

SOLUTION

The solution you choose depends upon the problem in your unit. Solutions are presented in logical sequence: most likely to least likely.

- Adjust the tension on the long and short belts. Refer to the *LN03A Pocket Service Guide* (EK-LN03A-PS).
- Replace the 3-gear set using kit P/N 29-25308-00. Refer to the *LN03A Illustrated Parts Breakdown* (EK-LN03A-IP) page 11, items 17–22.
- Clean or replace the OPC unit drive gear assembly using kit P/N 29-26068-00. See Figure 3-28 in the *LN03A Illustrated Parts Breakdown* (EK-LN03A-IP).

Make the appropriate entry in the maintenance log.

2.3.18 Single Horizontal Line

SYMPTOM

A single, thin, black, horizontal line, appears about 3.81 cm (1.5 in) from the top of the page. The location of the black line is consistent, but it may only appear intermittently, every tenth page or so.

PROBLEM

The upper and lower transport rollers are worn and failing.

SOLUTION

Replace the upper and lower transport rollers. Refer to the procedure in the *LN03A Pocket Service Guide* (EK-LN03A-PS) and to the *LN03A Illustrated Parts Breakdown* (EK-LN03A-IP).

Make the appropriate entry in the maintenance log.

2.3.19 Single Horizontal Line (OPC Synchronous Mark Error)

SYMPTOM

Error Code 4 displays or a single black line may appear, moving down each page.

PROBLEM/SOLUTION

See Section 2.9.5.

2.3.20 Irregular Print Skew

SYMPTOM

The print is skewed side-to-side on every page.

PROBLEM

- The paper tray is not installed correctly.
- The paper guide is not flush against the paper.

SOLUTION

The solution you choose depends upon the problem in your unit. Solutions are presented in logical sequence: most likely to least likely.

- Install the paper tray correctly.
- Place the paper guide flush against the paper.

Make the appropriate entry in the maintenance log.

2.3.21 First Character Missing from Left Margin

SYMPTOM

The characters A or W, or an underlined character will not print as the first character in the left margin.

PROBLEM

Margin parameters are incorrectly set in DECSLRM. The DECOPM does not work properly because of firmware incompatibility in Versions 4.3 and below. If any part of a character cannot be accommodated by the quarter-inch left margin parameter (even one pixel), the entire character is not printed.

SOLUTION

The solution you choose depends upon the problem in your unit. Solutions are presented in logical sequence: most likely to least likely.

- Change the 180 portion of the DECSLRM parameter to 182 and the 5940 portion to 5942. This allows 80 characters, including the A, W, and underscore (assuming 10-pitch) to be printed.
- Change the setting of the A4/8.5 X 11 switch on the pack panel to the 8.5 position.

Make the appropriate entry in the maintenance log.

2.4 INCORRECT IMAGING

2.4.1 Unexpected Page Results

This problem specifically addresses overprinting, missing pixels, or graphic image subdivided (among several pages) and status LED number 1 flashing.

SYMPTOM

- Overprinting—One page of printer output is being printed over several sheets of paper.
- Missing Pixels—The LN03 prints a page containing graphics, but the graphics are missing some pixels. The pixels will be missing from lines or shaded areas.
- Graphic Image Subdivided (among several pages) – The LN03 prints a page of graphics or text over several sheets of paper.

PROBLEM

The LN03 is out of dynamic memory space because the page is too complex. This is a common problem in the LN03 base system that has not been upgraded. Those that have been upgraded to an LN03 PLUS or LN03R should not be affected.

SOLUTION

The solution you choose depends upon the problem in your unit. Solutions are presented in logical sequence: most likely to least likely.

Try one or more of the following suggestions to solve the problem:

- Reduce page complexity. Heavy graphics usage, particularly shaded areas, can consume all of the LN03 random access memory (RAM).

  The page being printed is too complex for the hardware that moves the page image from RAM to the print engine. The hardware cannot translate the image fast enough for the print engine, resulting in missing sections or lines.
- Reduce the complexity of the page where pieces are missing by removing shading or fill from the graphic image.

- Reallocate existing memory by powering the LN03 down and up again.

  CAUTION
  Always pause momentarily before restarting any piece of equipment after powering down.

- A more permanent fix is to add an additional RAM cartridge.

  NOTE
  Even with an additional RAM cartridge, the total amount of memory available can still be exceeded.

  Some of the available memory is used up each time a new font is requested. When the LN03 is restarted, memory is reallocated. This is especially effective if the faulty page had printed without error in the past. Restarting the LN03 will stall, but not stop, the print queue.

- Upgrading to an LN03 PLUS should alleviate the problem.

  The LN03 base system builds the page (bit map) to be printed, in its resident RAM. The LN03 PLUS software builds a complete page on the print host before that data is transferred to the LN03 RAM. Thus, the page transfer time is always smaller than the LN03 PLUS paper-throughput time.

Make the appropriate entry in the maintenance log.

2.5 PAPER JAM

Paper jams can occur for many reasons. Custom paper, letterhead, and custom-printed forms often are to blame. Consult the *Digital Laser Printers: Guide to Paper and Other Media* (EK-LASER-GD) for an extensive discussion of laser media specifications.

2.5.1 Frequent or Constant Paper Jam

SYMPTOM

Frequent or constant paper jams occur. Error Code E or F is displayed.

NOTE

An E error code can be displayed without the jam being in the exit area. If the jam occurs before the registration sensor, then an F error code will be displayed. If the jam occurs at or after the registration sensor, then an E error code will be displayed.

PROBLEM

- The paper does not meet specification.
- The paper sticks together due to static buildup.
- The paper size switch is in the wrong position.
- If Error Code E is displayed, see Section 2.9.17.
- If Error Code F is displayed, see Section 2.9.18. A hardware problem is causing the jam. The problem could be:
  - — The paper tray bottom plate drive arm is binding and not allowing the tray to be sufficiently lifted.
  - — The prefeed roller is bad
  - — The feed roller is bad
  - — The separation roller is bad
  - — The paper feed clutch is bad
  - — The paper transport clutch is bad

SOLUTION

The solution you choose depends upon the problem in your unit. Solutions are presented in logical sequence: most likely to least likely.

- Ensure that the paper is within specification (16 - 24 lb.). Refer the customer to the *Digital Laser Printers: Guide to Paper and Other Media* (EK-LASER-GD). Consult with the customer on unique media use.
- Advise the customer to fan the paper prior to loading it into the tray.
- Ensure that the paper size switch is in the correct position.
- Check the cause of binding and adjust/replace hardware components as required.
- Refer to Section 2.9.17 or Section 2.9.18 to troubleshoot a hardware problem. Also refer to the appropriate pocket service guide and IPB to replace or adjust the following components, if required (see Figure 2–1):

  NOTE
  Changing all of the rollers and adjusting the clutches may avoid a follow-up service call.

  — Prefeed roller replacement

  — Feed roller replacement

  — Separation roller replacement

  — Paper feed clutch adjustment

  — Paper transport clutch adjustment

Make the appropriate entry in the maintenance log.

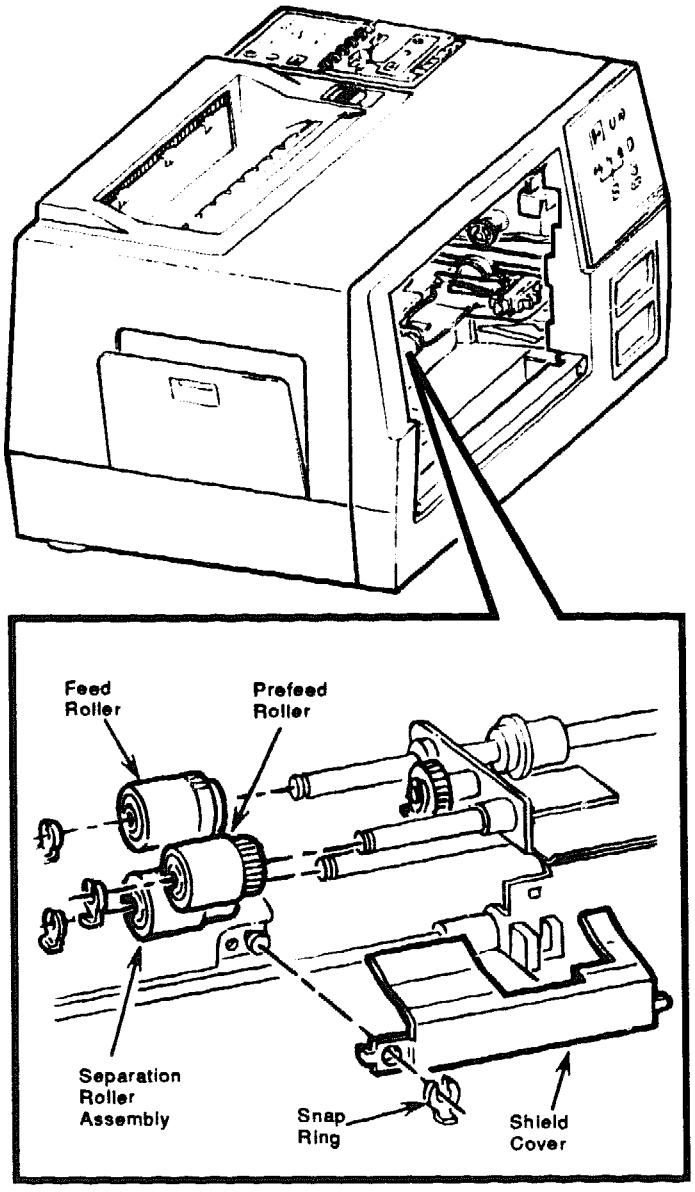


Figure 2–1 Feed and Separation Rollers

2.5.2 Paper Jam in the Exit Area

SYMPTOM

A paper jam occurs in the exit area before the page is completely out of the fusing unit, and/or Error Code E is displayed.

PROBLEM

- The stripper finger is missing or broken.
- The separation pawls are broken.
- The fusing drive pulley is stripped and the exit rollers fail to rotate.
- The exit sensor is broken
- The belts are broken
- The exit assembly guide plates are loose.

SOLUTION

The solution you choose depends upon the problem in your unit. Solutions are presented in logical sequence: most likely to least likely.

- Replace the stripper finger (located just before the fusing unit).
- Replace the separation pawls as follows:
  - — LN03: P/N 29-25215-00
  - — LN03A: P/N 29-26090-00
- Replace the fusing drive pulley, shaft, and bearing.
- Replace the exit sensor.
- Replace the broken belts.
- Secure the exit assembly guide plates.

Make the appropriate entry in the maintenance log.

2.5.3 Miscellaneous Paper Jams

SYMPTOM

- Paper jams occur in the fusing area (paper may be folded accordion style).
- The exit rollers do not turn.

NOTE
Other symptoms may occur, such as noisy operation and Error Code 4. Other error codes are possible.

PROBLEM

- The printer is probably being operated beyond its specified limitations.
- The fusing drive pulley may be failing due to a binding fusing unit.

SOLUTION

The solution you choose depends upon the problem in your unit. Solutions are presented in logical sequence: most likely to least likely.

- Advise the customer to adhere to the recommended print limitations of 3,000 to 6,000 pages per month, not to exceed 10,000 pages per month. Overheated components wear quickly because the self-lubricating qualities are undermined by the high temperatures generated when the limits are exceeded.
- If it has been more than 90,000 pages since the last fusing unit replacement is indicated in the maintenance log, replace the fusing unit.
- If the fusing drive pulley fails, replace it and the fusing unit. Also, install the new washer/spacer, which is placed between the C-clip and supporting bearing.
  - — Gear (P/N 29-26248)
  - — Washer/spacer (P/N 29-26235)

Make the appropriate entry in the maintenance log.

2.6 INOPERATIVE PRINTER OR COMPONENT

Failures of the printer itself or of one of the major components often develop after user maintenance or during a printer relocation.

2.6.1 No Power, No Fans

SYMPTOM

The LN03 will not power-up. The power supply LEDs are off and the dc fans are not running.

PROBLEM

- Either the ac line voltage is not reaching the power supply or the power supply has failed.
- For the LN03 only: The top cover interlock switch can keep the LEDs from lighting.
- The optical housing unit is faulty.

SOLUTION

The solution you choose depends upon the problem in your unit. Solutions are presented in logical sequence: most likely to least likely.

Use the following list to determine the failure:

- Verify that the ac line voltage is present at the wall outlet.
- Verify that the ac power cord is not internally open.
- Verify that the ac line voltage is present at PS1 (see Figure 2–2).
- Verify that the top cover open switch is working correctly.
- Verify that the ac circuit is working correctly.
- Check/replace the top cover interlock switch (not found on LN03A).
- To verify the optical housing unit:
  - — Remove the engine drive board.
  - — Replace the optical housing if the power supply LEDs illuminate.

If, after making all the preceding verifications the problem still exists, replace the power supply.

Make the appropriate entry in the maintenance log.

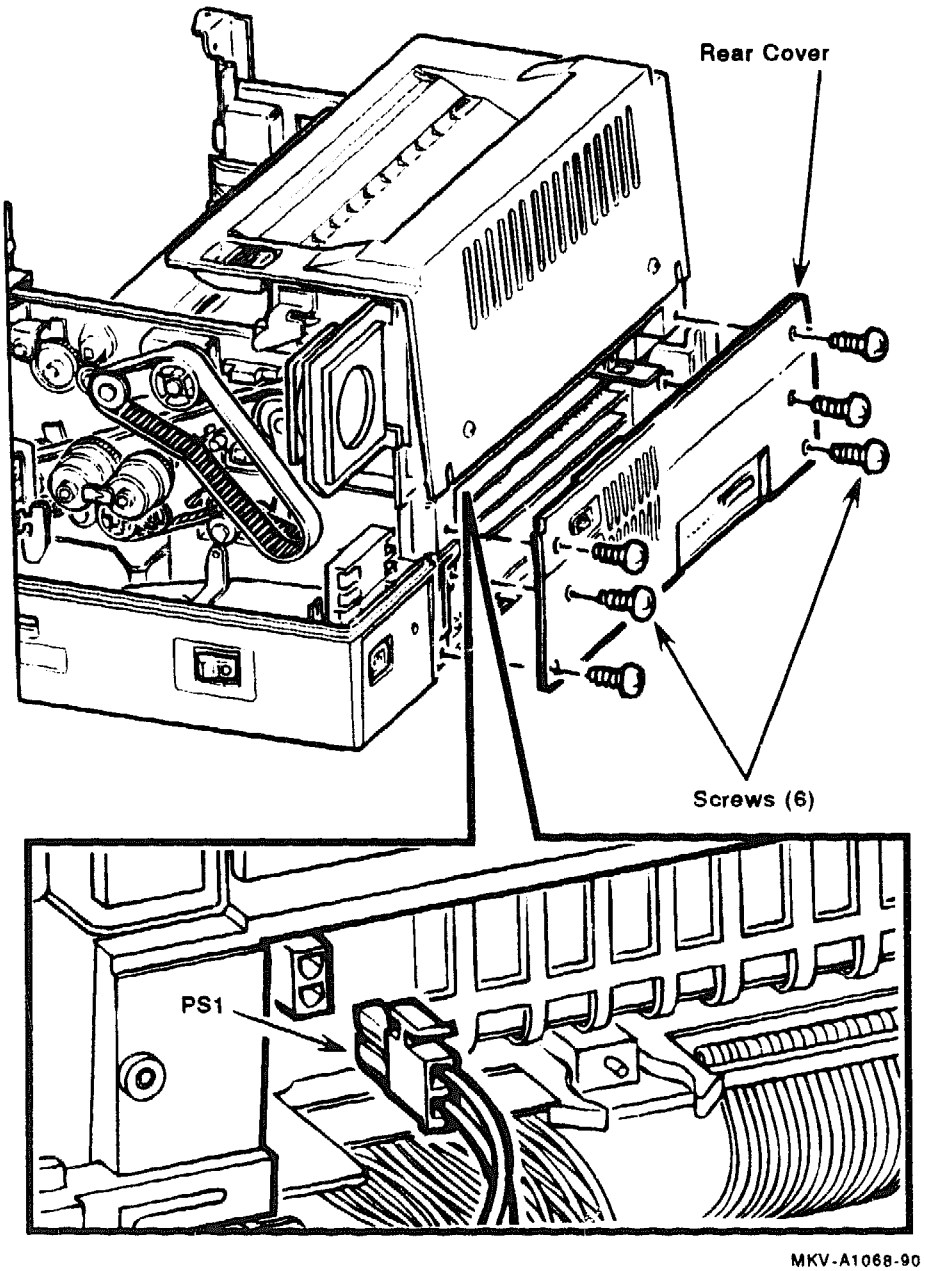


Figure 2–2 LN03 Power Supply

2.6.2 Printer Powers Up but Does Not Print

SYMPTOM

The printer powers up correctly, but does not print when data is sent.

PROBLEM

- The host and the printer have a communication problem between them.
- The print queue is stalled or stopped.
- The controller board has failed.
- An EIA-232 failure from data source.

SOLUTION

The solution you choose depends upon the problem in your unit. Solutions are presented in logical sequence: most likely to least likely.

- Check the configuration switch settings to ensure that they match the host settings.
- Restart the print queue.
- Perform the loopback test to diagnose a controller board failure. If the loopback test fails, replace the controller board. If the loopback test passes, a data connection problem exists.

Make the appropriate entry in the maintenance log.

2.6.3 Maintenance Light Comes On Prematurely

SYMPTOM

The maintenance light illuminates well before the projected OPC count total.

PROBLEM

- The counter did not reset due to:
  - — Previously broken OPC tabs
  - — Faulty counter or sensor
- The reset lever is sticking.

SOLUTION

The solution you choose depends upon the problem in your unit. Solutions are presented in logical sequence: most likely to least likely.

- If installing an OPC, ensure that the OPC tab has not been broken by previous use (see Section 2.2.5).
- If you suspect that the OPC belt did not reset the counter, power down, then manually reset the counter.
- If the counter or sensor is faulty, replace the following, as necessary:
  - — Counter (P/N 29-26056-00)
  - — Sensor (P/N 29-25087-00)

Make the appropriate entry in the maintenance log.

2.6.4 Toner Light On, Toner Full

SYMPTOM

The toner light stays on after filling the toner reservoir.

PROBLEM

- The toner-low arm is bent.
- The toner sensor is faulty.
- The engine drive board is faulty.

SOLUTION

The solution you choose depends upon the problem in your unit. Solutions are presented in logical sequence: most likely to least likely.

- Reform the toner-low arm.
- Replace the toner sensor.
- Replace the engine drive board.

Make the appropriate entry in the maintenance log.

2.6.5 Toner Collection Light Remains On

SYMPTOM

The toner collection light remains on.

PROBLEM

- The collection bottle is full or dirty.
- The toner collection sensor is dirty or broken.
- The engine drive board is faulty.

SOLUTION

The solution you choose depends upon the problem in your unit. Solutions are presented in logical sequence: most likely to least likely.

- Replace the toner collection bottle.
- Replace the toner collection sensor.
- Replace the engine drive board.

Make the appropriate entry in the maintenance log.

2.6.6 ISO/PC Cartridge Inoperative

SYMPTOM

The printer does not operate in ISO mode, but functions in "Other" mode.

PROBLEM

The LN03X-IC ISO/PC cartridge has failed.

SOLUTION

Replace the LN03X-IC ISO/PC cartridge (P/N 54-17083-01).

Make the appropriate entry in the maintenance log.

2.7 AUDIBLE SYMPTOMS

Noise, or lack of expected noise, can indicate problems. Listen to the sounds of a known good printer during power-up and during normal operation. Compare the normal sounds to those of a suspect printer.

2.7.1 Noisy Rhythmic Squeal

SYMPTOM

A noisy rhythmic squeal occurs once every cycle of the feed rollers. This is usually difficult to localize as there is no single primary contributor to this problem. Modifications have been made to components to reduce the likelihood of this type of noise.

PROBLEM

This noise can be caused by many components in the paper path.

Areas that could cause the symptom include exit assembly, fusing unit assembly, drive side plate assembly, OPC drive gears, paper tray motor and gear assembly, development drawer, and drive gears.

Most likely, toner has migrated into the bearings and dried out the lubricant, or caused excessive wear (or corrosion) to bearings and gears. Fuser gears are particularly subject to this problem. A broken white fusing drive pulley will exhibit these symptoms also.

SOLUTION

The solution you choose depends upon the problem in your unit. Solutions are presented in logical sequence: most likely to least likely.

- Inspect/replace the worn and corroded bearings and other parts including:
  - — Paper feed rollers
  - — Cleaning unit
- Inspect and clean the development drawer, if required (see Section 2.2.6).

Use the illustrated parts breakdown (IPB) for the particular LN03 model to identify the correct part numbers.

CAUTION
All of the bearings are self-lubricating. An external lubricant causes the toner to collect at a greater rate, which causes excessive wear and corrosion. If an external lubricant is a suspected problem, disassemble and clean the affected unit thoroughly to remove all traces of the lubricant.

Make the appropriate entry in the maintenance log.

2.7.2 Normal Sounds

The sounds heard during power-up and normal operation of the printer can provide important clues to the condition of the printer. Always listen for the sounds of a suspect printer and compare them to the normal expected sounds during various operations of the printer.

SYMPTOM

Normal sounds are not heard during operation.

PROBLEM

- The fans and/or other components are not functioning as expected.
- Loud sounds or no sounds at all.

SOLUTION

The solution you choose depends upon the problem in your unit. Solutions are presented in logical sequence: most likely to least likely.

- Verify the operation of the fans and other components expected to be heard during power-up and normal operation of the printer.
- Replace fans and/or other components as required.

Make the appropriate entry in the maintenance log.

2.7.3 Gear Grinding Noises or Buzzing Sounds

These noises or sounds are usually caused by improper meshing of gears, seating of drive assemblies, broken fusing drive components, and in some instances vibrations.

SYMPTOM

Grinding or buzzing sounds are heard.

PROBLEM

The problem areas could be the same as those listed in Section 2.7.1.

SOLUTION

Replace worn gears and assemblies as required. Refer to Table 3–3 if fusing drive component replacement is required.

Make the appropriate entry in the maintenance log.

2.8 INCORRECT OPERATING TEMPERATURE

Incorrect operating temperature has a direct effect on printer performance. The symptoms are often subtle, like blurred or light printing problems, but can be unmistakable, as when an overheated condition affects the surrounding components. Overheated and undertemperature operation have some common symptoms as well as unique symptoms. Any odd-numbered error code can be brought up as a result of incorrect operating temperature. Error Codes B and F can also indicate incorrect operating temperature. Compare the actual symptoms to those listed in the following sections.

2.8.1 Overheating

SYMPTOM

- Toner appears on the back of pages.
- Printed image blur or fuser unit meltdown.
- Any odd-numbered error codes (1 through 9, and B).
- In its mildest form, the effect of overheating is to blur the printed image.
- In its most extreme form, overheating can melt the fuser printed image, causing unreliable printing and/or warping of the fusing cover. Suspect overheating when the page output becomes streaked or blurred.

NOTE

No symptoms (such as smoke, smell, or discoloration) are apparent prior to meltdown.

PROBLEM

- The printer is located in a confined area.
- The airflow is obstructed.
- The ozone filter element or fan screen is clogged or dirty (see Figure 2–3).
- The cooling fan has a problem.
- The thermistor has failed on the fusing unit.
- The engine drive board has failed.

- **The solid-state relay on the ac input assembly of the LN03 has failed, or the low-voltage power supply of the LN03A has failed.**

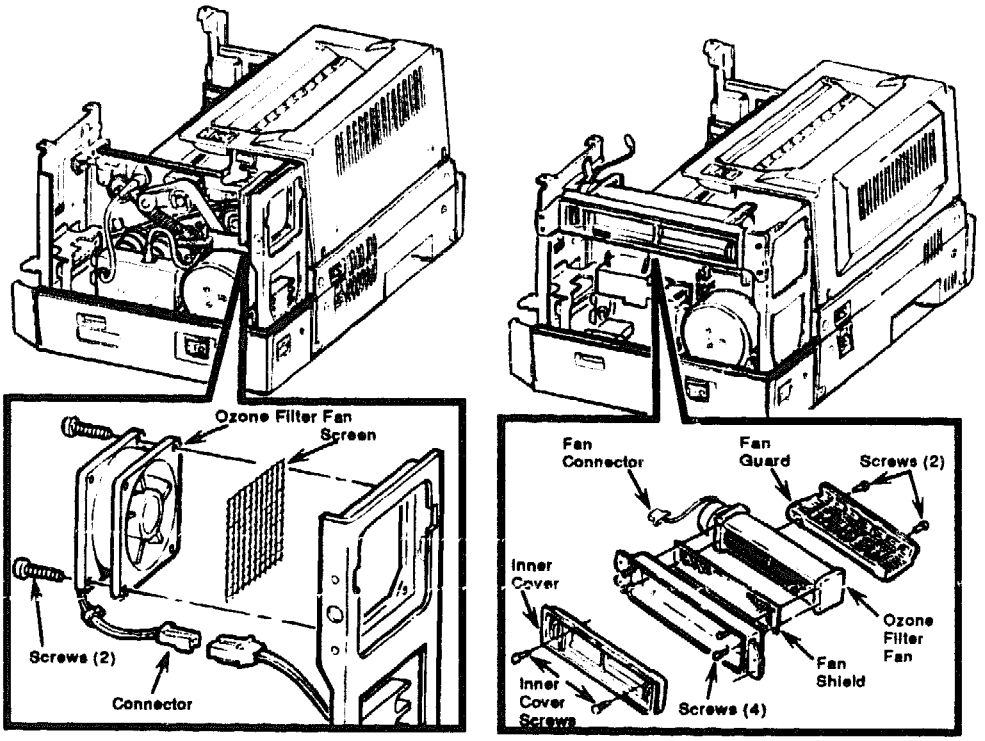


Figure 2–3 Replacing the Ozone Screens

SOLUTION

The solution you choose depends upon the problem in your unit. Solutions are presented in logical sequence: most likely to least likely.

- Relocate the printer for optimum airflow.
- Clean and check the air intake filter.
- Clean or replace the ozone filter or fan screen.
- Clean and check the fans for proper operation.
- Clean or replace the thermistor/fusing unit as follows:

  The fuser operating temperature is controlled by a thermistor that rests on the heat roller. The thermistor has a yellow/orange Teflon® tape covering it. During the normal operation of the printer, the thermistor can become coated with toner that hardens into a crust, insulating the thermistor. The effect causes the fuser temperature to exceed the working temperature range of 175°C to 185°C (347°F to 365°F).

  Use the following procedure to clean and/or replace the thermistor:

  1. Remove the two screws that secure the felt heat shield on the top of the fuser unit and remove the heat shield (see Figure 2–4).
  2. Remove one screw that secures the thermistor and shield.
  3. Discard the thermistor if it has melted.
  4. If the thermistor is still intact, remove the hardened toner from the yellow Teflon tape by gently scraping with a sharp object such as a pocket knife. Do not scrape the Teflon itself.
  5. Replace the thermistor and the heat shield or the fusing unit as required.

- Replace the engine drive board (see appropriate IPB for part number and location).
- Replace the LN03 solid-state relay or the LN03A low-voltage power supply. Refer to the appropriate IPB for the part number and location.

NOTE
To replace the LN03 solid-state relay, remove the relay from the ac input assembly of the printer. Replace with a relay from the new ac input assembly.

Make the appropriate entry in the maintenance log.

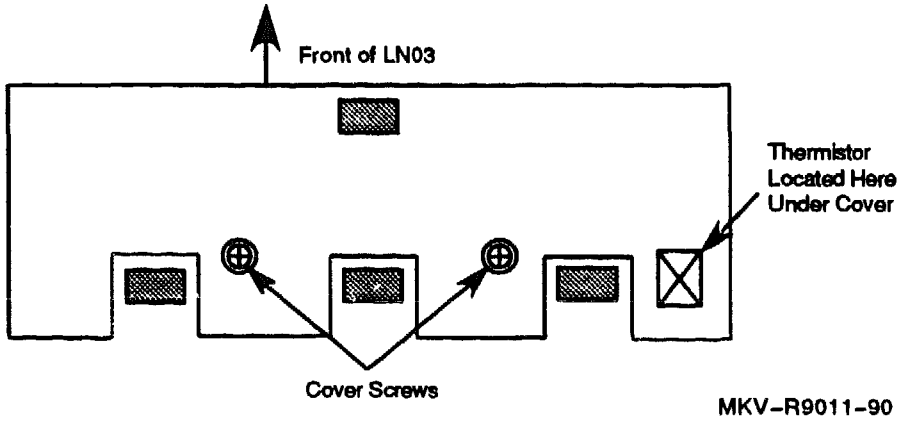


Figure 2–4 LN03 Heat Shield and Thermistor Location

2.8.2 Undertemperature

SYMPTOM

- Any odd-numbered error codes (1 through 9, and B).
- Print wipes off of the page (not fused).

PROBLEM

- The paper exit cover interlock switch (right side) has failed.
- The quartz fusing heater has failed.
- The temperature fuse assembly has failed.
- The fusing heater holder has failed.
- The engine drive board has failed.
- The solid-state relay on the ac input assembly of the LN03 has failed, or the low-voltage power supply of the LN03A has failed.

SOLUTION

The solution you choose depends upon the problem in your unit. Solutions are presented in logical sequence: most likely to least likely.

- Inspect/replace the paper exit cover interlock switch. Use a meter to check continuity.
- Isolate the fusing unit from the fuse assembly or other component problems.
- If above error code are displayed, check that the heater measures 2 to 3 ohms. If not, replace the quartz fusing heater.

  If measurement is ok (2 to 3 ohms), look for a failure of the fusing unit fuse (2 red wires) or the fusing heater holder. Replace the fuse or the fusing unit as required. Check for the cause of the blown fuse.
- Replace the engine drive board.
- Replace the LN03 solid-state relay or the LN03A low-voltage power supply. Refer to the appropriate IPB for the part number and location.

Make the appropriate entry in the maintenance log.

2.9 ERROR CODE INDICATIONS

NOTE
Throughout this section, when multiple error codes occur, troubleshoot the lowest error code first.

2.9.1 Error Code 1 at Power-up

SYMPTOM

The number 1 displays at power-up indicating a fusing error.

PROBLEM

- The fusing unit or the fusing lamp has failed.
- The engine drive board has failed.
- The power supply unit has failed.

SOLUTION

The solution you choose depends upon the problem in your unit. Solutions are presented in logical sequence: most likely to least likely.

- Verify operation of the fusing lamp and replace if required.
- Replace the fusing unit.
- Check the power supply voltage LEDs.
  - — If any of the voltage LEDs are not lit, replace the power supply unit (see Figure 2–2).
  - — If all of the voltage LEDs are lit, replace the engine drive board.

Make the appropriate entry in the maintenance log.

2.9.2 Error Code 1 After Power-up

SYMPTOM

The number 1 displays about 2 1/2 minutes after power-up indicating a fusing error.

PROBLEM

- The fusing unit has failed.
- The engine drive board has failed.
- The fusing unit heater has failed.
- The solid-state relay on the LN03 or the low-voltage power supply on the LN03A has failed.
- The power supply unit has failed.
- The paper exit cover interlock switch (right side) has failed.
- The ac bracket assembly has failed.

SOLUTION

The solution you choose depends upon the problem in your unit. Solutions are presented in logical sequence: most likely to least likely.

- Power the printer off and then back on. Check the fusing unit after approximately 90 seconds.

  If the fusing unit is hot:

  — Replace the fusing unit.

  — Replace the engine drive board.

  — If an LN03, replace the solid-state relay on the ac bracket assembly. If an LN03A, replace the low-voltage power supply.

  If the fusing unit is only warm or cold:

  — Replace the fusing unit heater.

  — Replace the fusing unit.

- Check the power supply voltage LEDs.

  — If all of the voltage LEDs are lit, replace the engine drive board.

— If any of the voltage LEDs are not lit:

- Replace the power supply unit.
- Replace the paper exit cover interlock switch (right side).
- Replace the entire ac bracket assembly.

Make the appropriate entry in the maintenance log.

2.9.3 Error Code 2

SYMPTOM

The number 2 displays at power-up indicating an optical system error.

PROBLEM

- The power supply unit has failed.
- The scanner motor drive board has failed.
- The engine drive board has failed.
- The optical housing unit has failed.
- The development drawer interlock switch has failed.
- The cover interlock switch (left side) has failed.
- The paper exit cover interlock switch has failed.

SOLUTION

The solution you choose depends upon the problem in your unit. Solutions are presented in logical sequence: most likely to least likely.

- Check the power supply voltage LEDs.
  - — If any of the voltage LEDs are not lit, replace the power supply unit.
  - — If all of the voltage LEDs are lit:
    - Replace the scanner motor drive board.
    - Replace the engine drive board.
    - Replace the optical housing unit (particularly when a slight click is audible just as the Error Code 2 appears).
    - Clean the development drawer interlock switch contact surfaces. Adjust or replace the interlock switch (as required).
    - Replace the cover interlock switch (left side).
    - Replace the paper exit cover interlock switch.
- Check all interlock switches. If a faulty interlock switch is found, replace the faulty switch.

Make the appropriate entry in the maintenance log.

2.9.4 Error Code 3

SYMPTOM

The number 3 displays at power-up.

PROBLEM

The conditions for Error Codes 1 and 2 have occurred.

NOTE
When multiple error codes occur, troubleshoot the lowest error code first.

SOLUTION

Refer to Section 2.9.1, Section 2.9.2, Section 2.9.3, and Section 2.8.

Make the appropriate entry in the maintenance log.

2.9.5 Error Code 4

SYMPTOM

- The number 4 displays at power-up indicating an OPC synchronous mark error.
- A single black line may appear, moving down on each page.

PROBLEM

- The organic photoconductor (OPC) cartridge has failed.
- The OPC cartridge is incorrectly seated.
- The cleaning unit is clogged.
- The OPC synchronous sensor has failed.
- The engine drive board has failed.
- The long drive belt is broken.
- The OPC drive gear is slipping.

SOLUTION

The solution you choose depends upon the problem in your unit. Solutions are presented in logical sequence: most likely to least likely.

CAUTION
Protect the OPC from light by covering it with paper whenever possible. The OPC is adversely affected by the long-term effects of any light source.

- Clean the OPC sensor.
- Reseat the OPC cartridge.
- Wipe the OPC synchronous mark with a lint-free cloth. Check wear on the synchronous mark.
- Replace the OPC with a customer-supplied OPC cartridge and install the LN03X-AD Maintenance Kit.
- Replace the cleaning unit.
- Replace the OPC sensor.
- Replace the engine drive board.
- Replace the long drive belt (see Figure 2–5).

- Tighten the OPC drive gear (see Figure 2–5) using the following procedure:
  - — Turn the OPC drive gear so that the hex set screw is facing forward. If the OPC drive gear does not turn easily, then rotate the development drive gear counterclockwise which in turn rotates the cluster of gears including the OPC drive gear.
  - — Remove the hex set screw and apply a small amount of Loctite® to the threads.
  - — Position the gear flush with the end of the shaft.
  - — Replace and tighten the hex set screw.
  - — Replace the other parts that were removed.

Make the appropriate entry in the maintenance log.

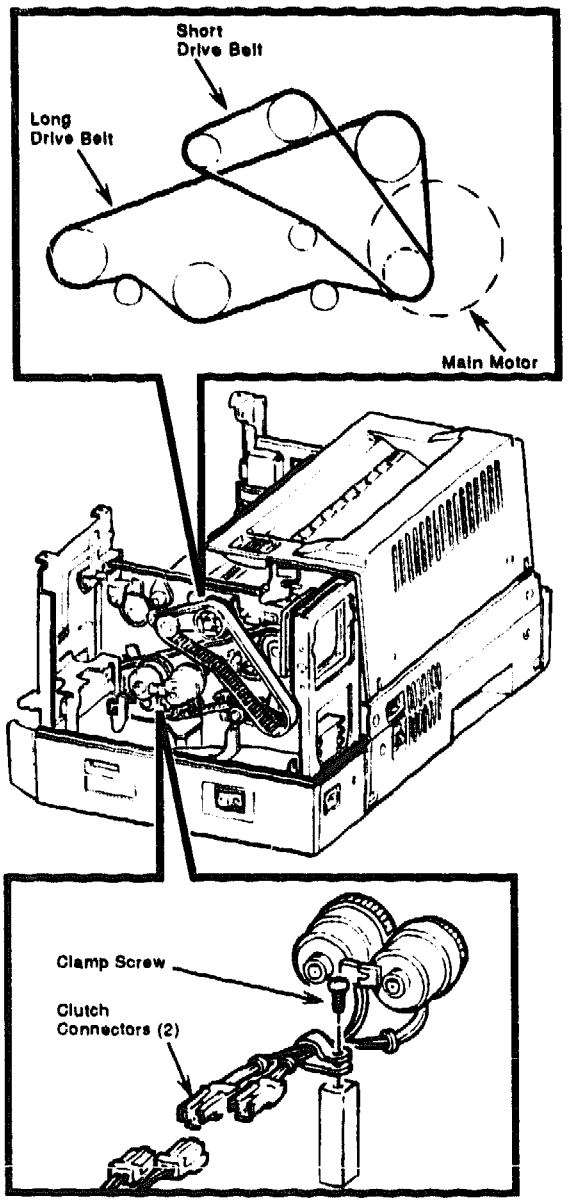


Figure 2–5 OPC Drive Belt and Gear

2.9.6 Error Code 4, Printer Shutdown

SYMPTOM

Error Code 4 displays and the printer does not print.

PROBLEM

- The toner spilled on left, inside the engine.
- The cleaning unit clogged in the vicinity of the collection bottle.
- The excess toner wore out the home mark on the OPC belt.

SOLUTION

The solution you choose depends upon the problem in your unit. Solutions are presented in logical sequence: most likely to least likely.

- Remove the excess toner and shake off the excess toner from the OPC belt. Run several pages through the printer to assure that the OPC belt is clean.
- Check that the "low toner" microswitch is functioning properly (this does not stop the printer).
- Adjust or replace the "low toner" microswitch (this does not stop the printer).
- Install the contents of the LN03X-AD Maintenance Kit.
- Replace the cleaning unit.
- Clean the engine, transfer corona unit, transport rollers, and development drawer (see Section 2.2.6).

Make the appropriate entry in the maintenance log.

2.9.7 Error Code 5

SYMPTOM

The number 5 displays at power-up.

PROBLEM

The conditions for Error Codes 1 and 4 have occurred.

NOTE
When multiple error codes occur, troubleshoot the lowest error code first.

SOLUTION

Refer to Section 2.9.1, Section 2.9.2, and Section 2.9.5.

Make the appropriate entry in the maintenance log.

2.9.8 Error Code 6

SYMPTOM

The number 6 displays at power-up.

PROBLEM

The conditions for Error Codes 2 and 4 have occurred.

NOTE

When multiple error codes occur, troubleshoot the lowest error code first.

SOLUTION

Refer to Section 2.9.3 and Section 2.9.5.

Make the appropriate entry in the maintenance log.

2.9.9 Error Code 6 Flashing

SYMPTOM

The number 6 flashes.

PROBLEM

The conditions for Error Codes 2 and 4 have occurred.

NOTE
This occurs normally while the LN03R is printing.

NOTE
When multiple error codes occur, troubleshoot the lowest error code first.

SOLUTION

The solution you choose depends upon the problem in your unit. Solutions are presented in logical sequence: most likely to least likely.

- If not an LN03R:
  - — Reset the buffer by taking the printer off line momentarily.
  - — Insert a blank page.
  - — Replace the controller board.
- Refer to Section 2.9.3 and Section 2.9.5.

Make the appropriate entry in the maintenance log.

2.9.10 Error Code 7

NOTE
This is normal for the LN03R.

SYMPTOM

The number 7 displays at power-up.

PROBLEM

The conditions for Error Codes 1, 2, and 4 have occurred.

NOTE
When multiple error codes occur, troubleshoot the lowest error code first.

SOLUTION

Refer to Section 2.9.1, Section 2.9.2, Section 2.9.3, Section 2.9.5, and Section 2.8.

Make the appropriate entry in the maintenance log.

2.9.11 Error Code 8

SYMPTOM

The number 8 displays at power-up indicating a main motor error.

PROBLEM

- The main motor not running at power-up indicates:
  - — The power supply unit has failed.
  - — The main motor drive board has failed. The main motor drive is part of the engine drive board in the LN03.
  - — The engine drive board has failed.
  - — The main motor has failed.
  - — The development drawer interlock switch has failed.
  - — The cover interlock switch (left side) has failed.
  - — The paper exit cover interlock switch (left side) has failed.
- The main motor starting to run within 2 minutes of power-up indicates:
  - — The main motor drive board has failed.
  - — The engine drive board has failed.
  - — The interlock switch has failed.

SOLUTION

The solution you choose depends upon the problem in your unit. Solutions are presented in logical sequence: most likely to least likely.

- If the main motor does not run at power-up, check the power supply voltage LEDs.
  - — If any of the voltage LEDs are not lit, replace the power supply unit.
  - — If all of the voltage LEDs are lit:
    - Inspect/clean the interlock switch contact surfaces.
    - If an LN03, replace the main motor drive board. If an LN03A, replace the engine drive board.
    - Replace the engine drive board.

- Replace the main motor.
- Replace the development drawer interlock switch.
- Replace the cover interlock switch (left side).
- Replace the paper exit cover interlock switch (left side).

- If the main motor starts to run within 2 minutes of power-up:
  - — Replace the main motor drive board.
  - — Replace the engine drive board.
  - — Check all interlock switches. If a faulty interlock switch is found, replace the faulty switch.

Make the appropriate entry in the maintenance log.

2.9.12 Error Code 9

SYMPTOM

The number 9 displays at power-up.

PROBLEM

The conditions for Error Codes 1 and 8 have occurred.

NOTE

When multiple error codes occur, troubleshoot the lowest error code first.

SOLUTION

Refer to Section 2.9.1, Section 2.9.2, Section 2.9.11, and Section 2.8.

Make the appropriate entry in the maintenance log.

2.9.13 Error Code A

SYMPTOM

The letter A displays at power-up.

PROBLEM

The conditions for Error Codes 2 and 8 have occurred.

NOTE

When multiple error codes occur, troubleshoot the lowest error code first.

SOLUTION

Refer to Section 2.9.3 and Section 2.9.11.

Make the appropriate entry in the maintenance log.

2.9.14 Error Code B

SYMPTOM

The letter B displays at power-up.

PROBLEM

The conditions for Error Codes 1, 2, and 8 have occurred.

NOTE

When multiple error codes occur, troubleshoot the lowest error code first.

SOLUTION

Refer to Section 2.9.1, Section 2.9.2, Section 2.9.3, Section 2.9.11, and Section 2.8.

Make the appropriate entry in the maintenance log.

2.9.15 Error Code F

SYMPTOM

The letter F displays continuously at power-up indicating an engine drive board error. It can also indicate a paper jam between the prefeed rollers and the transport rollers. If a jam is present, see Section 2.5, Section 2.9.17, and Section 2.9.18.

PROBLEM

The engine drive board has failed.

SOLUTION

Replace the engine drive board.

Make the appropriate entry in the maintenance log.

2.9.16 Error Code C Flashing

SYMPTOM

The letter C flashes indicating a cover open error or a binding paper tray lift arm.

PROBLEM

- The development drawer, paper tray, paper exit, or side covers are open.
- The interlock or cover open switches are damaged.
  - — Check for cracks between the prongs on the cover.
  - — Verify that the switch depressors are functioning properly.
- The paper tray lift arm is binding.
  - — The symptom disappears after the paper tray is loaded with sufficient weight to overcome the binding.

SOLUTION

The solution you choose depends upon the problem in your unit. Solutions are presented in logical sequence: most likely to least likely.

- Close the drawer or covers.
- Check the interlock and cover open switches for damage and replace if needed.
- Check the cause of binding. Adjust/replace the components as required.

Make the appropriate entry in the maintenance log.

2.9.17 Error Code E Flashing

Also see Section 2.5.

SYMPTOM

The letter E flashes and the paper jam symbol displays indicating a paper jam in the exit or fusing area, between the registration sensor and the exit sensor.

PROBLEM

- A paper jam exists in the exit or fusing area.
- The exit fusing area is obstructed.
- There is an obstruction under the registration sensor.
- The fusing unit has a broken drive pulley.
- The separation pawls are missing or broken.
- The registration sensor has failed.
- The exit sensor has failed.
- The exit cover chain is broken.
- The engine drive board has failed.
- The upper and lower transport rollers are damaged.

SOLUTION

The solution you choose depends upon the problem in your unit. Solutions are presented in logical sequence: most likely to least likely.

- Clear any jammed paper in the exit or fusing area, or in the registration transport area.

  If jam continues:

  — Verify the rotation of the exit rollers. If the exit rollers do not rotate, replace either:

    - The broken exit cover chain.
    - The broken fusing drive pulley (refer to parts list in Table 3–3).

  — Replace the separation pawls.

- Replace the registration sensor.
- Replace the exit sensor.
- Replace the engine drive board.
- Replace the upper and lower transport rollers.

Make the appropriate entry in the maintenance log.

2.9.18 Error Code F Flashing

Also see Section 2.5.

SYMPTOM

The letter F flashes and the paper jam symbol displays indicating a paper jam in the paper feed area.

PROBLEM

- The paper feed area has a paper jam.
- The prefeed, feed, and separation roller assembly are damaged.
- The registration sensor has failed.
- The upper and lower transport rollers are damaged.
- The feed clutch screw is loose.
- The feed clutch has failed.
- The transport clutch screw is loose.
- The transport clutch has failed.
- The engine drive board has failed.

SOLUTION

The solution you choose depends upon the problem in your unit. Solutions are presented in logical sequence: most likely to least likely.

- Clear any jammed paper in the paper feed area.

  If jam continues, inspect and:

  — Wipe shafts clean.

  — Inspect/replace the prefeed, feed, and separation roller assembly, if required.

  — Remove any obstruction in the paper feed path.

  — Replace the registration sensor, if required.

  — Replace the upper and lower transport rollers, if required.

- If paper does not feed at all, check to see if the feed clutch screw is loose. If it is loose, reset the feed and transport magnetic clutch gap. If it is not loose, replace the feed clutch.

- If paper only feeds about 2 inches, check to see if the transport clutch screw is loose. If it is loose, reset the transport clutch gap. If it is not loose, replace the transport clutch.
- Replace the engine drive board, if required.

Make the appropriate entry in the maintenance log.

2.9.19 Error Code 62

SYMPTOM

Error 62 displays on the status indicator.

PROBLEM

The bit-map module font ROM has failed.

SOLUTION

Replace the bit-map module (P/N 54-16943-01). Refer to the *LN03 Pocket Service Guide* (EK-OLN03-PS).

Make the appropriate entry in the maintenance log.

2.9.20 Error Code 63

SYMPTOM

Error 63 displays on the status indicator.

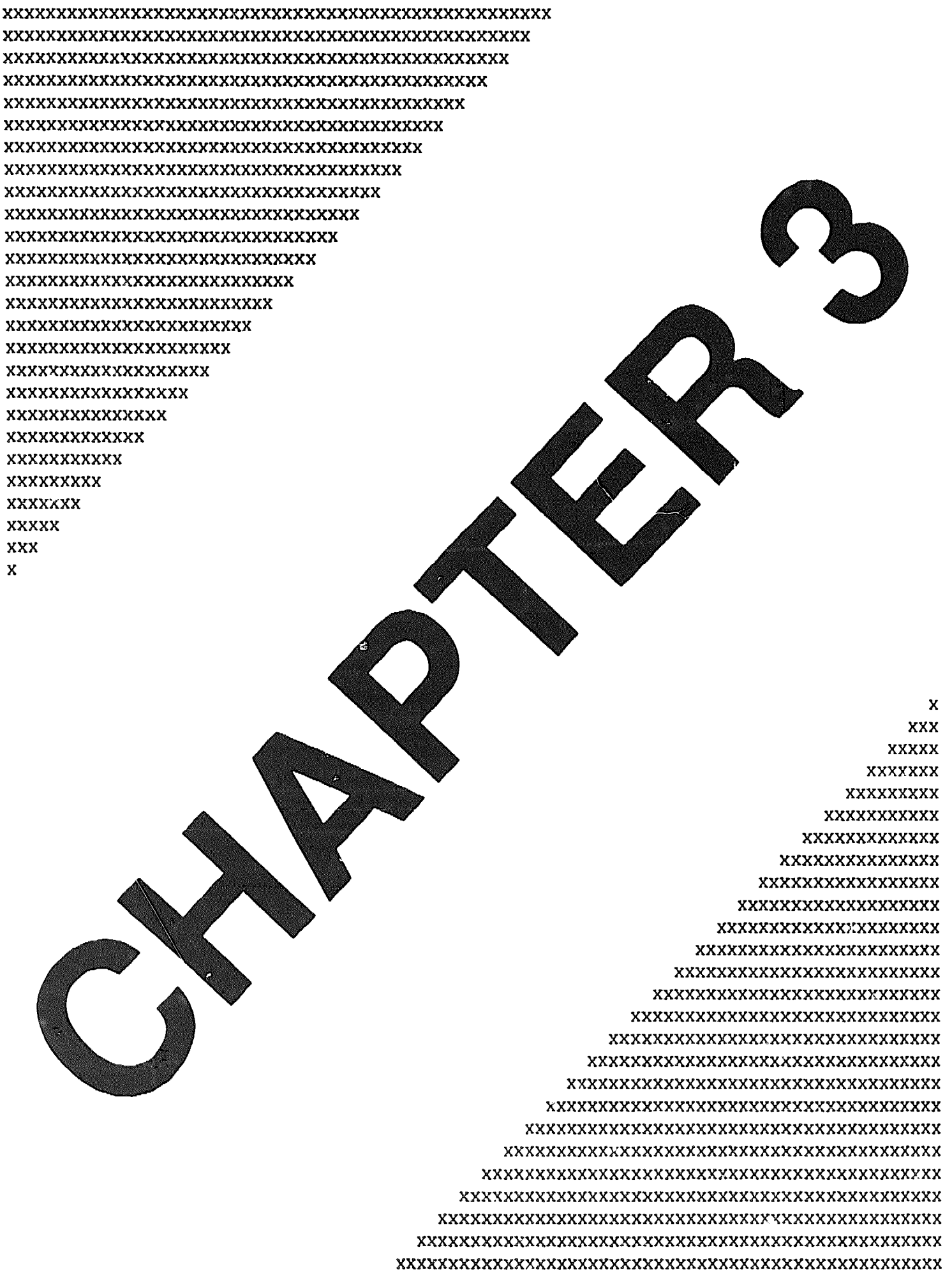
PROBLEM

The bit-map module font RAM has failed.

SOLUTION

Replace the bit-map module (P/N 54-16943-01). Refer to the *LN03 Pocket Service Guide* (EK-OLN03-PS).

Make the appropriate entry in the maintenance log.


CHAPTER 3

3
LN03 TOTAL CALL CONCEPT

3.1 INTRODUCTION

Because the LN03 Series laser printers combine mechanical, electronic, and photocopier technologies, the LN03 maintenance program is more complex than that of most conventional printers. The Total Call Checklist (TCC), included in this chapter, is designed to optimize LN03 preventive maintenance and minimize service calls.

Electrophotographic printing is an inherently dirty process. Frequent and careful cleaning preserves the life of all components by keeping abrasive material and dust out of the components' working surfaces.

NOTE
The LN03 Total Call Checklist is for Digital Equipment Corporation Customer Services engineers only. TCC users must have successfully completed the LN03 Maintenance Course (EY-2895E-IV) for maintaining the LN03 Series laser printers.

3.2 TOTAL CALL CHECKLIST DESCRIPTION

The concept of TCC (Total Call Checklist) for the LN03 printer, is a proactive approach to servicing electrophotographic printers. It incorporates an inspection procedure as an integral part of each remedial service call. This procedure helps to identify and correct potential problems caused by poorly maintained or excessively used printers.

TCC is based on two fundamental concepts:

- Maximize customer *uptime* and minimize call frequency.
- Avoid premature call backs which occur before the normal reliability-based failures.

For these reasons TCC should be an *integral* part of the same service call and not treated as separately scheduled preventive maintenance.

TCC should also be part of a precontract inspection so that the associated repairs can be identified and made before the contract is initiated.

This procedure will initially increase Mean Time To Repair (MTTR). The *action taken* code of the Labor Activity Reporting System (LARS) data field should be segregated to identify that portion of time dedicated to the inspection and data recording process. For consistency, use the following LARS codes.

The LARS codes for precontract inspection and per call use are:

Activity: F
Call Type: C
Action Taken: G

The LARS codes for contract calls use are:

Activity: K
Call Type: C
Action Taken: G

Case-by-case observations demonstrate that proper application of TCC actually improves service performance and customer satisfaction.

3.3 LN03 TOTAL CALL CHECKLIST

Use the following checklist to verify that you have adequately fulfilled the TCC requirements, then make a maintenance log entry of parts replaced and work performed during the TCC. Be sure to carry spare parts and cleaning tools for TCC requirements on each service call.

☐ **Verify that the printer is functioning properly before performing this TCC.**

The recommended procedure is to repair the customer problem before continuing with the TCC. This eliminates TCC-related downtime.

☐ **Clean and vacuum all external surfaces and user-accessible areas (see Section 2.2.6). Remove all traces of toner, paper dust particles, and dirt. User-accessible areas include the development drawer, fusing unit, paper input tray, toner collection bottle cavity, and exit assembly. Inspect and confirm that the air vents are clean and free of obstructions.**

The tools listed in Table 3–1 are required for proper cleaning.

Table 3–1 Cleaning Tools

Part	Part Number
Cleaning Kit	29-26234-00
Toner Vacuum	29-25526-00 (60 Hz)
Toner Vacuum	29-26259-00 (50 Hz)

Aside from having a printer that looks pleasing to the customer, cleaning all external and user-accessible areas allows the printer to attain the optimum print quality. Toner, paper dust, and dirt can cause streaking. Excessive toner can also cause the printer to operate at a much higher temperature than desired. High temperature can cause premature component and field replaceable unit (FRU) failures.

☐ **Inspect the feed and separation rollers for wear or damage. Replace if necessary.** Refer to Table 3–2 and Figure 2–1.

Table 3–2 Feed and Separation Rollers

Part	Part Number
Feed Rollers	29-25102-00
Prefeed Rollers	29-25103-00
Separation Rollers	29-25104-00

Wear or damage to the feed and separation rollers can be caused by many factors. For example; pages per month, characteristics of the media, heat, and ozone all play an important part in determining the life of these components. Rollers that develop flat spots, that become brittle, and that develop cracks must be replaced. Jamming or paper feed problems occur when the rollers are not functioning properly. If it is not certain that the rollers require replacement, a rule of thumb is—replace them anyway. This could save a future service call.

☐ **Check the maintenance log to verify when the fusing unit was last replaced.**

NOTE
The average fusing unit life has been determined to be 100,000 pages. Regular cleaning ensures that this figure will be met reliably. Inspection and common sense should be the final rule as to when the fusing unit should be replaced. Fusing drive pulley breakage has been directly linked to worn fusing units.

If the page count is *at or over* 90,000 pages, replace the fusing unit. If the page count is *under* 90,000 pages, inspect the following components for accumulation of toner and clean accordingly:

- Thermistor (see Section 2.8.1)
- Separation pawls
- Heat pressure rollers

Make the appropriate entry in the maintenance log.

☐ **Remove the top cover and inspect for worn or damaged components and FRUs. Clean and vacuum all traces of toner, paper dust, and dirt. Inspect drive belts for damage and replace as needed. Check the fusing drive gear for excessive play and replace the gear, supporters, shaft, and washer if excessive play is found.** Refer to Table 3–3.

Table 3–3 Fusing Drive

Part	Part Number
Short Belt	29-25086-00
Long Belt	29-25085-00
Fusing Drive Gear	29-26248-00
Fusing Drive Shaft	29-26007-00
Supporter (2)	29-26008-00
Washer/Spacer	29-26235-00

Many intermittent problems can be attributed to damaged or broken FRU assemblies. Repair or replace pinched or frayed wires that can eventually short out and cause problems.

Paper dust, dirt, and toner on the internal components will eventually lead to random printer errors. These contaminants also settle on the shafts, bearings, and gears, causing excessive stress on the mechanical components. This leads to premature failure. It is important that the parts listed in Table 3–3 be replaced as necessary if indications of wear or excessive play are suspected.

☐ **Vacuum and clean the exhaust fan screen assemblies. The LN03 and LN03A base screens should be replaced with a new style screen, if not already changed.** Refer to Table 3–4 and Figure 2–3.

The two screen styles can be differentiated as follows:

- The old screens have 1/32-inch mesh.
- The new screens have 3/16-inch mesh.

Table 3–4 Exhaust Fan Screens

Part	Part Number
LN03A Screen	29-27658-01
LN03 Base Screen	12-30568-01
Screws (2)	90-10925-02

Inadequate air intake and exhaust airflow causes the printer to overheat. Excessive heat causes premature component failure. Ozone is also generated inside the printer. The organic photoconductor (OPC) is adversely affected by excessive levels of ozone, which can accumulate in the printer. The new screen avoids these problems.

A properly maintained air exchange system protects the internal components from ozone particles. Vacuum and clean the fans each time the printer is serviced, and replace the ozone filter when needed. This reduces the ozone level and the internal operating temperature level, increasing printer reliability.

☐ **Install the top cover and verify that the printer is functioning properly. Record the total page counter and enter "TC=" on line item "A" of the LARS.**

Again, this ensures that problems were not introduced into the printer during the total call process. The total page count information provides important printer reliability data.

☐ **Remind the user of the proper maintenance and toner kit replacement cycles (see Section 2.2). Also, be sure that the customer is familiar with the proper use of the LN03 Series printers. For example:**

— Use only fresh Digital toner and supplies.

— Do not use non-Digital specified toner.

— Use only Digital-approved supplies and parts.

— Adhere to the guidelines specified in the *Digital Laser Printers: Guide to Paper and Other Media* (EK-LASER-GD).

— Do not overuse the printer. Recommended use is 3,000 to 6,000 pages per month, but not over 10,000 per month.

— Do not overfill the toner reservoir. Clean up spilled toner.

— Remember to latch the toner reservoir cover.

— Do not use the LN03 Series printers for two-sided (duplex) printing or for envelopes.

— Do not lubricate any part of the LN03. External lubrication accelerates the accumulation of toner and dirt on the self-lubricated components and causes failure.

— Remove the development drawer before moving the printer to another location.

— Do not expose the OPC to light unnecessarily.

— Periodically install the entire contents of the LN03X-AD Maintenance Kit, as specified.

A clean and properly maintained printer minimizes service calls. Inform the user that all of the applicable contents of the LN03X-AD Maintenance Kit must be used.

Also, ensure that the user knows that the cleaning pad must be replaced each time a toner cartridge is installed. The LN03X-AC toner kit contains two toner cartridges and two cleaning pads.


APPENDIX A

A
LN03A

A.1 LN03A PRODUCT DESCRIPTION

The LN03A is a cost-reduced version of the base LN03 laser printer and operates the same way as the base LN03. The LN03A has all the capabilities and functions of the LN03 base printer.

The LN03A can be distinguished from the base LN03 by observing the location of the ozone filter and the name tag. On the LN03A, the ozone filter is located on the side of the printer. On the base LN03, it is located at the back of the printer. A name tag identifying the printer type is located on the back of both printers.

A.2 DOCUMENTATION

The documents listed in Table A–1 contain information on the LN03 and LN03A printers.

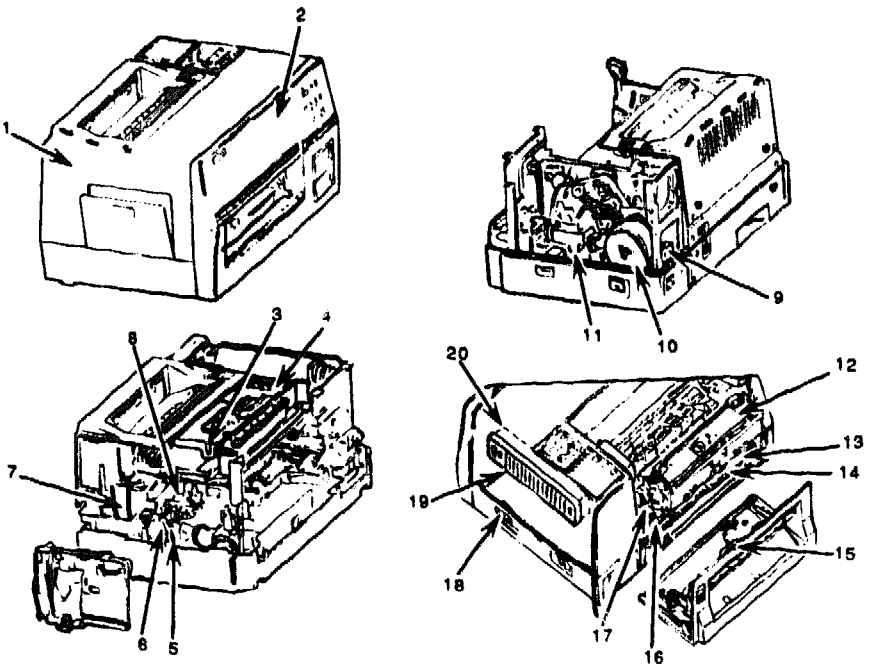
Table A–1 LN03A Documentation

Document	Part Number
LN03 and LN03A	
LN03 Series Toner Kit Guide	EK-TLN03-MG
LN03 Series Maintenance Kit Guide	EK-MLN03-MG
LN03A Only	
Installing and Using the LN03A	EK-LN03A-UG
LN03A Pocket Service Guide	EK-LN03A-PS
LN03A Illustrated Parts Breakdown	EK-LN03A-IP

The *LN03 Operator Reference Cards* (EK-LN03A-RC) represent only the LN03A and replace the current set of flip cards.

A.3 FIELD REPLACEABLE UNITS

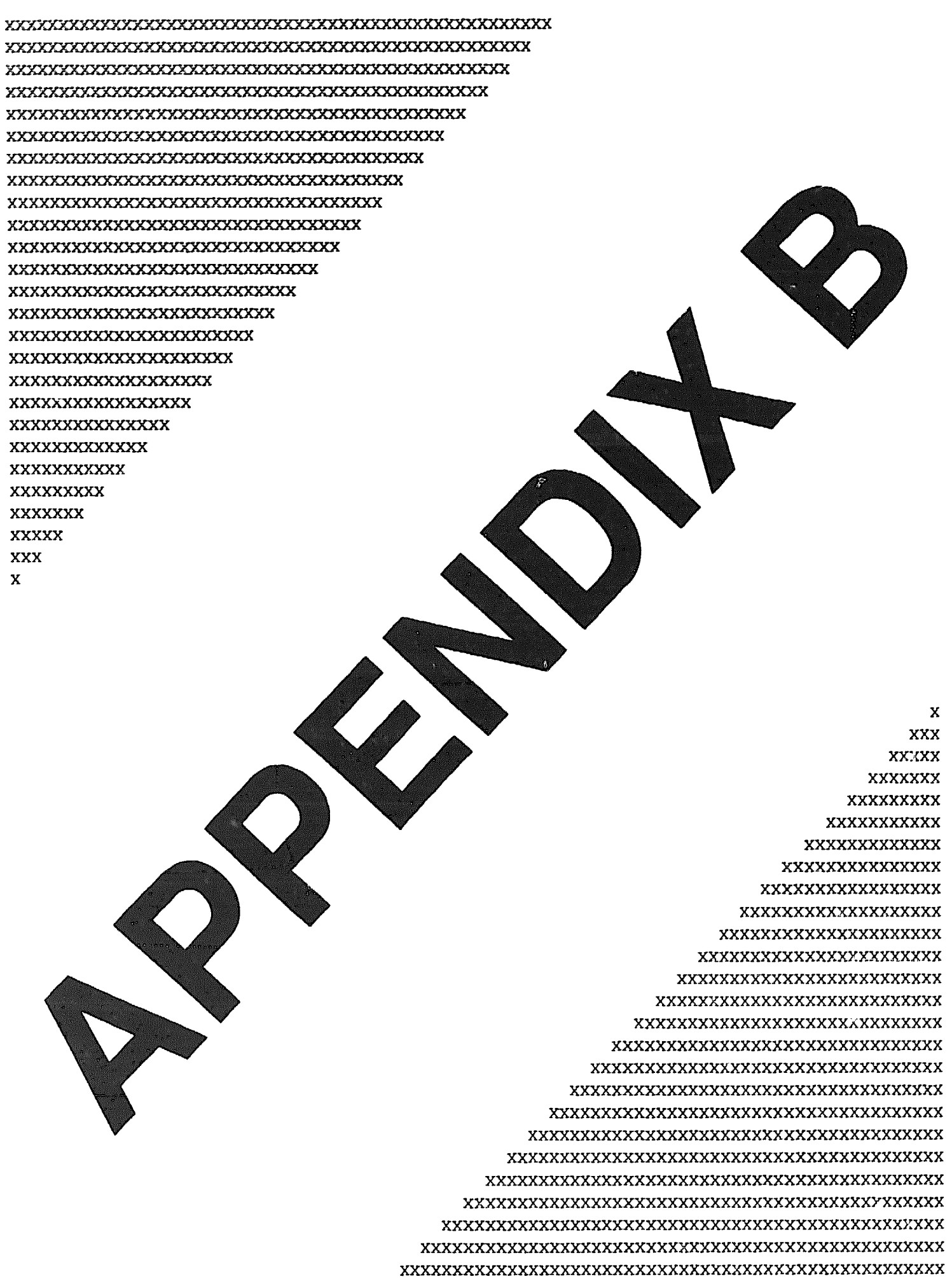
In the LN03A, some of the FRUs have changed in appearance and location. Figure A–1 lists the changed FRUs and their part numbers. These FRUs are *not* interchangeable with the base LN03 printer. Refer to the *LN03A Pocket Service Guide* (EK-LN03A-PS) for locations, removal and replacement procedures, and troubleshooting techniques.



Item	Description	PN
1	Top Cover	29-26063
2	Development Unit	29-26088
3	Optical Housing Unit	29-26070
4	Scanner Motor Drive Board	29-26074
5	Lower Transport Roller	29-26079
6	Registration Sensor	29-26078
7	OPC Counter	29-26056
8	OPC Sensor	29-26076
9	AC Bracket Assembly (100 V)	29-26053
	AC Bracket Assembly (200 V)	29-26060
10	Main Motor Assembly	29-26067
11	High Voltage Power Supply	29-26097
12	Fusing Unit (100 V)	29-26089
13	Engine Drive Board	29-26098
14	Controller Board	29-25334
15	Exit Sensor	29-26077
16	Power Supply (100 V)	29-26096
	Power Supply (200 V)	29-26099
17	Fusing Unit Heater (115 V)	29-25208
	Fusing Unit Heater (200 V)	29-25594
18	Total Counter	29-26058
19	Ozone Filter	29-26055
20	Ozone Filter Fan	29-26054

MKV-A1067-90

Figure A–1 Field Replaceable Units (FRUs)


APPENDIX B

B
LN03 PLUS

B.1 LN03 PLUS PRODUCT DESCRIPTION

The LN03 PLUS is an LN03 laser printer with a bit-map option board that upgrades the base LN03 printer. The LN03 PLUS differs from the base LN03 printer only by the bit-map option board (P/N 54-16943-01). See Figure B–1.

The bit-map option board allows the LN03 to print documents that contain multiple font sizes and detailed graphics without errors.

The key feature of the bit-map option board is the on-board memory capability. Approximately 28 Kbytes of memory is available for program and font storage. The bit-map option board contains 1 Mbyte of dynamic RAM.

The LN03 PLUS can be used only with DEC V4.4 microcode.

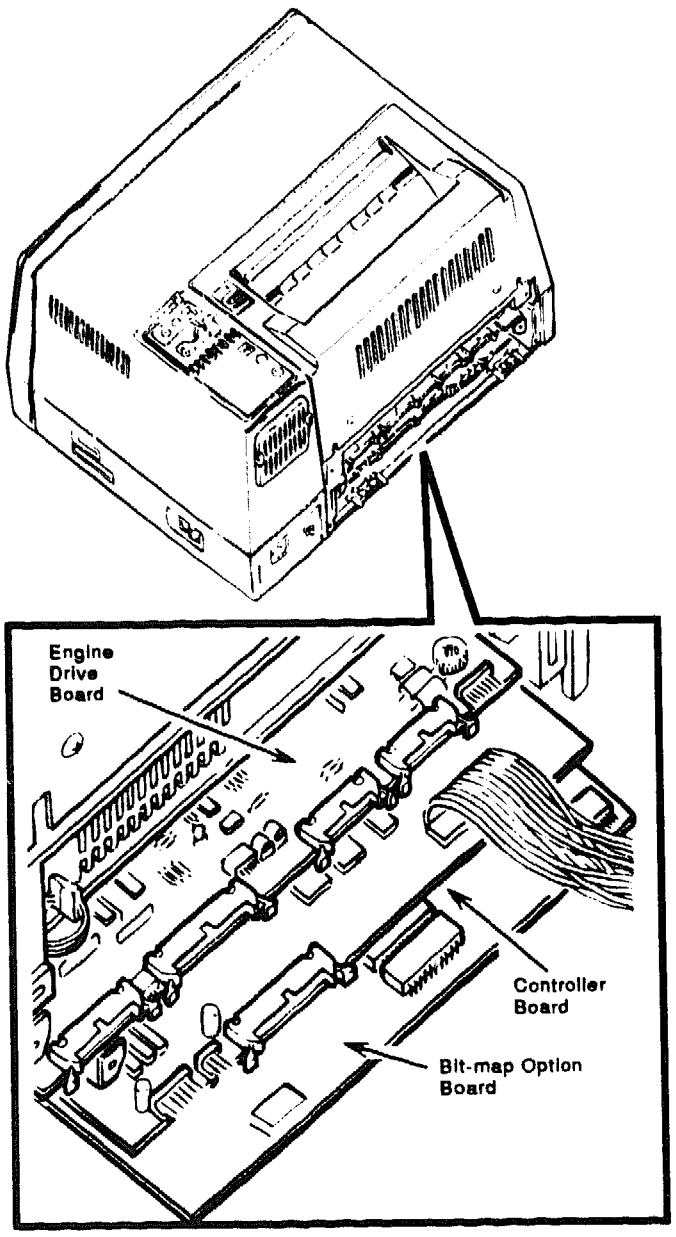


Figure B–1 LN03 PLUS

B.2 DOCUMENTATION

Current LN03 PLUS documentation includes the publications listed in Table B–1.

Table B–1 LN03 Plus Documentation

Document	Part Number
LN03 Bitmap Option Installation Guide	EK-LN03S-IG
LN03 PLUS Programmer Reference Manual	EK-LN03S-RM
LN03 PLUS User Guide Addendum	EK-LN03S-UG
LN03 Pocket Service Guide	EK-OLN03-PS

B.3 THEORY OF OPERATION

The LN03 laser printer uses a band buffer architecture to transfer bit information to the laser engine. The *LN03 Operation and Servicing* course explains how the band buffers operate. The LN03 supports sixel graphics protocol, but because of CPU time and memory restrictions, relatively complex graphic images cause the printer to generate *band too complex* or *page too complex* errors.

Band too complex errors occur when the print engine needs the data in the buffer, but the buffer is only partially full. The buffer does not have enough time to fill with information because there are too many different print attributes on a particular page. The page being printed has partial lines or entire bands missing.

Page too complex errors occur when all of the memory space in the printer is exhausted. A page that has too many different fonts or detailed graphics exhausts the memory. When this happens, information that should print on one page prints over several pages.

The LN03 PLUS generates complex graphics without complexity errors.

The bit-map option board eliminates these problems. Whenever the printer cannot process data, due to exhausted memory or too many print attributes, the printer controller uses the bit-map option board.

NOTE
When the printer controller uses the bit-map option board, information takes longer to print.

B.4 DIAGNOSTICS AND TESTING

The LN03 PLUS is tested by a power-up self-test and a summary sheet self-test.

B.4.1 Power-Up Self-Test

Press the (|) on the power switch.

After one minute, check the indicator for error messages.

If the bit-map option Error Code (62 or 63) appears on the indicator panel, replace the bit-map module.

B.4.2 Summary Sheet Self-Test

To print out a summary sheet, press the test T button at the rear of the printer.

The printer should print a summary sheet similar to the one shown in Figure B–2.

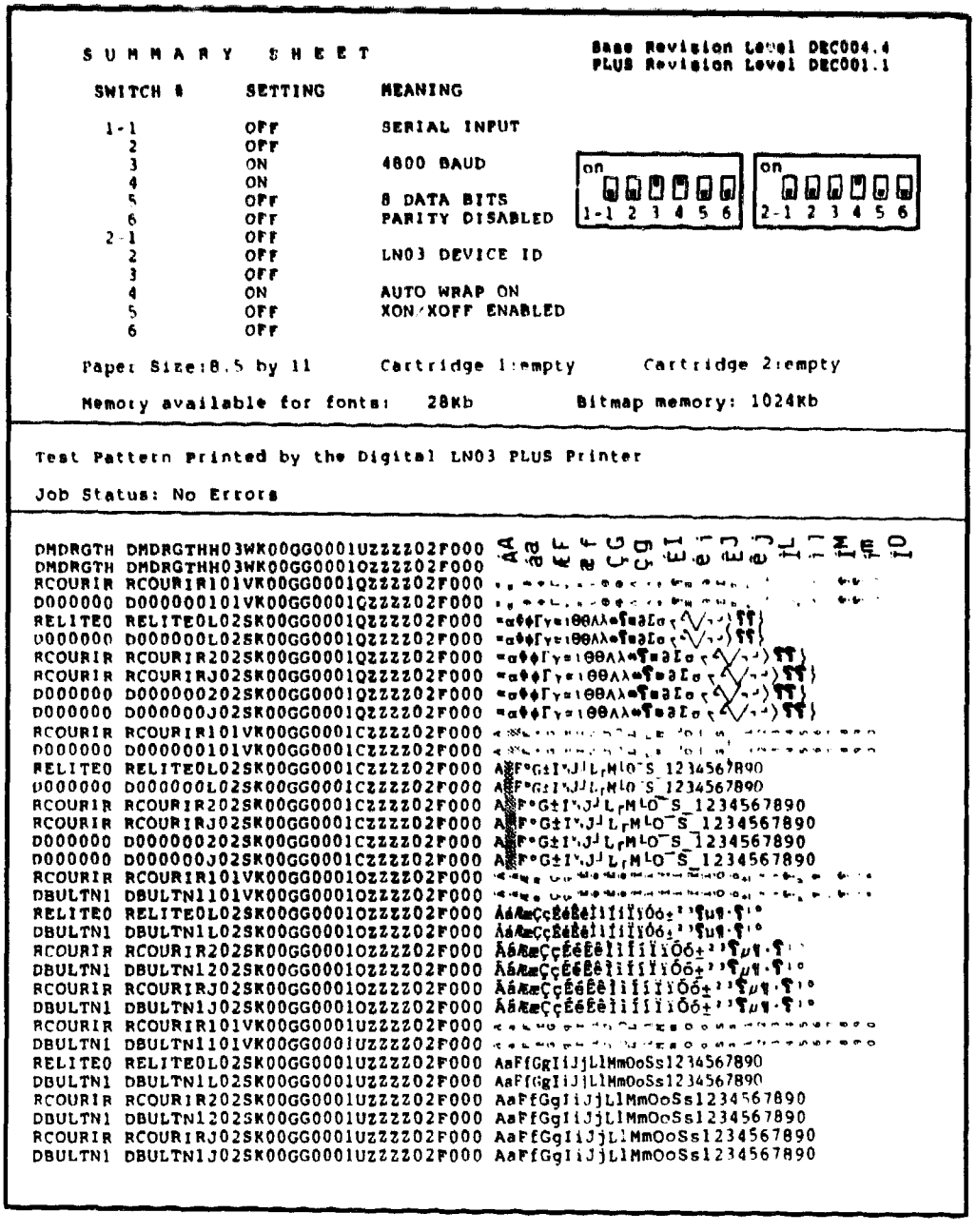
NOTE
The LN03 PLUS firmware revision code (V4.4) is in the upper right corner. Notice the memory space allocated for the font (28 Kbytes) and bit map (1024 Kbytes). There is also one line of text that refers to the test pattern printed by the LN03 PLUS printer.

If the summary sheet does not print, or if errors are listed, take the correct action as described in the *LN03 Pocket Service Guide.*. Refer to the *LN03 PLUS Programmer Reference Manual* for all LN03 PLUS error codes.

If the summary sheet prints without any indication of the bit-map option board being installed (no PLUS firmware code revision or extra memory space is noted on the summary sheet), the board failed the test and must be replaced.

NOTE
Make sure the bit-map option board is seated properly in the printer before replacing it.

Refer to the *LN03 PLUS Pocket Service Guide* for removal/replacement and troubleshooting procedures.



```
S U M M A R Y   S H E E T                    Base Revision Level DEC004.4
                                             PLUS Revision Level DEC001.1
 SWITCH #      SETTING      MEANING

  1-1          OFF          SERIAL INPUT
    2          OFF
    3          ON           4800 BAUD
    4          ON
    5          OFF          8 DATA BITS
    6          OFF          PARITY DISABLED
  2-1          OFF
    2          OFF          LN03 DEVICE ID
    3          OFF
    4          ON           AUTO WRAP ON
    5          OFF          XON/XOFF ENABLED
    6          OFF

Paper Size:8.5 by 11        Cartridge 1:empty      Cartridge 2:empty

Memory available for fonts:   28Kb          Bitmap memory: 1024Kb
```

on 1-1 2 3 4 5 6 on 2-1 2 3 4 5 6

```
Test Pattern Printed by the Digital LN03 PLUS Printer

Job Status: No Errors

DMDRGTH DMDRGTHH03WK00GG0001UZZZZ02F000
DMDRGTH DMDRGTHH03WK00GG0001OZZZZ02F000
RCOURIR RCOURIR101VK00GG0001QZZZZ02F000
D000000 D000000101VK00GG0001QZZZZ02F000
RELITE0 RELITE0L02SK00GG0001QZZZZ02F000
D000000 D000000L02SK00GG0001QZZZZ02F000
RCOURIR RCOURIR202SK00GG0001QZZZZ02F000
RCOURIR RCOURIRJ02SK00GG0001QZZZZ02F000
D000000 D000000202SK00GG0001QZZZZ02F000
D000000 D000000J02SK00GG0001QZZZZ02F000
RCOURIR RCOURIR101VK00GG0001CZZZZ02F000
D000000 D000000101VK00GG0001CZZZZ02F000
RELITE0 RELITE0L02SK00GG0001CZZZZ02F000 A F°G±I J L M O S 1234567890
D000000 D000000L02SK00GG0001CZZZZ02F000 A F°G±I J L M O S 1234567890
RCOURIR RCOURIR202SK00GG0001CZZZZ02F000 A F°G±I J L M O S 1234567890
RCOURIR RCOURIRJ02SK00GG0001CZZZZ02F000 A F°G±I J L M O S 1234567890
D000000 D000000202SK00GG0001CZZZZ02F000 A F°G±I J L M O S 1234567890
D000000 D000000J02SK00GG0001CZZZZ02F000 A F°G±I J L M O S 1234567890
RCOURIR RCOURIR101VK00GG0001OZZZZ02F000
DBULTN1 DBULTN1101VK00GG0001OZZZZ02F000
RELITE0 RELITE0L02SK00GG0001OZZZZ02F000
DBULTN1 DBULTN1L02SK00GG0001OZZZZ02F000
RCOURIR RCOURIR202SK00GG0001OZZZZ02F000
DBULTN1 DBULTN1202SK00GG0001OZZZZ02F000
RCOURIR RCOURIRJ02SK00GG0001OZZZZ02F000
DBULTN1 DBULTN1J02SK00GG0001OZZZZ02F000
RCOURIR RCOURIR101VK00GG0001UZZZZ02F000
DBULTN1 DBULTN1101VK00GG0001UZZZZ02F000
RELITE0 RELITE0L02SK00GG0001UZZZZ02F000 AaFfGgIiJjLlMmOoSs1234567890
DBULTN1 DBULTN1L02SK00GG0001UZZZZ02F000 AaFfGgIiJjLlMmOoSs1234567890
RCOURIR RCOURIR202SK00GG0001UZZZZ02F000 AaFfGgIiJjLlMmOoSs1234567890
DBULTN1 DBULTN1202SK00GG0001UZZZZ02F000 AaFfGgIiJjLlMmOoSs1234567890
RCOURIR RCOURIRJ02SK00GG0001UZZZZ02F000 AaFfGgIiJjLlMmOoSs1234567890
DBULTN1 DBULTN1J02SK00GG0001UZZZZ02F000 AaFfGgIiJjLlMmOoSs1234567890
```

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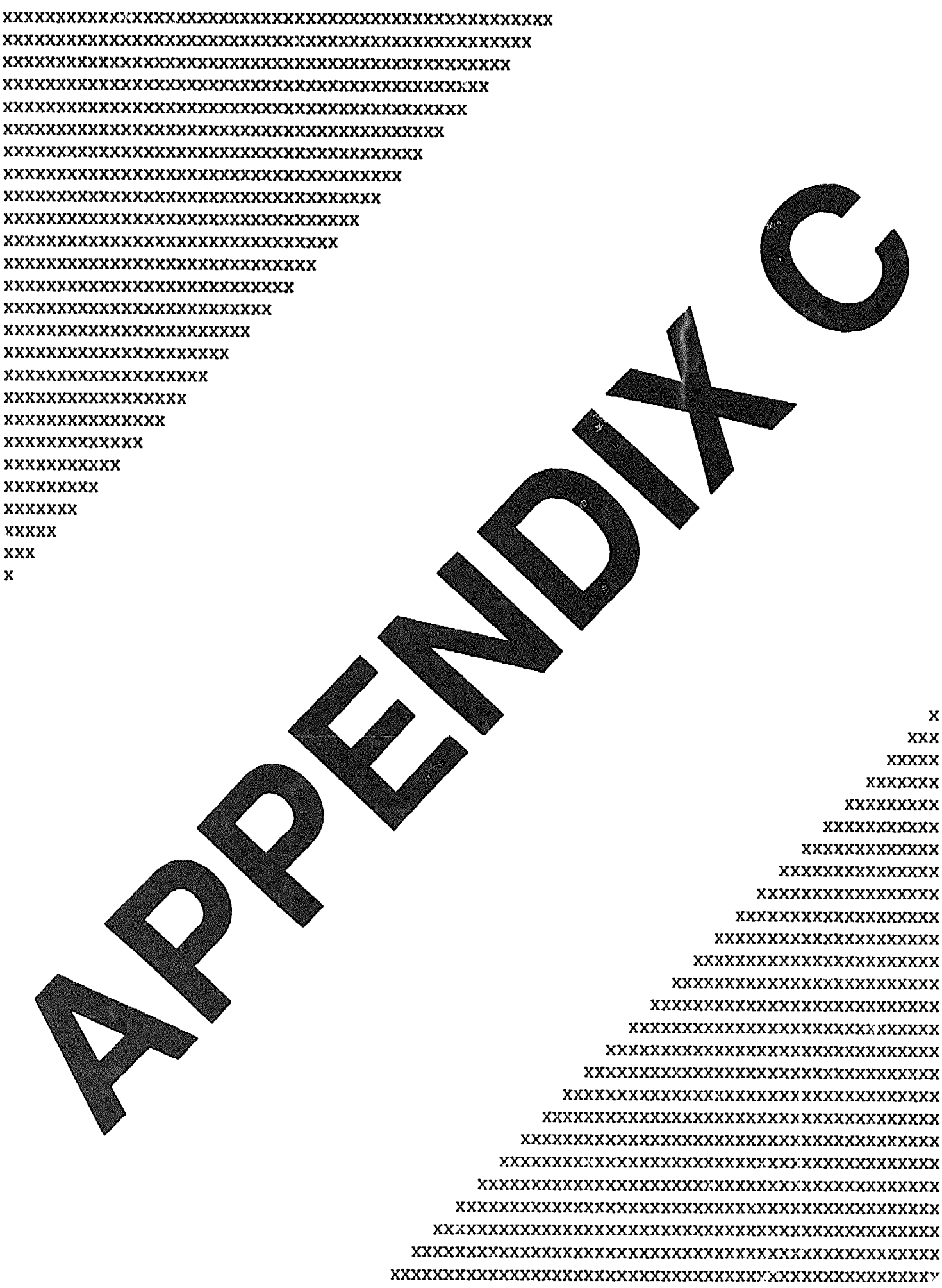
Figure B–2 LN03 PLUS Summary Sheet


APPENDIX C

C
ISO/PC CARTRIDGE

C.1 ISO/PC CARTRIDGE PRODUCT DESCRIPTION

The ISO/PC cartridge is used with an LN03 PLUS and a VAXmate. The cartridge has two modes of operation. In DEC mode, the cartridge gives the LN03 access to the International Standard Organization (ISO) 8-bit Supplemental Character Set (Figure C–1). In "Other" mode the cartridge allows the LN03 PLUS to emulate the IBM Proprinter®. (The cartridge allows the LN03 PLUS to comply with all LA75 printing specifications.)

The ISO/PC cartridge contains 128 Kbytes of ROM for fonts and firmware and 16 Kbytes of RAM.

8		9		10		11		12		13		14		15	
1 0 0 0		1 0 0 1		1 0 1 0		1 0 1 1		1 1 0 0		1 1 0 1		1 1 1 0		1 1 1 1	
	200 128 80	DCS	220 144 90		240 160 A0	°	260 176 B0	À	300 192 C0	Ð	320 208 D0	à	340 224 E0	ð	360 240 F0
	201 129 81		221 145 91	¡	241 161 A1	±	261 177 B1	Á	301 193 C1	Ñ	321 209 D1	á	341 225 E1	ñ	361 241 F1
	202 130 82		222 146 92	¢	242 162 A2	2	262 178 B2	Â	302 194 C2	Ò	322 210 D2	â	342 226 E2	ò	362 242 F2
	203 131 83		223 147 93	£	243 163 A3	3	263 179 B3	Ã	303 195 C3	Ó	323 211 D3	ã	343 227 E3	ó	363 243 F3
IND	204 132 84		224 148 94	¤	244 164 A4	'	264 180 B4	Ä	304 196 C4	Ô	324 212 D4	ä	344 228 E4	ô	364 244 F4
NEL	205 133 85		225 149 95	¥	245 165 A5	µ	265 181 B5	Å	305 197 C5	Õ	325 213 D5	å	345 229 E5	õ	365 245 F5
	206 134 86		226 150 96		246 166 A6	¶	266 182 B6	Æ	306 198 C6	Ö	326 214 D6	æ	346 230 E6	ö	366 246 F6
	207 135 87		227 151 97	§	247 167 A7	•	267 183 B7	Ç	307 199 C7	×	327 215 D7	ç	347 231 E7	÷	367 247 F7
HTS	210 136 88		230 152 98	¤	250 168 A8	¸	270 184 B8	È	310 200 C8	Ø	330 216 D8	è	350 232 E8	ø	370 248 F8
	211 137 89		231 153 99	©	251 169 A9	1	271 185 B9	É	311 201 C9	Ù	331 217 D9	é	351 233 E9	ù	371 249 F9
VTS	212 138 8A		232 154 9A	ª	252 170 AA	º	272 186 BA	Ê	312 202 CA	Ú	332 218 DA	ê	352 234 EA	ú	372 250 FA
PLD	213 139 8B	CSI	233 155 9B	«	253 171 AB	»	273 187 BB	Ë	313 203 CB	Û	333 219 DB	ë	353 235 EB	û	373 251 FB
PLU	214 140 8C	ST	234 156 9C	¬	254 172 AC	¼	274 188 BC	Ì	314 204 CC	Ü	334 220 DC	ì	354 236 EC	ü	374 252 FC
RI	215 141 8D	OSC	235 157 9D		255 173 AD	½	275 189 BD	Í	315 205 CD	Ý	335 221 DD	í	355 237 ED	ý	375 253 FD
SS2	216 142 8E	PM	236 158 9E	®	256 174 AE	¾	276 190 BE	Î	316 206 CE	Þ	336 222 DE	î	356 238 EE	þ	376 254 FE
SS3	217 143 8F	APC	237 159 9F	¯	257 175 AF	¿	277 191 BF	Ï	317 207 CF	ß	337 223 DF	ï	357 239 EF	ÿ	377 255 FF
ADDITIONAL CONTROL SET				ISO 8-BIT SUPPLEMENTAL CHARACTER SET											

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Figure C–1 ISO 8-Bit Supplemental Character Set

C.2 PARTS AND DOCUMENTATION

A cartridge can be ordered using the appropriate part number listed in Table C–1.

Table C–1 ISO/PC Parts

Part	Part Number
ISO/PC Cartridge	70-24261-01
Option Number[1]	LN03X-1C
• ISO/PC Cartridge	
• *Installing and Using the LN03 PLUS ISO/PC Cartridge*	
• Ten-foot cable MMJ (male-to-male) (BC16E-10)	
• Cable Adapter (H8571-A)	

[1]Use the option number to order a complete package.

The documents listed in Table C–2 combine information for the LN03 PLUS printer and the ISO/PC cartridge.

Table C–2 ISO/PC Documentation

Document	Part Number
Installing and Using the LN03 PLUS ISO/PC Cartridge	EK-ISOPC-UG
LN03 PLUS Programmer Reference Manual	EK-LN03S-RM
LN03 PLUS User Guide	EK-LN03S-UG
LN03A Pocket Service Guide	EK-LN03A-PS

C.3 THEORY OF OPERATION

For the ISO/PC cartridge to function, the LN03 PLUS must be at the proper revision level. The LN03 PLUS microcode must be V4.4 and the bit-map option board must be V1.1. The cartridge allows software selection of DEC or "Other" (IBM) protocol.

DEC mode provides the same features as the normal LN03 PLUS operation. In addition, it gives the printer access to the ISO 8-bit character set in the following font styles: Courier 10, Elite 12, and Courier 13.6. This character set provides additional mathematical symbols and Icelandic characters.

"Other" mode allows the LN03 PLUS to emulate an IBM Proprinter.

NOTE
Because IBM Proprinter software is designed for a dot matrix printer, print quality may vary between DEC and "Other" mode. Refer to DIAGNOSTICS AND TESTING in this chapter for a description of differences between the LN03 PLUS and the IBM Proprinter.

C.4 INSTALLATION

CAUTION
Make sure the power switches on the LN03 PLUS and the VAXmate are set to OFF before installing the ISO/PC cartridge.

Figure C–2 shows the hardware needed to connect the cartridge to your system. Plug the BC16E-10 cable into the H8571-A adapter. Connect the adapter to the EIA-232 connector at the back of the LN03 PLUS and the other end of the cable to the MMJ connector at the back of the VAXmate.

Choose either DEC mode or "Other" mode as your power-up mode. The cartridge is factory set to DEC mode. To select "Other," push the DEC/Other button in.

NOTE
The DEC/Other button enables you to set a power-up default and should be considered a set-and-forget switch. The printing can be changed by software, either directly or via push and pop firmware.

Insert the ISO/PC cartridge into the bottom font cartridge slot in the front of the LN03 PLUS. The cartridge works *only* in the *bottom* slot.

Power up the LN03 PLUS and the VAXmate.

Check the green LED on the front of the cartridge to ensure that it is in the selected mode.

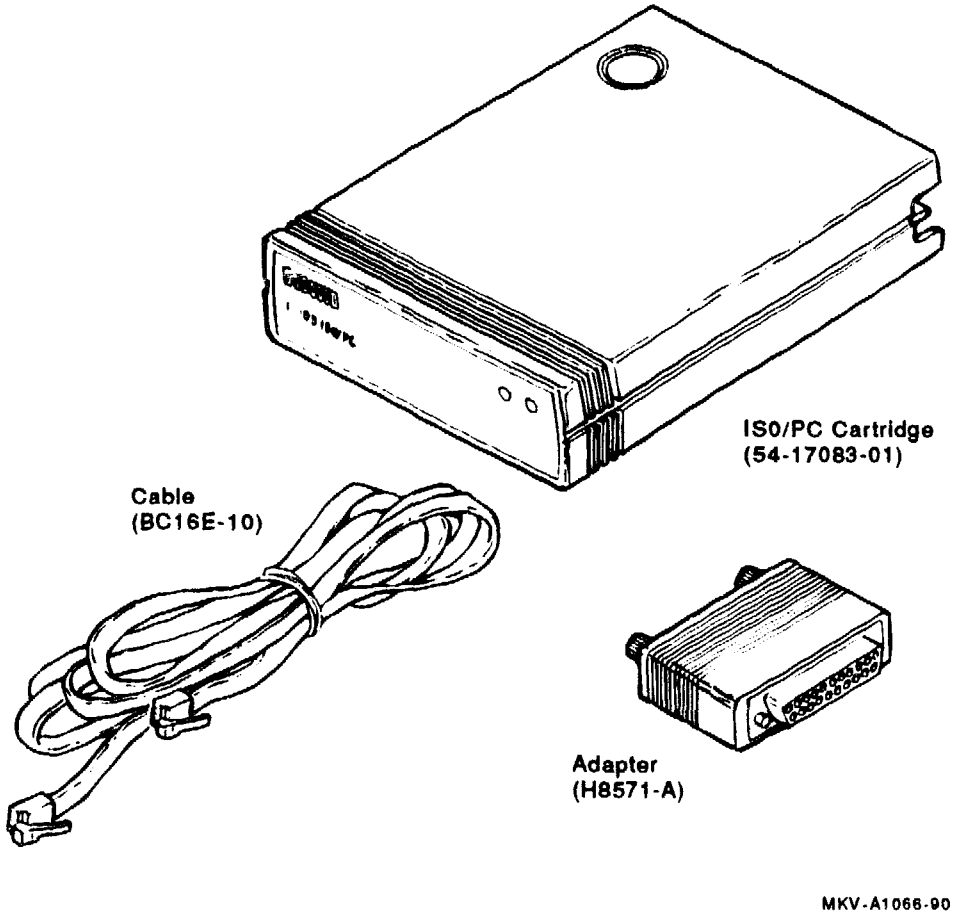


Figure C–2 ISO/PC Cartridge, Cable, and Adapter

C.5 DIAGNOSTICS AND TESTING

The LN03 PLUS is tested by a power-up self-test and a summary sheet self-test.

C.5.1 Power-Up Self-Test

About a minute after powering up, check the indicator for error messages. There are two ISO/PC cartridge related errors:

- 76 (cartridge failure)
- 77 (printer is not an LN03 PLUS)

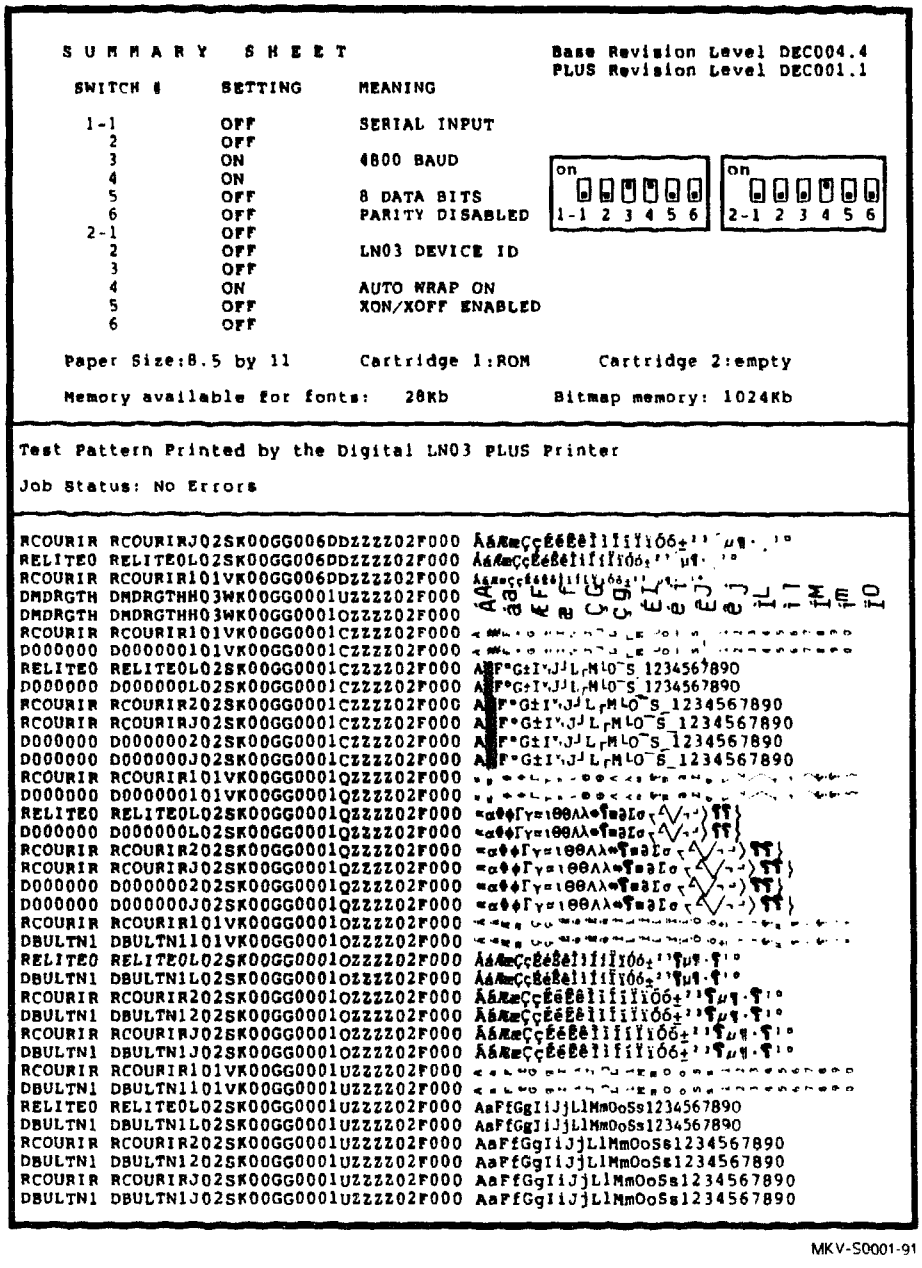
C.5.2 Summary Sheet Self-Test

To print out a summary sheet, press the test T button at the rear of the printer. Depending on your printing mode, the printer should print a summary sheet similar to the one shown in Figure C–3 or Figure C–4. If the summary sheet does not print, or if errors are listed, take the correct action as described in the *LN03 Pocket Service Guide.*

To test for a fully functional ISO/PC cartridge, refer to *Installing and Using the LN03 PLUS ISO/PC Cartridge.*

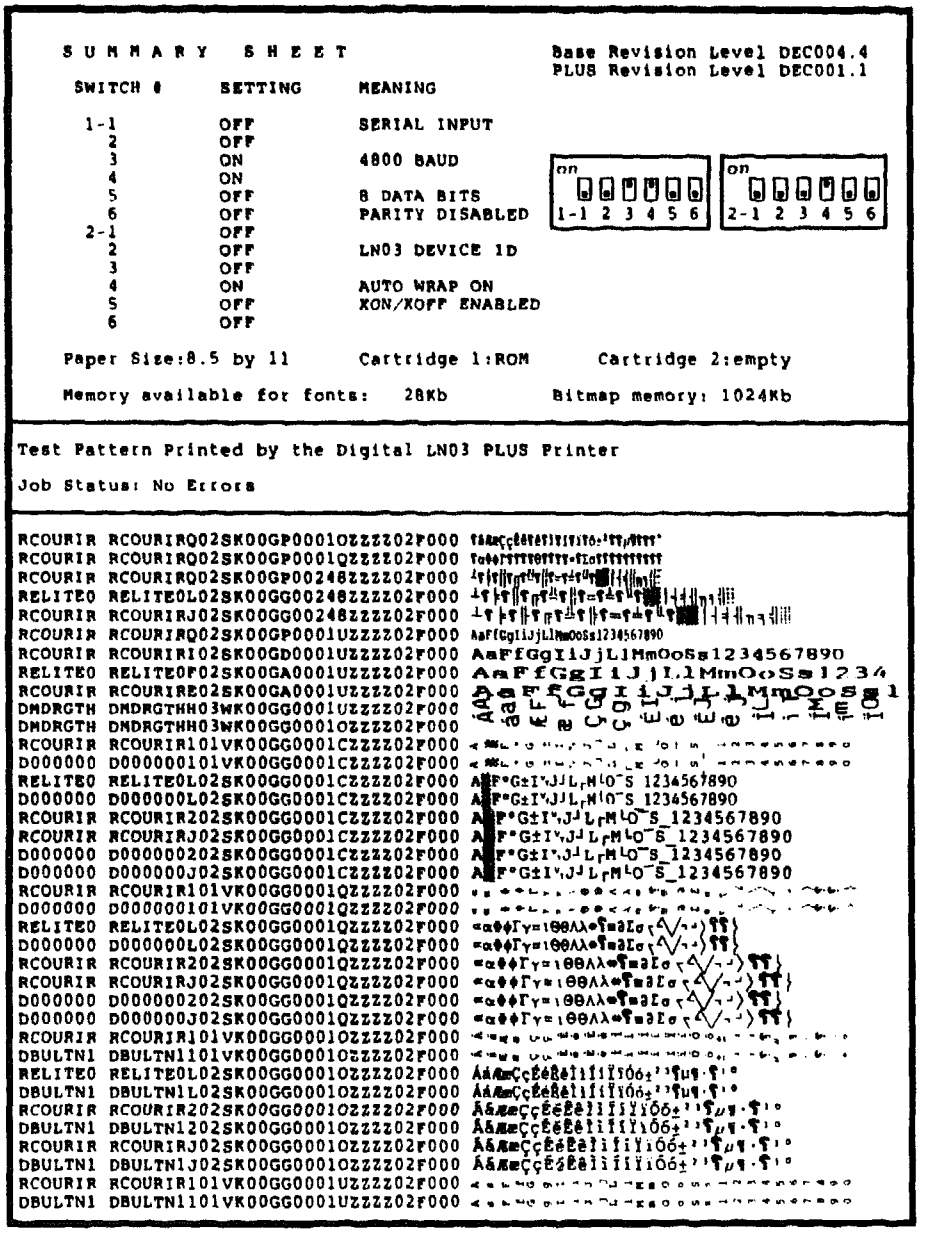
NOTE

The IBM Proprinter prints 240 dots per inch horizontally and 144 dots per inch vertically. The LN03 PLUS prints 300 dots by 300 dots per inch. The different printing methods make the output of the two printers look different. Resident fonts in the LN03 PLUS, and fonts that are down-line loaded in DEC mode, are of higher quality than down-line loaded IBM fonts. Graphics produced in DEC mode are of higher quality than those produced in "Other" mode because DEC mode makes full use of the LN03 PLUS high-resolution capacity.



MKV-S0001-91

Figure C–3 DEC Mode Summary Sheet



MKV-S0002-91

Figure C–4 "Other" Mode Summary Sheet


APPENDIX D

D
LN03Q

D.1 LN03Q PRODUCT DESCRIPTION

The LN03Q, also known as LN03 Image, is a high-speed video interface laser printer. It consists of an LN03A print engine with a Video Interface Module (VIM). The VIM allows bit-mapped data to be sent directly to the LN03Q for printing. The VIM is designed to work with Digital Equipment Corporation's LNV21 Q-bus controller.

The LNV21 is a dual device controller capable of supporting both an optical scanning device and a bit-mapped video image printer. There are two versions of the LNV21: one for traditional Q-bus enclosures (dual height) and one for BA200 series enclosures (quad height). The two versions function identically. An additional ribbon cable and bulkhead connector are included with the dual-height controller.

In most cases, the LN03Q is used with an MD300 optical page scanner. For more information on the MD300, see the *Scanning System Pocket Service Guide* (EK-MD300-PS). Figure D–1 shows the LN03Q configurations.

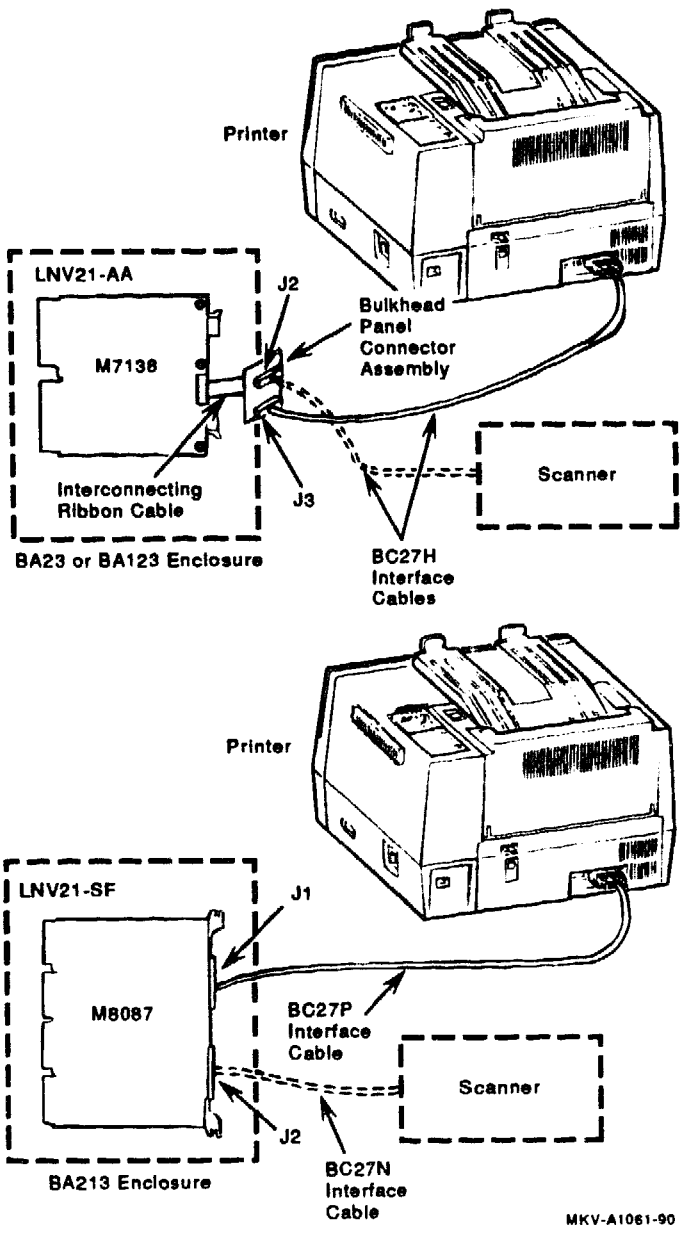


Figure D–1 Printer/Interface Configurations

D.2 PARTS

Table D–1 contains a list of unique LN03Q parts.

Table D–1 LN03Q Unique Parts

Module	Part Number	Cable
LNV21-AA (dual height)	M7138-00	BC27H-xx
LNV21-SF (quad height)	M8087-PA	BC27P-xx
Video interface module (VIM)	29-27410-01	

The LN03Q is supported on the MicroVAX II/GPX and the VAXstation 3200 and VAXstation 3500 series workstations with VMS Version 5.x operating systems.

D.3 PHYSICAL DIFFERENCES

The LN03Q can be distinguished by the front panel logo, back panel name plate, and D-connector. Internally, the LN03Q has a VIM in place of a serial interface controller. Figure D–2 shows how to access the VIM.

NOTE
LN03 printers *cannot* be upgraded to LN03Q printers.

D.4 SERVICE AND MAINTENANCE

The service and maintenance strategies are the same for the LN03Q as for the LN03. The same Total Call Concept that applies to other Digital laser printers applies to the LN03Q printer as well. See Chapter 3 in this Problem Determination Guide.

The LN03Q printer is diagnosed and repaired to the FRU level. This is done on-site with the support of the Atlanta CSC, if necessary. Option swap is *not* a supported repair strategy.

The LN03Q printer can be installed by the customer in less than one hour.

CAUTION
At least two people should perform the installation procedures because the printer weighs 29.93 kg (66 lbs).

The LNV21 controllers require Customer Services installation because they are inserted directly into the backplane and may require system reconfiguration.

D.5 TESTING

The LN03Q is tested by the power-up self-test and the grid sheet self-test.

The power-up self-test automatically prints a grid-pattern test sheet following a successful power-up sequence. An error-free test sheet provides assurance that the print engine and video interface are functioning correctly.

The only VIM error that displays on the LN03Q indicator panel is the fatal controller error. The controller symbol flashes with the service symbol and the number 7. This indicates a VIM failure.

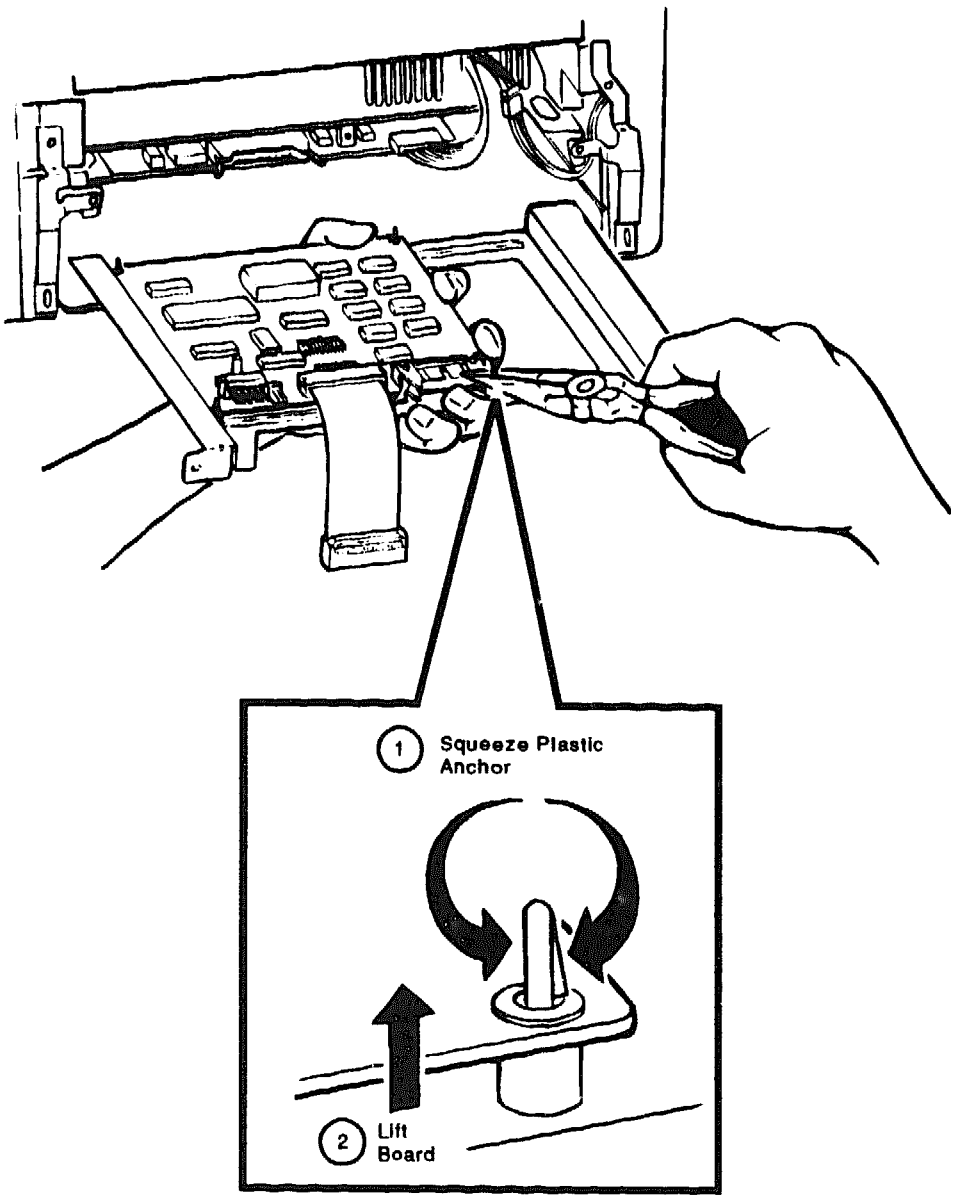


Figure D–2 Video Interface Module (VIM)

D.6 DOCUMENTATION

The documents listed in Table D–2 provide related information.

Table D–2 LN03Q Documentation

Document	Part Number
LN03A Illustrated Parts Breakdown	EK-LN03A-IP
LN03 Image Installation and Operation Guide	EK-LN03Q-OP
LN03 Image Operator Reference Card	EK-LN03Q-RC
LN03A Pocket Service Guide[1]	EK-LN03A-PS
LN03A Pocket Service Guide Addendum[2]	EK-LN03A-A1
LN03A Technical Manual	EK-LN03A-TM

[1]Contains comprehensive LN03 printer information.

[2]Contains specific information about the LN03Q printer.


APPENDIX E

E
PARTS AND TOOLS LISTING

E.1 HOW TO USE THESE TABLES

The parts listed in this appendix have been assigned to the LN03 and LN03A printers. If the illustrated parts breakdown (IPB) reference is "A" then use the EK-LN03A-IP for parts location. If the IPB reference is "blank" then use the EK-OLN03-IP for parts location. Be aware that some parts are LN03 or LN03A exclusive. Please pay particular attention to the column headings.

E.2 29-CLASS PART NUMBERS

The part numbers listed in this appendix are in addition to those found in the IPB and related pocket service guide.

E.2.1 LN03 Part Numbers

Table E–1 identifies the specific LN03 parts.

Table E–1 LN03 Parts Only

LN03 Only	Part Number	IPB	Fig	Item
Registration sensor, base LN03	29-25379-00		7	12
Shield plate stay	29-26750-00		6	8
R-cam, fusing LN03 base	29-26747-00		5	34
L-cam, fusing LN03 base	29-26746-00		5	17
Pelteir Element	29-27262-01		3	3
Separator spring	29-26953-01		3	32
80 mm square mesh ozone fan screen	12-30568-01			
2m 4 X 10 screws for mesh	90-10925-02			

E.2.2 LN03A Part Numbers

Table E–2 identifies the specific LN03A parts.

Table E–2 LN03A Parts Only

LN03A Only	Part Number	IPB	Fig	Item
LN03A ozone fan screen	29-27658-01	(near)	1	15
Exit sensor for LN03A	29-26618-00	A	9	11
LN03A *plastic* exit cover	29-26960-01	A	9	15
LN03A *plastic* ozone filter cover	29-26964-01	A	1	12

E.2.3 LN03, LN03A, and LN03S Cross–References

Table E–3 lists cross-referenced parts for the LN03 Series products.

Table E–3 LN03, LN03A, and LN03S Cross References

LN03 or LN03A Parts	Part Number	IPB	Fig	Item
Holder, PCB	29-26967-01	A	2	5
Gear, fusing drive	29-26248-00	A	3	16
Shaft, fusing drive	29-26007-00	A	3	21
Supporter, fusing drive	29-26008-00	A	3	12
Spacer, fusing drive	29-26235-00		6	50
Click, side	29-26236-00		6	11
Metal back cleaning pad	29-26092-00		5	32
Laser care kit	29-26480-00			
Transport roller support	29-26961-01		3	12
Exit link	29-26962-01	A	9	3
Exit link frame	29-26963-01	A	9	12
Paper stacker	29-26749-00	A	9	22
Comm cable, intermodule	29-26748-00	A	10	9
Exit unit link chain	29-27282-01	A	9	5
Grounding brush	29-27341-01	A	5	8
Exit cover lock spring	29-27349-01	A	9	16
Exit cover lock left	29-27350-01	A	9	17
Heater socket shaft	29-27608-01		5	39
Supporter: 80, lower shaft R	29-27609-01		3	46
Bushing: 6 mm, lower shaft L	29-27610-01		3	14
Supporter: Upper shaft L/R	29-27611-01		3	12


APPENDIX F

F
MAINTENANCE LOG

A folded Maintenance Log follows the Index. Prior to filling out this log, make numerous blank copies for future use.

A pad of 25 maintenance logs can be ordered through Northboro P&CS under P/N EN-02024-12.

A special adhesive-backed pouch (P/N 36-18307-04) is available for storing the Maintenance Log on each printer at the customer's site. Attach the pouch on the rear of the printer.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