Printer and Photocopier Troubleshooting and Repair Collection

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Chapter 1) About the Author & Copyright

Printer and Photocopier Troubleshooting and Repair Collection

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Chapter 2) Introduction

Most of the articles in this document have been compiled over the last few months from postings on the USENET newsgroup sci.electronics.repair. I cannot vouch for the accuracy of all of the recommendations they contain but have edited out anything I felt was totally bogus. I apologize if your response is not here - it could have been that I missed the posting and will welcome contributions.

Note that many of the problems and solutions are listed with respect to specific models. Even though your model and problem may not be included, there is a good chance your problem is covered but with respect to some other model printer or copier. Therefore, search for a generic description of the symptoms and you may get lucky.

Since the operation of laser printers and photocopiers is very similar, check both chapters to see if your problem is covered when dealing with either type equipment.

There is also a chapter on fax machine problems though it is pretty sparse at the moment.

Eventually, this document may be expanded into a full "Notes on the Troubleshooting be happy that it exists at all! :-)

As always, comments, suggestions, and corrections are welcome.

2.1) Printer and photocopier safety

Also see the document: "Safety Guidelines for High Voltage and/or Line Powered Equip

While printers are not generally considered dangerous pieces of equipment (compared to TV, monitors, and microwave ovens, at least), some types - laser printers in particular - present a variety of hazards that should not be underestimated. In addition, photocopiers - particularly larger high speed

machines - need to be treated with great respect while servicing.

The first set of items applies to all line operated printers:

* The input power is 110 VAC (or 220 to 240 VAC depending on where you live).
  If it is necessary to work inside with the power on, identify the location
  of any exposed terminals and cover them with plastic electrical tape or
  block accidental access in some other way.

* Some equipment of this type uses switchmode power supplies. Their internal
  voltages may exceed 300 VDC, include large capacitors, and the entire
  front-end is likely line-connected. Aside from staying away, if power
  problems are suspected, one must take extreme care in troubleshooting these
  types of power supplies both for personal safety and because it is extremely
  easy to destroy them (and possibly the powered equipment) due to a misplaced
  probe. If there is NO large power transformer near the power input but one
  or more smaller transformers (possibly with HV warning labels) amid-ships on
  the power board, you probably have a switcher! See the document: "Notes on the Tr
  information.

* Moving parts can grab dangling neckties (yes, I know, you haven't worn one
  of these in 17 years!) and jewelry - remove any you may be wearing.

* There will be all sorts of sharp sheet metal and other parts to gouge flesh.
  Avoid sudden uncontrolled movement.

* Dot matrix and thermal print heads may be HOT - stay clear.

* The inks, while probably not toxic, are certainly indelible, so don't wear
  anything you care much about!

The following apply to laser printers and photocopiers:

* In addition to the AC line input, the fuser lamp is usually powered from the
  line. Thus, dangerous voltage may appear (come and go as the fuser cycles)
  at contacts deep inside the machine - possibly hidden from view but not
  touch. The main motor drive may also use line voltage.

* The main drive motors and gear trains in this equipment are quite powerful,
  especially in large photocopiers. There is no telling what can get sucked
  in due to carelessness.

* The fuser is very HOT (heat-wise) and can cause a nasty burn. It remains
  hot for a long time after power is removed.

* There are several high voltages used to charge the various corona wires.
  For most modern equipment, the maximum current available from these is
  extremely small (less than 1 mA) so actual danger is minimal. However,
  some older copiers may have more dangerous high voltage power supplies.
  Don't assume all are the same! Interlocks are *supposed* to prevent
  operation except when printing but they can be defeated.

* Powdered toner is not something you want to inhale (in addition to getting
  all over EVERYTHING). Also see the additional toner warnings at the start
  of the chapters on laser printers and photocopiers.

* The photosensitive coating on the imaging drum may also be toxic if it
  should flake off or become powdered. Avoid direct contact.

And finally, for laser printers:

* The laser in all but very old (or high performance phototypesetters and
  other specialized imaging systems which this document does not address) are
  IR - invisible. So, you cannot detect it by eye - an IR tester circuit,

IR detector card, some camcorders, or other means will be needed to
determine if the laser is actually working. The beam will also be well
collimated and thus especially hazardous to vision since it will be focused
to a fine point on the retina.

Fortunately, under normal conditions, the laser beam will not be turned on
unless all interlocks are closed and a page is actually being printed and/or
will be in constant motion as a result of the scanning mirror (which reduces
the risk considerably). (It is virtually impossible to get to the laser
beam before the scanning mirror without total disassembly.) However,
certain failure modes could result in a stationary beam which ignores the
interlocks so take care whenever working on a laser printer with the covers
removed.

* If your printer does use another type of laser (like helium-neon), there may
  also be a high voltage power supply for that which can really bite.

2.2) DISCLAIMER

Some of the procedures described in this document require access to dangerous
voltages, hazardous laser radiation, moving mechanical parts, and other
potential risks to personal safety and damage to equipment and property. The
authors and contributors to this document will not be held responsible for any
direct or collateral damage which might result from following the suggestions
or recommendations contained herein including but not limited to: shock,
burns, electrocution, vaporization, meltdowns, torn flesh, destruction of the
equipment, and local or planetary wide power disruptions or implosions.

Chapter 3) Printer and Photocopier Technology

3.1) Dot matrix printer operation

These are the only type of impact printers still in wide use. A set of steel
pins - typically between 9 and 24 - strikes the paper through a fabric or
carbon film ribbon. The pins are activated by solenoids which are controlled
by the printer's control logic. Multiple passes may be used to increase the
effective number of pins and improve print quality (letter versus draft mode).

For text, an internal character generator (ROM) converts ASCII codes to
pin firing patterns. For arbitrary graphics, the actual bit map is read
out and used to control the pin drive.

The paper, carriage, and sometimes ribbon movement use stepper motors. These,

their drivers, or interconnect cables, are common problem areas.

3.2) Daisy wheel printer operation

These may still turn up at yard sales and flea markets but have virtually
disappeared due to slow speed and limited flexibility with respect to graphics.
In their defense, for basic text, their quality is superb for a low cost
printer.

Instead of pins, these use a wheel with all the possible characters molded
on 'leaves' around the perimeter. The wheel spins to the correct character
position and a hammer than taps the leaf to impress the character (via a
ribbon) on the paper. Carriage and printhead movement is similar to that
of dot matrix printers.

3.3) Ink-jet printer basics

"Is there anyone out there who could reference me to a good text/reference
 on ink jet printer design."

(From: Tony Hardman (tony@f54x19.demon.co.uk)).

There is a US publication called 'The Hard Copy OBSERVER' from Lyra
Research Inc. Tel: (617) 322-0708.

This discusses the latest technologies and who does what. It may not
cover the print head technology very much but is a good read if you are
into print technology in general.

There are many companies that sell variable print processes. One I have
heard of is RALFLATAC. They do a brochure that does an excellent brief
of most technologies available for printing. They have UK (and many
other sites in europe) and US sites. UK Tel 01732-583661, US Tel (704)
684-3931.

I have no idea if you can easily get copies of either publication from
them so here goes a very very brief description.

Ink jet printing has two main types, continuous ink jet (CIJ) and
impulse printing (DOD) (drop on demand). Each of these can be a single
jet, or an array of jets.

* CIJ as a single jet is used on product identification (sell by dates,
  serial numbers) on high speed industrial applications.

  CIJ is a continuous jet of ink cycling round a system and occasionally
  (when required) a drop is deflected out of the stream onto the paper.
  The stream is modulated to break it into a consistent drop size. The
  deflection works like the beam on an oscilloscope. If you charge 1 drop
  and pass it between two high voltage plates it is deflected. This
  system also requires cunning mechanics, but the support electronics is
  much more complex, and probably one of the reasons for its performance
  limitations being not up to what you might expect. The calculations of

the aerodynamics of drops being deflected is no small task, even if look
up tables are used.

* DOD is often an array of small jets used on desk top printers.

  DOD works in principal like an old Dot Matrix pin printer. Instead of
  firing a pin at a ribbon, a drop of ink is fired at the paper. The drop
  is fired by either a piezo crystal squeezing the ink out of a small tube,
  or by boiling the ink and the vapor forces the ink out of the chamber.
  The key to both of these processes is in the mechanical design of very
  small components if 300 dpi is required. The control electronics is a
  bit cunning, but I figure it is the easy bit.

3.4) A primer on priming

The priming station of a typical ink-jet printer (e.g., HP DeskJet 500C)
includes a rubber seal ('boot') and small pump to actually suck on the end of
the print cartridge to free up nozzles (there are 50 or more in a typical
print cartridge) that have dried up or become clogged. It may fire all the
nozzles at some point during this process as well. It also includes rubber
'flappers' which the end of the cartridge pass over to wipe off excess ink.

Priming and cleaning are normally done automatically upon power-on and
possibly between pages. However, additional cycles may be needed at times.

With the water based ink, even if the printer is powered off properly which
seats the cartridge(s) on a rubber seal, some evaporation occurs so priming
will often be needed after it sits idle for a while. Note: Don't kill power
to an ink-jet printer as soon as your printout pops free - it needs to
position the printhead and cartridge(s) on the rubber boots. Wait until the
printhead stops moving and clunking. Some (older) printers don't even have a
seal in which case letting it sit idle is even more likely to result in
problems.

If there has been ink spilled into the priming area, it may clog up the
little hose connecting the priming station to the pump - I have used a wooden
toothpick to clear the hole though this may be risky if it should break off.
With care, a wire rounded off at the end so as not to puncture the tubing can
also be used. Complete disassembly and washing of the parts is probably the
best but is probably a pain.

3.5) A bit of ink-jet history?

(From: John Nagle (nagle@netcom.com)).

The original ink jet printer of this type was the Teletype Inktronic,
which introduced the concept of video-type distortions to printing.
It appeared around 1970, and was so bad nobody tried again for years.

(From: Tony Hardman (tony@f54x19.demon.co.uk)).

I guess that is why it was used in industrial applications I guess.
Were the 'video-type distortions' a deliberate feature or just a

coincidence of how they turned out?

Who are/were Inktronic???(apologies to anyone connected with them) I
guess that may have been spin off development from some work contracted
out by IBM, but it was so....?? (costly/low res/unreliable - choose
one) they lost interest. Although one of the very early machines still
runs well on a textile mill. It had a large number of jets side by
side, and may be multi color too. I've only seen the patents so don't
know exactly what it looks like.

I thought original ink jet printer was a chart recorder developed in the
last century. It was just a nozzle on deflection mechanism, and was not
modulated so it was always printing. It was a lighter mechanism than
actually trying to move a pen and so had some performance advantages over
other technology available at the time...

The same reason CIJ still sells world wide, even when high resolution
DOD is biting at its heals.

3.6) Response times of resistance heater elements in ink jet printers

The ink drops that make up the 'image' on the paper from an ink jet printer
are expelled by microscopic resistance (thin film or the like) heaters with
response times in the 10s of microseconds if I recall correctly. When
living in the macro world, it is often counterintuitive to realize that a
resistance element can have such a fast thermal response.

(From: John Eaton (johne@vcd.hp.com)).

The trick is that a lot of the energy that you pump into the resistor
leaves the printhead with the fired dot. One way to detect Out_of_Ink
is to mount a thermistor on the printhead and watch for a sudden rise
in temperature as you are firing.

3.7) How many colors a ink-jet printer can produce?

"I use a HP680C in the office, and it have two cartridges, one for black and
 one for color (yellow/cian/magenta?). If the printer fire one drop of each
 ink at a given point, we can have only 6 different colors (ignoring white and
 black). If it can fire two or more drops at a given point, maybe we can have
 more colors, but I suspect that the printer use this to control quality of
 the presentation, not the number of colors. Anybody knows for sure? With
 dithering it can make more colors, with reduced resolution."

Like most print processes you only have a limited selection of inks to use.
Full colour can be derived from three primary colors, just like a monitor.
For monitors, these are Red, Green, and Blue because monitors emit light
resulting in an additive color process. Inks, on the other hand, absorb
light so printing is a subtractive process. The resulting inks should then
be cyan (blue+green or -red), magenta (red+blue or -green), and yellow
(red+green or -blue).

Therefore, the colors used in common ink-jet printers are not really capable
of producing true full spectrum photorealistic quality results since they are
red (not magenta), blue (not cyan), and yellow. These are optimized for nice
saturated primary colors when used independently. Also see the section: "Why are re

In addition, the combination of the three primary colors should be capable of
being combined to produce black but due to misregistration and the pigments
used, this black would be somewhat muddy and brown. Therefore, a separate
black ink cartridge is normally used for black printing.

(From: Tony Hardman (tony@f54x19.demon.co.uk)).

With printing there are more problems than solutions and I do not know
which method HP use in their printing.

If you can vary the drop size, you can change the drop spread on the
paper. This can be done by firing bigger slugs of ink, or multiples of
the drop at the same position. As you can figure the ink will either
spread and make a bigger drop, or stay the same size and become denser.
Depending on the resolution you want these could both improve colour
density. This depends on two key components.. The ink, and the paper.

The problems with laying down multiple drops on paper is that if you do
a large block the paper will curl up and the overall image becomes
worse. This is why you can pay 1$ a sheet for 'quality' paper.

Another problem with this is speed. Firing two drops in the exact same
place is difficult... Unless the head is stationary but that is not good
either. You may notice that most DOD printers in high resolution mode
do a number of passes over the same place. This does allow dithering
and other techniques for resolution / colour enhancement. They usually
only print while going in one direction for improved mechanical control.

In the 1600 printer there is a heater to assist with the drying times
and reduce the curling problem.

Inks are a problem too. They can dry at different times because of the
different dyes used, or they may not mix how you expect if you place two
colours on top of each other. Its only ink ... but to get the best
balance of surface tension, drying time, viscosity, colour,
stability.... and more is not as straight forward as it might seam. I
have noticed that the water based inks are improving, and there are some
that do not run if they get wet (after drying on the paper).

I think the spec in your manual may suggest what method they use..
The printer resolution (best) is 600dpi (I guess), and I recon the best
full colour resolution is lower. Also the print head is only 300dpi so
you must do two passes to get 600dpi black (single black ink cartridge).
This suggests a partial step of 1/600 inch between the passes.
What happens when you print black using the colour head? How many
passes, how much slower? The resolutions quoted may also be 600 * 300,
or what ever. If they make blocks of colour from a potential 600dpi
machine, the resultant image is probably only 75dpi (possibly less).
This still might be called 600dpi, because the drop placement uses this
resolution, but it is not 600dpi at full colour. The resolution of
quality picturers / poster is several thousand dpi, but not a variable
image (not ink jet).

In the Lyra publications they did publish the real print head
specifications for the machines they review. They also include some of
the methods of colour printing.

After all this I have noticed that I have not answered the question of

how do HP et all get their colour resolutions. All I have mentioned is
a few of the parameters that the designers have to deal with.

3.8) Why are red, blue, and yellow inkjet primaries?

For a subtractive printing process, the 'optimum' primary colors for a 3-ink
system would be closer to magenta, cyan, and yellow. However, these are not
generally used. Why?

I don't know the precise answer but it is no doubt a tradeoff between cost
and which colors are used most often. For non-photo printing, the straight
red, blue, and yellow are far more useful since they can be use by themselves
or in simple combination to produce a wide range of vibrant, if not realistic
colors. For example, pure red is far more likely to be used for simple
graphics than magenta. To make something that looks like pure red using
magenta and yellow requires a precise combination - not easy to do with an
inkjet printer!

3.9) Laser printer and photocopier operation

Copiers and laser printers have a lot in common. The major difference
is in how the image is formed on a photosensitive drum:

* A copier uses a bright light and lens to focus an image of the original
  (actually, a strip at a time which is scanned in most modern low to medium
  performance copiers) onto the drum. Adjusting the lens-to-original and
  lens-to-drum distance is used to vary the reduction or magnification.

* A laser printer uses a low power sharply focused laser beam to scan one
  line at a time on the drum. Modern laser printers use infra-red solid
  state laserdiodes similar to those used in CD players and optical disk
  drives while older ones used helium neon lasers.

  The digital image is generated from a bit map stored in the printer's
  memory and modulates the laser beam. Scanning is mechanical - a high
  speed motor spins a multifaceted deflection mirror to get the X-axis
  and the paper moves to get the Y axis.

  LED printers use a large array of LEDs as the image source but are otherwise
  similar to laser printers.

  Plain paper fax machines use similar techniques in their printing
  mechanism.

Beyond this, copiers and laser printers are nearly identical (at least in
principle) except that copiers use a positive process (dark areas in the
original result in marks on the paper) and laser printers commonly use a
negative process (a spot of light results in a dark mark on the paper).

(Portions from: Copenhagen Cowboy (cowboy@fastlane.net)).

The photosensitive drum is the heart of the laser printer or copier. In
larger machines, it may be a separately replaceable unit. In most laser

printers and smaller copiers, it is part of the 'toner cartridge' and
is a throw-away (or may be recycled).

The drum is coated with a photosensitive material which has an extremely
high resistance when in darkness. It's resistance drops to a low value
when illuminated.

All of the following takes place as a continuous process as the drum rotates.
Note that the actual photosensitive drum in most copiers and laser printers
has a circumference that is much smaller than the length of the printed page.
Therefore, only a portion fits at any given time and the charging, exposure,
transfer to the paper, cleaning, and erasing is a continuous process:

* The drum's surface is charged to a high positive voltage (typically 5 to 6
  KV) by a set of charging corona wires in close proximity to the drum.

* The exposure process differs for copiers and laser printers:

  - For copiers, a swath of the original is focused onto the drum. As the
    drum turns, a quartz lamp and strip mirror moves along the original and
    second strip turning mirror moves at half this speed. The result is that
    the entire original's image is kind of 'peeled' onto the rotating drum.
    (Look through the glass platform that supports the original of a copier
    as it is copying and you will see what I mean.)

  - For laser printers, the negative image of the page stored in the printer's
    buffer memory (the laser is turned on where the print is to be black) is
    read out and scanned onto the drum one line (i.e., 1/300th or 1/600th of
    an inch) at a time.

  Where the light hits the drum's surface, its resistance drops dramatically
  and the charge in these areas is dissipated.

  At this point, a swath of the image of your ultimate copied or printed page
  resides as areas of electrostatic charge on the drum. This is a 'latent'
  image and must be 'developed'.

* As the drum continues to turn, the latent image rotates past the 'developer
  unit' which contains a mixture of developer and toner. For the most part,
  developer is not really used up during the printing process but some is lost
  and may need to be replenished from time-to-time (depends on design).

  - Developer is a material which includes powdered iron or other powder
    which is attracted by a magnet.

  - Toner is the actual 'ink' and consists of very finely powdered thermo
    plastic particles. These are 'fixed' in the fuser by literally melting
    the image onto the paper.

  Depending on design, the developer material may be separate or actually
  combined with the toner.

  A magnet in the developer unit which is as long as the page is wide causes
  the developer along with trapped toner to stand out following its lines of
  force off of its long N-S pole pieces. This forms a kind of brush of toner
  and developer material which is in contact with the drum as it rotates with
  its latent image. Normally, the developer material brush is C-shaped, and
  toner particles are carried in the C-shape (the back of the 'C' is against
  the drum).

  Here is where the developing processes of copiers and laser printers differ:

  - For copiers, the relative charges of the drum and toner are set up so that
    toner is drawn to the unexposed (dark parts of the original) portions of

the drum resulting in a positive image on the paper.

- For laser printers, the relative charges of the drum and toner are set up
  so that toner is drawn to the exposed (where the laser beam was turned
  on) portions of the drum resulting in a negative image on the paper.

* The drum continues to rotate around and comes in contact with the paper.

  Below the paper is another corona, the 'transfer corona'. Another high
  voltage is applied to the back of the paper (once again, around 7 or 8
  KV DC) to draw the toner from the drum to the paper. (Remember, all this
  is going on in a continual cycle and it is all in motion).

* Depending on the manufacturer of the machine, you may or may not have a
  third corona, the 'separation corona'. This is needed to separate the
  paper from the drum, but not disturb the toner on the paper (the separation
  corona is usually 4 or 5 KV AC (if it was DC, you would separate the paper,
  but have *very* smeared toner all over the page as to make it unreadable).
  The separation corona usually has guides over it to keep the paper from
  'dipping' down too far into the corona shell.

* Paper is then transported to the fuser which 'fixes' the toner to the paper
  via heat (to soften the toner particles) and pressure (to embed them in the
  paper fiber). There are parts in the fuser which also keep the paper from
  sticking to the hot rollers. A thermostatically controlled quartz tube lamp
  provides the heat inside the anti-stick (Teflon coated) fuser roller.

* Finally, your copy or printed page is ready!

* However, we are not done as there is still some toner on the drum - it is
  not possible to get it all off electrically) so there is usually a rubber
  or plastic blade which rubs in direct contact with the drum. This 'drum
  blade' scrapes the toner off the drum, and the 'recovery blade' catches
  it to keep it from falling back into the machine. A 'used toner auger'
  transports the used toner (which is now changed both physically and
  electrically and is also contaminated with paper dust (don't reuse your
  used toner) because it can eventually damage the developer unit, cleaning
  blades, fuser sections and other parts of the mechanism.

* Now that all the toner has been scraped off the drum, there is still some
  residual charge on the drum from the previous exposure process. You can't
  scrape the static charge off the drum, so the cleaned drum is now fully
  exposed to a bright light to discharge the drum surface and prepare it
  again for a new charge, which comes right after the discharge lamps.

That is the basic process. Many variations are possible and depending upon
the machine and manufacturer, some of this may be a little different. Where
a (disposable) toner cartridge is used, many of these components are replaced
with the cartridge - typically the drum, toner itself and developer (usually
combined into a single powder), developer magnet (really neat!), cleaning
blades, some of the corona wires.

There is also some photocopier information at:

* http://homepages.tcp.co.uk/~diverse/.

3.10) Laser printer operation summary

(Portions from: Zaki (zg@ix.netcom.com)).

In general the principle of electrostatic laser printing is as follows:

1. Charging a photoconductive selenium (or other) coated drum.

2. Discharging the drum with the laser steering engine in accordance with the
   input image rasterized pattern. (the laser is modulated to generate a
   predefined pixel pattern on the face of the drum - the focal plane).

3. The rotating drum attracts toner to the charged pattern (latent image)
   generated by the laser.

4. The toner is transfered from the drum to the moving papaer to generate a
   full image.

5. The paper carrying the toner moves through the heater to fuse the toner to
   a fine non-erasable image.

The laser steering engine is combined of the following components:

1. Diode laser most likely in the 780nm range, 3 to 4 mW.

2. Beam expander to form the required size of the collimated input beam which
   generates the beam spot size in the focal plan.

3. Cylindrical lens to reshape the laser elliptical beam to a round one.

4. Mirror polygon to deflect the laser over the focal plan.

5. F-Theta lens to flatten the inherent circular plan of a rotating mirror.
   This lens is a very special lens which only few in the optical community
   know how to design and fabricate. The one that you own is particularly
   special because it is a Sectioned F-Theta lens which are typicaly more
   expensive (most of them are spherical).

   If you need to scan or to print in high resolution 500 dpi or higher, you
   end up using a glass F-Theta lens.

Hope that the above short tour in the fascinating field of hard copy
printing was clear enough.

3.11) Book on laser printer maintenance and rapair

(From: Michael (ncacaver@aol.com)).

Get the book: "Easy Laser Printer Maintenance and Repair by Stephen J.
Bigelow".

Your local library should have it or be able to get it. Stephen J. Bigelow
has several other books on printer repair, both laser and non laser types.
All are very good.
From your description it could be a worn out cleaning pad on the fusing
roller. Other problems are possible, the book has several symptoms and
their solutions.

3.12) Discussion on laser diodes in laser printers

"I just acquired the optics from a dead laser printer and have been trying to
 understand it. There are two functions I have yet to grasp. One is something
 which it has but for which I see no need. There seems to be a heater
 (Contains mica) and a thermometer, with PCB markings like "T1" and H2" or
 something similar. If these the laser is temperature controlled, why? There
 seems to be a control photodetector to monitor the laser diode so temperature
 control appears like overkill unless the photodiode itself has too much
 temperature dependence and the drum exposure is very critical."

(From: Jonathan M. Elson (jmelson@artsci.wustl.edu)).

There is a heater inside the fuser roller. This is what melts the toner into
the paper. It is thermostatically controlled, and then has a safety
thermostat in case the control fails.

There are two photodetectors for the laser. One compensates for dimming
of the laser over years of use, the other picks up the beam at a particular
angle of the polygon mirror, and synchronizes the raster electronics to
the polygon rotation.

"The other thing is something I cannot find, the aperture defining the nice
 well-formed pixel. So far I must admit the study has been a bit superficial
 but the aperture ought to be pretty obvious if there is one!"

The laser is the aperture. With an optical path of .5 M or so, the laser
is a pretty good approximation of a true point source. A simple lens makes
it look like a very good point source.

"Finally, how are the correction lens made? They look like slices out of
 the middle of some fair sized lenses, but that would be a very wasteful
 way to make them. Can they be diamond formed to nearly the final shape and
 with such good finish so only a simple polish completes them. Grinding the
 old-fashioned way on a sliver of glass looks doomed to generating all sorts
 of defective approximations to a sphere. (As far as I can tell they are
 glass, or some wonderfully hard plastic I would like to know more about!)
 Can they be molded to sufficient precision? (The sides are ground or sawn.)
 Thanks to anyone who can bring me up to date on lens fabrication technique."

I think they mold these lenses to near correct shape, then grind and polish
to the desired aspheric shape with specialty machines for that purpose.
(Note that almost all eyeglasses are aspheric for astigmatism correction.)
Yes, these lenses are glass, I've had a few printers apart myself.

3.13) Types of toner

(From: Lionel Wagner (ck508@FreeNet.Carleton.CA)).

There are two basic kinds of toner: magnetic and non-magnetic. If your laser
printer has a Cannon 'engine' it most likely uses magnetic. NEVER use the
wrong type. The imaging process is extremely delicate and specific toners are
important. Use of toner that is slightly different could result in all black
or all white copies.

3.14) So you put in the wrong type of toner?

"I have a 3M Model 6312 copier. I believe it is a re-badged Lanier. I
 didn't pay much for it but it worked well. When the toner warning
 light came on, I made the mistake of adding the wrong kind of toner.
 I removed the wrong toner as much as I could by vacuum. Is there
 anything I should do before adding the right type of toner? Did I do
 serious damage to the system? What to do if the warning light
 remained on even with the right type of toner added? Any suggestion
 will be greatly appreciated."

(From: Lionel Wagner (ck508@FreeNet.Carleton.CA)).

If your copier uses non-magnetic toner, it is mixed with iron powder,
called the Developer. Both have to be removed and all residue vacuumed out.
If the copier uses magnetic toner, less of it will remain in the machine.
Try to get as much as possible out. Do not scratch the roller on which
the toner sits.

WARNING: See the section: "Warnings about vacuuming laser printer toner"
before using a household vacuum cleaner to do this!

Chapter 4) Dot Matrix and Daisy-Wheel Printers

4.1) So you took your printer apart....

"I stupidly took apart my Panasonic KX-P1123 to attempt a head swap (the cable
 was too short!), now that it's back together it just beeps when I try to
 print. The only things I touched were the rod that the head assembly slides
 on and the toothed belt also had to come off (I don't think it's a timing
 belt.. there's no clear markings suggesting that). When I try to print, the
 head moves to the center, there's no pin action and it starts beeping at two
 second intervals (and won't stop). It's not the paper sensors because they
 seem to work properly...any ideas?"

(From: Filip M. Gieszczykiewicz (filipg@repairfaq.org)).

Greetings. A few:

1. Make sure you didn't trap and crimp any wires .. there SHOULD be a
   'Column 0' sensor - either a photo-interrupter or a switch. The
   print head will activate it during the self-init.

BTW, move the carriage all the way to the right, close the cover and
turn it on - does the print head move or does it just sit there and beep?

2. Ensure that you have the ribbon cable correctly hooked up between the
   printer & head .. some [smarter] printers can tell... I am not sure
   about that one, but some printer have an optical (IR) sensor that
   detects ribbon presence (or am I spoiled with fixing $$$ printers? :-)

3. This should be obvious - but does the print head move FREELY all the
   way from the left to right and back? Don't forget to oil (not too much!)
   the rails!

4. Did you reconnect all the cables? Is the front-panel (display+buttons)
   attached?

More depends on the answers and results of the above. BTW, most newer
dot-patrix printers just need 2 screws to be removed to release the
head. I know the Epson LQ-1050 works like that (and many of that Stars
as well). Anyones needs parts from the former? I have one with a dead
head (and it's not economical to repair).

4.2) Print head repair

"I have a few Epson dot matrix print heads with stuck or sunken pins.
 Does anyone have experience with disassembling these things for
 cleaning/repairs? It looks like you just have to pop a few clips
 to get them apart."

(From: Chris Serrano (brace@loop.com)).

I resurrected one by hanging it pins downs in an ultrasonic cleaner.
A lot of old dried up ink floated right out and the stuck pin became
obedient again.

(From: Filip M. Gieszczykiewicz (filipg@repairfaq.org)).

Greetings. If one does not have the use of an ultrasonic cleaner,
I have found a different way to get these suckers working again.

Go to your local plumbing store and look in the chemicals department
for 'CPVC-PVC-ABS CLEANER' (used to clean plastic pipes). This stuff is
a combination of groovy chemicals Methyl Ethyl Ketone and Acetone.
It will 'melt' most plastics so be sure the print-head's any
plastic parts are safely taken off.

Pour some of this stuff into a GLASS container and put the print head,
business-end first, in it and leave it there for a few minutes. When
the stuff turns dark-purple (all the ink and goo from the print head)
you are done. Let it dry (few minutes) and then oil it with LIGHT
OIL. Note: Do NOT use WD40 - we're interested with something that
sticks around for a few months... WD40 just leaves a 'protective
layer' with almost zilch lubricating properties (it's a Water
Displacer (WD), after all).

I have done this for a few DataSouth DS-180, Infoscribe 1000s,
and Xerox [monster] printers that see a box of 132 column paper
a month (each) for a number of years with excellent results.
Note: YMMV... these printers have rugged print heads (7/9 pin)...

I don't know how a 24-pin Made-in-China feather will respond.

4.3) Compaq Pagemarq 15 printer service mode

(From: Darren Mckillop (Darren.Mckillop@gecm.com)).

Try powering on while holding escape, this will put you into
service mode. Press the up arrow to start the engine test, if
this works you may have a problem with the xerox controller
board.

Try disconnecting all the n/w cables and reseating the cables
on the system board. Remove this by the two thumbscrews at the
back and slide out as far as you can then pull the cable off.

I have a Compaq Pagemarq 15/20 service manual that I am
selling, but I am in the UK, where are you?

4.4) Ribbon does not advance after replacing flex-cable

Have you actually confirmed that your 'new' ribbon cables are making proper
contact - with an ohmmeter? Assuming that the thing worked better before
the cables were cut, then there are only two possibilities: your replacements
aren't quite right or something was damaged by the 'event' or through later
actions.

4.5) Print head stepper

Confirm that you simply don't have bad solder connections around the plug to
the motor. This is common in printers and will result in erratic or incorrect
motor movement.

(From: Ralph Wade Phillips (ralphp@gcstation.net)).

What's common in some older Okidata 32x's and 39x's is that the lithium
battery *above* the stepper driver will spring a leak, and drop the lithium
compound onto the legs of the stepper. I do not know for sure if it's
corrosive, conductive, or just plain nasty, but it kills the stepper
deader'n'snot.

I'd LOVE to find a replacement - I've got a service customer that has about
2,500(!!!) 320's and 321's in the field, and I am not looking forward to
having to exchange all those boards over the next several years.

4.6) IBM X-24 Proprinter print head jumps around

"Got a problem with a real nice 24 pin dot matrix printer I bought used.
 Was working fine for awhile then all of a sudden it will be printing fine
 an the printhead intermittently will jump to the center of the carriage
 and start printing from there. Also, when you turn it on, many times the
 printhead jams over to the right side of the carriage and the gears grind
 and you have to cycle it on and off to get it to start up right. Then you
 now almost for sure it will have problems printing. Help, any ideas? Do
 I just change a control chip? How do you scope out something like that?
 Can I get a manual somewhere? I want to keep the printer."

Also check for bad connections. If the printhead motor is a servo (DC instead
of stepper), you have an intermittent feedback problem, again could be bad
connections or bad parts.

(From: Ralph Wade Phillips (ralphp@gcstation.net)).

First off, have you changed the RIBBON? Second, clean the print
head carriage rails. They need a VERY LIGHT coat of VERY LIGHT oil, then
wiped clean.

Usually, when I see this, either the printer is just plain wore
out, or the ribbon is snagging. Since the ProPrinter family drive the
ribbon off of the carriage drive, if it ever snags, you'll get these
symptoms.

4.7) Epson FX-286e printer problems

"I just received the above printer in a non-working condition. It
 exhibits the following symptoms:

 When power is applied, the head appears to try and move, but will not
 unless you manually get it started. Then it goes to its home position.
 You then hear three beeps, and nothing else can be done to elicit any
 response from the printer. The power LED comes on, but the paper-out
 will not, regardless if there is paper installed or not. The paper
 detect switch is working properly (checked with ohmmeter by
 inserting/removing paper while across switch). Also, I hooked up a
 resistor and +5v to the paper-out LED, and it lit up ok. I have also
 mapped out the stepper motor leads, and resistance checks show that it
 appears to be ok.

 MY question is if perhaps I lost one of the outputs for one of the
 stepper phases. The controller seems to be one large power-ic from what
 I've traced out."

Could be. Do you have a scope? You could check the phases.

"I know if you keep voltage across one phase, you can lock a stepper. If
 you lose power to one phase, will the other phases keep it going
 provided you manually start it like I'm doing?"

Also check for bad connections to the stepper from the logic board - I
have seen these on printers.

It doesn't explain your other problems, however. Once initialized, even
though the print head doesn't move properly, I would expect the printer
to work in other respects.

(From: Joe Wagg (jwagg@fs.cei.net)).

The 3 beeps tell you there's a carriage error, probably from an incorrect
number of steps needed to reach the home position. Since you've already
checked the motor, the next step is to check the motor drivers. Using a
meter with a diode check function, put the red lead on ground and the black
lead on each phase coming from the board (disconnect the motor first). The
readings should be within 20 percent of each other, not open or shorted. Also
make sure the motor, pulleys, and carriage are all relatively clean and move
freely. The other symptoms are caused by the carriage error, which halts the
cpu to prevent damage. Clear up the carriage error and the other problems
should go away. You should also make sure that all socketed chips are properly
seated and don't have dirty contacts.

4.8) Paper debris clogging Epson LQ-570

"I have an Epson LQ-570 series dot-matrix printer that has developed an
 intermittent paper feed problem over the past year or so. It uses a
 push tractor for sprocket-feed paper, and paper tends to bunch up
 under the platen. There doesn't seem to be an obvious way to remove
 the platen to see what the paper's catching on, indeed the FAQ on
 Epson's website says it can't be removed, and to bring it in to the
 dealer for repair."

(From: Asimov (Asimov@juxta.mn.pubnix.net)).

Remove everything that is normally accessible. Then flip the printer on its
back and play a vigorous drum roll all over it. This should dislodge a huge
amount of "holes". Didn't you always wonder where those perforations went?
Well, some of them make it into clogging up under the platten.

Flip the printer on its side and with a thin brush dust the remaining grime
away. If the jam didn't clear up you might try manually inserting a stiffer
paper (postcard, greeting card, etc) a few times before dismantling the
platen assembly any further.

4.9) Star SD15 printer self-test problem

"This printer has a problem I am lost with. When I power it up and
 attempt to have it perform the self-test printout (FF on power up), the
 print head moves back and forth, the paper feeds, but the pins don't
 actually fire. However, if I connect the printer to a computer, the
 printing is just fine."

You are complaining? :-) Usually, it is the other way around!

(From: Ralph Wade Phillips (ralphp@gcstation.net)).

Eh? On the SD-15, the FF SelfTest is for checking HEAD MOVEMENT only. It
sounds like it passes just fine!

Try holding down LINEFEED button instead. :-)

4.10) Motor driver blows fuses

The following was in response to a dot matrix printer blowing the power
fuse whenever the paper advance motor was driven. A 74LS273 was getting
hot as well:

(From: Tony Duell (ard@p850ug1.demon.co.uk)).

I'm going to guess (based on what I've seen in other printers) that
there's a set of power transistors (either H-bridge drivers or 1 per
coil, depending on the motor) that drive the stepper. These transistors
are driven from the printer's microcontroller via an output port - in
this case the '273.

Now, if a TTL chips is getting very hot, then either something is drawing
too much current from it, or something is overvoltaging one of the pins.
A particularly unpleasant failure mode is when a PNP power transistor,
with the emitter tied to the V++ rail (the 20V + rail that supplies the
motors) decides to short and apply said voltage to the output of whatever
device is driving it. If you're unlucky, the next stage is that the
output port device breaks down as well, and the CPU data bus gets 20V or
more on it. The result is blown chips all over the printer. Please don't
ask how I found that out ;-)

My guess is that there's at least one shorted transistor in the stepper
motor drive circuit. If the system uses an H-bridge driver (an equal
number of NPN and PNP transistors) then if one transistor shorts, its
companion is connected across the power rails. When it turns on, the
supply is effectively shorted.

I think you'll have to trace out the driver circuit for the stepper
motor. Figure out what drives what. Test the transistors, and then
replace the defective ones _and_ that '273, which is probably now blown.

4.11) Ribbon on electronic typewriter does not advance

"My wife has a "Smith Corona" Model SD800 electronic typewriter that will not
 advance the ribbon. Everything else seems to work fine. We have been unable
 to find a local repair for this unit. I think I can fix it with some advice
 from someone familiar with these machines."

Can you determine if it is a mechanical or electronic problem? For example,
with the ribbon removed, does the gear or post that drives it appear to
try to turn or not at all?

Modern electronic typewriters are a combination of keyboard, microprocessor,
and printer. Therefore, the same sort of troubleshooting approachs can be
used as for computer printers.

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Common electronic problems include bad connections to the motor that advances
the ribbon (cold solder joints, cracks in traces on flex cable to carriage),
bad motor driver chip, or bad motor.

Mechanical problems include stripped or broken gears, misalignment preventing
advance mechanism from engaging, and defective ribbon cartridge.

(From: Roger D. Waddell (rwaddell@peachnet.campus.mci.net)).

This problem is usually caused by a broken 'E' clip on the bottom of the print
hammer solenoid.  The clip holds on a lever that works in conjunction with the
ribbon/correction feed solenoid near the right front of the print carrier.

When the clip breaks, the lever falls out of position and never trips the lever
that assists in feeding the ribbon.

I have seen this problem many times!!
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4.12) NEC P5200 Printer problem

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"I have a NEC printer that has an intermittent CE (ribbon cartridge empty)
 problem, only the cartridge is new and good.  Anyone knows what senses
 this condition and what part could be affecting this?  NEC wants $20.00
 just to talk to me.  Thanks for any help."

(From: Paul Weber (webpa@aol.com)).

Look at the old ribbon.  Does it have a short piece of transparent tape at
the end of the ribbon?  If so, the printer probably has an optical
end-of-ribbon sensor; a LED/phototransistor pair that looks through the
ribbon.  Does it have a short patch of aluminum foil tape (probably on the
back side of the ribbon) ?  If so, there is probably a pair of contact
fingers that rub the back of the ribbon as it feeds.  Look for bent
contacts or debris in the ribbon holder mechanism.

Look at the ribbon holder mechanism in the printer.  Is there switch or
contact pair that could sense the motion of the ribbon cartridge's feed
reel? If so, check for free movement and cleanliness.  Does the ribbon
holder move with the printhead on this machine?  If so, check that the
ribbon cable connecting the carriage with the remainder isn't damaged and
is connected properly at both ends.
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4.13) OKI Microline 391 Elite Problem/Error

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"I am having a problem with a OKI Microline 391 Elite:

 I opened it up and cleaned out the dust and paper from inside.

 On putting it back together and powering up .. The SEL light, the COURIER
 font light, LW and 10 cp light are all flashing and the stepper motor for
 the platen is jigging back and fore about once every 3 secs."
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(From: Glenn Allen (pclogic@xtra.co.nz)).

These printers generally need just a clean out and put back together.

I would try to reseat the main logic board first, also try cleaning the edge
connectors. There is a plastic joining bracket between the print head cable
and the main logic board.

If you are getting bad carriage movement then check that the carriage can move
freely back and forth, also check the black teethed guide lying on the bottom
for clogged teeth. The print head ribbon can be removed for better testing.
if the carriage doesn't move freely then you may need to adjust it's position
by loosening the two screws on either side of the print head carriage and then
adjusting back and forth until good movement is achieved.
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4.14) Imagewriter II Squeal

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"My Imagewriter II, after many years of faithful service (~8), is starting to
 squeal. It squeals when the carriage moves. It still prints perfectly fine,
 but....a new noise can only mean trouble. Does anyone have any experience
 with this problem and his solution? I imagine it would take only a drop or
 two of lubricant. But where?"

(From: Chris Jardine (cjardine@wctc.net)).

I would suggest that you might have a problem with the ribbon mask. A few
years ago I was the service manager at an Apple dealership. I can't tell you
how many ribbon masks I replaced for many different problems, including wierd
noises. It could also be a problem with the carriage drive motor. I can't
remember which side of the printer it is on, but, it is below the gear/pulley
that drives the toothed belt. You might try some very fine (maybe silicone)
oil there and you might want to clean and then re-oil the carriage guide bar
(the shiny round bar) and the bushings on the carriage that ride on the bar.
The only other possibility would be a problem in the gears below the ribbon
that are responsible for driving the ribbon.
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Chapter 5) Ink-Jet Printers

5.1) HP DeskJet problems

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This of course also applies to other HP printers as well!

First try the suggestions at HP's the support documentation web site.

For example, the HP850C, this would be:
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http://hpcc997.external.hp.com/cposupport/indexes1/dj850cd.html.
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5.2) Types of HP ink-jet technology printers

(From: Paul Grohe (grohe@galaxy.nsc.com)).

The PaintJet printers are 180 DPI and the DeskJet printers are 300 DPI. The resolution of the PaintJet is about that of a poor 24 pin printer. The PaintJet and ThinkJet printers are also PCL, so you can use a HP laser printer driver set to 150 DPI.

There seem to be currently four levels of HP ink-jet printers:

1. ThinkJet/QuietJet: The original. Small see-through bladder cartridges. These are small, compact, quiet, form-feed printers. Text quality was about that of a 9 pin (I still love the little ThinkJet printer; damn near indestructible, small, and built-in Epson emulation). (BTW, look in the 1989 HP Optoelectronics handbook for the datasheet of the miniature ThinkJet cartridge). Original cartridges needed special paper for best printing. Replacement cartridges that print on plain paper are now available.

2. PaintJet: The first color printers. Cartridges are bigger, 'squarish' and usually are mounted horizontally. Resolution is the same as their 'little brothers', the Thinkjets (180 DPI). There are black, combined color and separate color cartridges (and sizes) available for the different printers. Printers were generally form-feed.

3. DeskJet/DeskWriter: 300 DPI. BIG improvement. Cartridges mount vertically. Black and combined color cartridges are available. Printers are sheet feed and plain paper printing.

4. DeskJet 800 series: 600x300 DPI B&W, 300x300 DPI color. Cartridges are tall and narrow and mount vertically. Damn near laser quality w/special paper.

5.3) Dissertation on HP DeskJet repair

These comments are in response to: "Repair Brief #49 - Part 1: HP DeskJet Professional Printer - Dead" and its followups. My text is indented. See those articles for details. The quick summary is that I picked up this printer at a garage sale and first had to dry it out and repair some cold solder joints before it would print at all.

(From: Paul Grohe (grohe@galaxy.nsc.com)).

I've dealt with a few of these buggers before! ;^)

Is yours a DeskJet, DeskJet Plus, or any of the DeskJet 500 or 600 series?

   I believe it to be an original DeskJet.

If not, then ...well....then I may as well tell you this anyways because you

will probably run into these some day....(some of the below can apply to other
ink-jet printers).

  Now, how to do a self test? Fortunately, the complete HP users' manual
  was part of the deal. "Hold the FONT button while turning on power".
  OK, no problem.

Try holding down 'FF' during power-up, you may get a different test page.
One of the pages should have a jet-test pattern (A slanted diagonal line
separated by 11 vertical marker lines and little jet ID numbers).

  The first page of the standard self test results in that pattern.

  I first tried the cartridge that looks exactly the same as the one that came
  with the printer (though the part number is different). Then, I tried
  another somewhat larger one that apparently has identical connections.

The different part numbers are the 'standard capacity' and the 'high capacity'
cartridges. They're interchangeable.

  Going back and forth, they are consistent. I am not sure if one of the
  two missing lines are the same on both cartridges. Could something be
  marginal or is the priming not working? However, all other nozzles seem
  to be rock solid. Reseating the connectors to the print head makes no
  difference. If I knew which drivers were involved I could look at the
  signals but it will be difficult to trace the circuitry from the driver
  board to the actual nozzle.

I assume you have cleaned the contacts (with a Q-tip, on both cartridge and
socket). Use a magnifying glass and check *each* of the gold 'bump' contacts.
Repeated cartridge swapping, or improper insertion, can cause a crack to form
around the base of the 'bump' and the pad (or the pad and the trace). The
'bumps' can also be 'flattened' by cartridges that were forced in at too
much of an angle. There should also be some 'give' or 'sponginess' to the
contact area to assure even contact with the cartridge.

Check for broken/bad traces in the flex-cable that goes from the driver board
to the cartridge. Ohm out the cable between the supply commons and the
individual driver lines (at the PCB) with the cartridge in place. I think
the jet resistance was about 50 ohms (It's been a while). There were four
separate jet sections (commons). All four commons were tied to the +20V
supply through four separate (12 ohm?) series current limiting resistors.
The driver outputs seemed to be grounded emitter, open collector (w/clamp
diode?). The jets themselves are driven individually and are not multiplexed.

To test, I printed an all-black page (with an empty, but installed cartridge)
and watched for activity on each of the lines at the PCB end. Good pulses are
'bi-levelish'. Normally negative going 20V, with pulses down around 15V, and
going all the way near ground for that particular jet. The commons 'bounce'
because of the shared series current limiting resistor, causing the numerous
smaller pulses around 15V (caused by the firing of other jets sharing that
common). A bad connection will show up as a weak or distorted pulse. An open
or broken line will show up as 0V. I theorize that a bad driver would show
just the smaller 'line bounce' 15V pulses and a shorted driver would show 'GND'
(and also would blow out that jet!).

The current involved to drive the 'jets' is a pulse of short duration and
pretty high current. Any poor connections will cause excessive I/R drop and
the jet may not fire hard enough. A sign of this is drops (dribbles) of ink
that form on the head during printing.

While you are in there, check and clean the rectangular rubber seat that
the cartridge rests on in the 'parked' position. Dry ink can cake up on it,
causing a faulty seal and resulting in dried-up cartridges ($$$!). The rubber

seat pulls off and is easily cleaned with a wet paper towel (wear gloves, or
you will suffer the dreaded 'black finger syndrome'). Also clean the 'nose
wiper' that sticks up about a centimeter to the left of the cartridge seat.
This always cakes up and can cause printing problems.

To manually prime an uncooperative cartridge, you do not have to suck on
the business end. You can gently blow into the top vent (located on the
top of the cartridge, inside the green arrow) to prime it. But be careful!;
If the jets are severely plugged, ink may blow out the check-valve on the
bottom (under the plastic 'flap' with the 'maze-like' area). Very messy!
Have a towel ready!

The old DeskJets were (and still are) notorious for paper feed problems as
they age. This is caused by the three big paper pick-up rollers drying out
and becoming hard and smooth. Roughen them up with some rough sandpaper.
The HP FTP site has a article about this in the DeskJet DOC directory. A
free kit is available from HP (to qualifying S/N#'s) that 'dresses' the
rollers (basically forces the rollers to turn and sandpapers them).

OH! Biggie! Another big 'failure mode' of the early printers is that the paper
sensor lever will jump out of position and jam if the printer has suffered
some rough handling (especially if it was turned upside-down or on it's side).
The paper sensor lever (pivot) is located on top above the middle roller. The
other end breaks the beam of a photosensor. The 'interrupter' end will move
over just enough to wedge itself above the photosensor. This is cured by
simply raising the lid and wiggling it until it drops back into position (I
have 'fixed' many an alleged 'broken' printer this way). The 'interrupter'
end seems to have been made larger on the later printers to prevent this.

From time-to-time, the cartridge's nose should be wiped clean with a soft,
moderately damp cloth (~ every 100 pages). Keep the 'business' end pointed
down when handling/cleaning the cartridge (Yes, this means hold it above you
and clean it from the bottom!). This keeps the galleys and jets primed.

   Comments: I suspect the original problem resulting in the dead printer to
   have been a cold solder joint on the DC power connector which I repaired.
   I don't really think that the nozzle problem was caused by the water since
   the print head driver board was never wet. Since the data connection to the
   print head driver board is a 20 pin cable, this must be a common bus and thus
   it is unlikely that any failure on the main logic board could manifest itself
   as a single or pair of bad nozzles. Stay tuned.

I concur. If just *one* jet is not firing, then it is on the driver/flex-
cable/connector/cartridge side. All the nozzle decoding is done on the driver
board, so the 20 pin interconnect cable is okay. The DC (well..really 20VAC)
power connector does take some abuse in normal service, this could have
aggravated the cold joint.

Don't forget to check the buttons for water damage/contamination.

   Been there, done that. The FONT button was Coke-logged.

   Do you know what the difference is between the DeskJet and PaintJet
   cartridges? There is at least one contact that is open on a DeskJet
   cartridge and wired to something on a PaintJet cartridge.

I also have a color PaintJet 300 with a possible "dead" driver line, but I
focused my attention to the ailing DJ500, so I did not have a chance to
"buzz-out" the PaintJet cartridge. From looking at it, it looks like the
PaintJets are multiplexed in some way (there are more jets/contacts than
wires in the flex-cable). I never got around to fixing/looking into it (it's
still sitting there).

BTW 1; The DeskJet, DeskJet Plus and DeskJet 500 (non 'C' models) are basically

the same (except for some internal fonts). The DeskJets speak PCL, so if a
driver for a DeskJet is not available, you can use a basic HP LaserJet driver
(but the margins may be cut off, as the DeskJets print area is not as big).

   The missing line problem turned out to be bad connections between the
   flex cable and the gold contacts on the print cartridge due to the flex
   cable shifting position on its indexing pads.

These things are so damn simple that not much can happen to them. I have
yet to run across one with a severe electrical problem. They are always
minor mechanical failures (or missing power bricks...$35 from HP).

   As noted previously, the HP DeskJet series in general is a well engineered
   design with only a half dozen basic components. While my (DeskJet) printer
   is one of the oldest models, the fundamental design has not really changed
   dramatically in the last several years as evidenced by the fact that print
   cartridges for some much more modern printers work just fine in this old
   machine.

All the DeskJet/DeskWriter printers, up to and including the 6X0 series, use
the same B&W cartridge as the original DeskJet. Those cartridges will still
be available for some time. Your printers life is not over any time soon!

   The print quality with a new cartridge is nearly laser-quality. Yes, HP
   seems to come out with a new, faster, cheaper, color. etc. printer every
   few weeks. But, looking inside newer printers shows that their basic
   design and construction is quite similar.

The DeskJets are good, sturdy and reliable printers (as long as they are
well maintained) You did clean the rubber cartridge seat and flap. Right?.

BTW 2: For maximum cartridge life, make liberal use of the "draft" setting
for "not-so-important" printouts (or, er, um, drafts!). It also prints
faster because it "swipes" once per line instead of twice.

BTW 3: Use the cheap 'Shark' brand inkjet paper for best results. Pretty near
laser quality! Regular copy paper tends to bleed, but is fine for general use.

Can you tell I have a 'few' of these printers around???? ;^)

   Just when I thought all was well....

   At random times, the print will fade out and require priming by mouth
   to restore operation. This can be anywhere from a few lines to a few
   pages. Until it quits there is no evidence of a problem. Blowing into
   the vent hole will restore operation. This happens with more than one
   cartridge. It appears as though the ink is just not refilling after
   being vaporized.

Is the cartridge full? As you get down to the last 20% or so of the
cartridges capacity, it tends to start doing this. I guess there is not
enough pressure "from above" to force the ink down. If you can start seeing
through the cartridge, you are probably near this point.

   Caution: I found out the hard way that you really do not want to stick
   anything into the vent hole - ink all over the place as the vent valve
   must have been damaged by this mischief. I 'salvaged' the cartridge with
   a blob of silicone sealer. I don't know what the long terms implications
   of this 'repair' will be.

In troubleshooting the printer, you tend to "burn up" cartridges a *lot*
faster than in normal use.

   I cleaned out the priming tube which was *totally* clogged with dried ink

and it seems to be much happier now.

This can be a symptom of the print head not seating firmly when in the "parked" position. Use a dental mirror and make sure the seat presses firmly against the head. One cause of this can be turning off the printer before it has a chance to run through all of it's "housekeeping" cycles at power-up, reset (re-boot), or after printing. During certain parts of the cycle, the head is moved slightly, or the cover is moved. Turning off the printer too soon may leave the head exposed. Always let it finish, then turn it off (warn others about this).

If you haven't already, just pull the thing apart and give it a good overhaul (get your favorite pair of Torx bits ready!). Clean all the rubber tires, seals and "nose wipers". Wipe off the slider bar to remove any old lubrication. If there was a serious ink leak and the printer was involved in some "circus acrobatics", some of the ink can get on the slider bar and contaminate the factory lubrication, causing it to become "pasty". I wipe the slider bar clean with a cloth then apply a *light* coating of a light, teflon-type machine oil with a cloth (I use "Tri-Flow", a spray-on type usually found in bike shops).

BTW 4: In the winter months, with it's low humidity, the rollers will shrink even more, causing even more paper feed problems. This is also compounded by the fact that the paper sometimes develops a static charge and tends to "stick" together. Sometimes it pulls two or three sheets in at once, or the paper sticks firmly together in the tray and the weak, dry rollers cannot pull the paper in. Just remove the stack of paper and "fan" it out to loosen it (especially if it has been sitting there unused for a couple of weeks).

These printers are, like some other things we won't mention, 'Use `em or loose `em'! They work best with frequent use. They do not like sitting around for months unused. Three months seems to be the limit before a 'good' printer will start to dry up from no use.

    Before I 'discovered' the priming problem, I has visions of a serious electronic problem like an intermittent resulting in the nozzle drive pulses getting messed up at random times.

    How is pulse width determined in these things?

I never really investigated the timing of the pulses. I'm not sure how they vary the pulse width. I looked at the pulses when it was doing the first page of the self test, which is mostly text, and all the pulses seemed to be the same width.

Happy printing!

5.4) HP ThinkJet printer repair 1

(From: Paul Grohe (grohe@galaxy.nsc.com)).

The ThinkJet is VERY simple. The ThinkJet printers (and clones) do not employ any type of printhead covers or 'priming stations', so the cartridges are prone to drying out if not used for a while. A quick 'priming' is usually required, even after only a week or two of non-use.

The cartridges also tend to leak if placed in odd positions or subjected to rapid temperature changes. Make sure the cartridge has not drooled on itself

and caused ink to cake down on the contacts in the holder. Clean the gold
contacts *gently* with a cotton swab moistened with rubbing alcohol.

BTW: Like motor oil, fresh ink is great for cleaning up old, dried-up ink.

The ink is contained in a rubber bladder inside the plastic shell. There is
a hole in the 'butt-end' of the cartridge. *Gently* stick a bent paper clip
in and push on the bladder to prime it. A drop of ink should form on the
printhead. Use a piece of tissue to wipe the drop off and re-install the
cartridge.

Note that there are two types of HP ThinkJet printheads. One is the older,
original type meant for printing on special 'ThinkJet' paper, and the newer
'Plain Paper' ones meant for, well, plain paper! ('PLAIN' will be printed on
the side of the cartridge).

The older cartridges printing will appear very light if printed on plain paper.
Make sure you have the 'Plain' type. Note that even with a 'plain' paper
cartridge, the printing is lighter than a Laserjet or DeskJet, especially in
draft or single pass modes. Don't expect razor sharp printouts. This was the
first Inkjet printer!

As for the missing jets, eyeball the cartridge contacts and see if they appear
straight and aligned correctly. The contact area could have slipped and may be
out of alignment (although rare).

The flex cable/connector assembly is held in place with a pair of plastic
bars. The "bars" have two pins that snap into the 'carriage' (they also
provide alignment).

If the contacts appear to be out of alignment, carefully pull out the plastic
bars to release the contact pad, realign the holes and press them back into
position. Make sure the rubber 'bumps' behind the contacts are clean and
undamaged.

(This makes more sense when you actually see it :^))

Be careful! Nothing needs to be forced.

5.5) HP ThinkJet Printer repair 2

"I have an HP ThinkJet 2225C printer. I just replaced the print cartridge.
 It still doesn't print dark enough, and even after I primed the cartridge a
 few times, it still also misses a dot at the top and the second one from the
 bottom.

 I'm wondering, could the voltage to the cartridge be too low?"

(From: Kevin).

I have seen on rare occaisions the cartridge bad out of the box! Try wiping
down the cartridge head & contact points on the printer with a Q-tip & alcohol.
Sometimes blowing in the vent holes will force ink out the head, wipe off
excess and try it. You may have to repeat the procedure a few times. If this
doesn't work get another cartridge. You may want to try swopping the bad
cartridge into a working unit or taking a working cartridge and putting it in
the suspect printer.

(From: Frank Reid (reid@indiana.edu)).

I agree with all Kevin said. I use blue window-cleaner (e.g. Windex) instead
of alcohol; the ink is very soluble in that stuff, and it penetrates the tiny
holes in the printhead. After cleaning, hold a rag over the printhead and
sling it downward a few times (as if throwing, but don't let go), such that
centrifugal force pushes some ink out. If that doesn't work, try blowing on
the upper vent.

On a few rare occasions I've encountered bad connections at the fixed end of
the printhead cable, fixed by reseating the connectors. Also, if the cartridge
has leaked, there may be ink on the gold pads in the moving end of the
printhead connector, causing bad contact. Clean as above.

Some of the later models, including the type which takes two cartridges
(3-color and black), have screws at the end of the carriage rod which allow
adjusting the clearance between printhead and paper. Those may need adjusting
if the ink is smearing. If too light, it's probably a printhead problem.

(From: Richard M. (Digitech@bogus.net)).

It is a water based ink. There is no need for any solvent other than water.
Warm water works well. Use it all the time on my 1200C and DJ750C... BTW, I
never have to touch my Epson. Use lint free cloths to tamp dry. NEVER wipe.

(From: R. Wagner (rwagner@ncn.net)).

I found the cable from the computer to the print head had some open places
close to the head. The want 35 dollars for a new one. I went to the auto
parts store and got some a rear window defroster repare kit. I got it working
but for how long I dont know.

5.6) HP DeskJet paper feed problems

(From: John T. Black (cz667@cleveland.Freenet.Edu)).

The paper feed problem afflicts the HP DeskJet 550C and 560C, DeskJet 520 and
DeskWriter 520 printers produced between June 1993 and March 1994. The
affected units have serial numbers beginning with 'US3' through 'US43.'

The problem seems to be that the rubber rollers become slick over time and
then the paper doesn't always feed properly. Last year HP offered a free
paper-feed cleaning kit to fix the problem. Try contacting HP at 800/656-2324
or 510/657-1473 (FAX) to find out if the free kits are still available.

(From: Allen E. Amey (a_amey@ix.netcom.com)).

Try contacting the manufacturer. I have heard that HP has a free kit for
the 500 series printers. The kit dresses the rollers and is supposed to
be a fix for the type of problem that you are experiencing. BTW, using
alcohol can actually compound the problem by prematurely drying out the
rollers.

(From: FaxRepair (faxrepair@aol.com)).

I believe the only replacement part would be the entire paper pickup assembly
which may need to be replaced because the gear train is damaged
from ink having dripped onto it. Once the gear train is out of timing

there is no known cure. Clean the rollers with rubbing alcohol and a soft
cloth. If it doesn't pick up the paper after cleaning the rollers, then
remove the entire print assembly and look for signs of ink on the gears at
a location directly below the ink cartridge's home position. On a few
occasions I have had success by flushing the gear mechanism with warm
water to wash away dried ink.

(From: James E. Burke, Jr. (jeburke@ibm.net)).

I fixed one for a friend a couple of months ago. Parts are not available
(well, you can get them, but they're too expensive).

In the one I fixed, it was a broken plastic part that caused the misfeeds. To
get to the part, I had to disassemble the whole printer.

If you decide to to this, check the two 'fingers' that are behind the
print head when it's in the parked position. The hook on the tip of
one of them was broken off. I found the broken part inside the printer
and glued it back on with JB Weld (twice--first time backwards). The
pair of 'fingers' are identical so you could probably swap parts from
one of the other machines instead of attempting the
repair of the "fingers".

(From: Paul Grohe (grohe@galaxy.nsc.com)).

I have the same problem.

The rollers dry up and become glazed-over and smooth. You need to 'rough' them
up.

Try sandpapering the wheels with coarse sandpaper (100 to 200 grit).

You'll need to trick the paper sensor. Take the cover off and
lift-up on the black paper sensor lever. Then hold the piece of
sandpaper firmly against the wheel and hit 'FF'. You'll need to
do this repeatedly, as the wheels will only spin a sheets' worth
each time.

Do this until the wheels feel 'sticky' again.

It also helps to keep the paper tray full at all times (but not overloaded).

Unfortunately, they'll never be like new.

(From: Frank Reid (reid@indiana.edu)).

I've had very good results cleaning the rollers with naphtha or mineral
spirits, no sanding. It removes the glaze from the clay content of the
paper, and makes the rollers softer.

(From: (Egiglious Giggles" (chsoccer@prodigy.net)).

The thing I have come across, is the spring which is directly under the roller
itself. The purpose is to allow tension on the roller for pulling the paper
in one sheet at a time. If you look directly in the middle under the roller
from the front there is a guide that is spring tensioned. You have to take
the roller assembly apart to get to it. But, if cleaning the rollers doesn't
do the job, this is probably the culprit.

(From: Tony Dunlap (tdunlap@odot.dot.ohio.gov)).

The "Glaze" that gets on the rollers is often due to the rag content of many
cheaper papers (especially "Recycled"). To clean the rollers:

1. Remove the paper and paper tray.

2. Send a short test page to the printer with the paper out. This will cause the form-feed light to blink.

3. Wet the rollers one at a time with a cloth (not a paper towel) dipped in alcohol, while pressing the paper feed button.

4. While it is wet, rub it with something rough and non-porous (I modified a toothed chip extractor that came with a pentium upgrade kit), again while pressing the paper feed.

5. Wet it again with a fresh part of the cloth dipped in alcohol.

6. Dry it with a fresh part of the cloth.

7. Put it back together and let it print the test page.

5.7) HP DeskJet 520 - Crunch!

"I just picked up an HP DeskJet 520 printer that doesn't work. On startup, the print head moves right an inch, then all the way left, where it slams into the left side of the carriage and grinds away for about a tenth of a second before stopping."

(From: Tech Guy (patrickmcardle@sprintmail.com)).

You may wish to check the undercarriage (no pun intended).

The printhead location sensor microswitch may be on the fritz The printer uses this switch to determine the starting point of the printhead after which it uses assumed location by how far the data has sent the head every time the unit gets a reset code, it checks this switch and if the signal is not detected, it may slam the head to either rail end or not move at all. If this is the case you can make sure that the platen is not clogged with label or paper debris. Gently move the head by hand to the right. If you shine a bright light into the area where the printhead usually calls "home" you may be able to see this switch (it may however be located under a cover triggered by the belt) if the switch is defective, replace it. If in fact it is jammed by debris, simply clear it and you may have solved the problem. Beyond this, you may have a logic problem (bad chip or other component) I make a good practice of doing a thorough cleaning of all machines that have left my shop to reduce the possibility of other problems during my warranty period. (it also makes the customer think that they have gotten something for their money)

I have replace a switch or a fuse on many machines, charged my base fee and heard the response upon their pick-up by customers that, "I can tell right away that you have found and fixed the problem" without even so much as a demo.

(From: michae98@ix.netcom.com).

There is a clear plastic strip strung between the both ends of the printhead pathway. This strip of plastic has microscopic vertical bars which the printhead can read and sense what position its in the pathway. The strip may be contaminated with excess ink which may confused the printhead. Take a soft cloth or Q-tip dampened with water and wipe of the strip (the ink is water

soluble) and the printer should work.

(From: Raymond Carlsen (rrcc@u.washington.edu)).

Closely examine the toothed belt that drives the printhead. Look for a few
missing teeth at one end. I managed to make one work again by shifting the
belt over a bit (past the bad teeth). If that's it, the belt should of course
be replaced.

5.8) HP DeskJet 1200C power supply repair story

(From: Marc Geyskens mgeysken@innet.be)).

A while back, I got this broken down printer, most of the time the power
supply wouldn't kick in after pressing the standby switch. After checking
elementary things, I got stuck on the PCB that holds the standby switch, on
it reside passive components, a few LM431 and a UN3854 all of the components
where ok except for the LM and UN chips. Since I had no schematic and no sheet
on the UN3854 I turned to the chip directory which led, via a few stops, to
the Unitrode site and yes, a data sheet for the UN3851. Plugged my scope
(power supply on isolation transformer) onto the ucc line for the UNxxxx,
noticed that the voltage was almost 0 raising slowly to 12 V and then fast
to 20V after that time the PS worked normal. So I traced the supply back to
a FET 2SK537 on the power supply mainboard which is part of a protection,
its gate pulled up by a zener ZD1 and a resistor of 680k from 400V and pulled
down by a transistor in case of the transformer's output voltage gets to high.
Well, it was the 680k resistor, infinitive resistance yet not a scratch on it.

Thanks to the Chipdir site, and the Unitrode people.

5.9) HP PaintJet problems

(From: Paul Grohe (grohe@galaxy.nsc.com))

"My HP PaintJet printer has a problem! When I turn the printer on, the print
 head moves as if it's cleaning the head but thats it! The "on" light stays
 on but the "SET TOF", "LF", and "FF" buttons don't work. I've tried a test
 page by holding down the "FF" button and turning on the printer but it won't
 print. It just goes through the head cleaning stage again and then stops.
 If I turn the printer off and manually move the print head to the other end
 of the carriage and then turn it back on again the print head will move back
 to it's home position."

I am assuming you have the original tractor-feed "PaintJet", and not the
sheet-feed 300XL.

It sounds like you have a problem with the "paper out" detector.

Is the second lamp on, even when there is paper loaded?

Here's a clue: If the other light is *on* after you do the self-test key
sequence, then it thinks there is no paper loaded, so it does not print.
The buttons are useless at this point, too. I have confirmed this with my

PaintJet by removing the paper, and it does exactly what you describe.
During normal "self test" printing, the paper out lamp is off.

It is very common with DeskJets and PaintJets to have their "paper out"
detectors jam after rough handling.

Looking down into where the paper goes in, there is a little black lever
sticking up (about 8cm to the right of the left end of the platen). This is
the paper detect lever. The other end is a "flap" that goes between a
photodetector.

Make sure this lever moves freely.

Open up the case (don't worry, it is very simple). Pull the big platen knob
off. Then there are two rubber "wedges" stuck in two oval-ish latch holes on
the bottom under the front "lip". Pull out the wedges and squeeze the
latches. The cover then lifts right off (nothing is connected to it).

With the cover removed and viewing the printer from the front, look at the
bottom left corner of the circuit board. You can see the "flap" end of the
paper detect lever and photosensor, right above the "made in USA" sticker.
Make sure it moves freely and that it is situated between the two detector
"blocks" (I have seen these levers "wedge" themselves against the outside
edge of the detector).

My guess is that you will either find paper jamming the lever, the lever
itself mechanically jammed, or a piece of paper wedged in the sensor.

While you have the top off, notice that there is a long, plastic strip with
fine lines on it running along the front. This is used for sensing the head
position. Move the head over and make sure that strip is clean and that no
ink has spilled anywhere on it. Also clean out any paper dust or spilled ink.

Don't be afraid to plug in the printer to test it with the cover off. The
input voltage is only 20VAC, so you will not get shocked. Just be careful
of the orientation of the power plug and watch out for the moving parts.

BTW1: The PaintJet printer is very stupid. It will 'print even with the
cartridges removed or the platen motor unplugged, so there are no other
sensors that could be causing a problem.

BTW2: HP's support doc's are available at:

  * http://hpcc997.external.hp.com/cposupport/indexes1/pjpr.html
  * ftp://ftp.hp.com/pub/printers/support_doc/

"The symptoms are that first the color cartridge got weak and stopped working
 and now the same has happened to the black cartridge. It's not out of ink or
 clogged and the contacts are all clean."

(From: Paul Grohe (grohe@galaxy.nsc.com)).

The 3630 (aka: "PaintJet") was one of, if not *the* first, color ink jet
printer. As such, it was plagued by the usual "first-of-it's-kind"
problems. HP learned from their mistakes on this one!

We have a few of them around here, and your experience is not unusual. They
tend to "dry up" more often than the newer printers. I seriously doubt it is
an electrical failure.

Even though the cartridge appears "full", the ink gallies will clog if not
used after a certain amount of time. After a week or two, you will need to
clean and prime the cartridges.

This printer does not have the automatic "priming" that the DeskJets
have. Instead, you have to remove the cartridges and manually prime them with
the "plunger" located under the "flap" on the top-left. Then "wipe" them with
the rubber "nose-wiper" located on the underside of the cartridge access door.

There is (supposed to be) a slide-out card located on the bottom of the
printer with the "cleaning and priming" instructions (The little tab with the
"i" on it).

The PaintJet also lacks a rubber-sealed "cover" for the cartridge head when it
is in the "park" position. This greatly adds to the "dry-out" problem.

The head connector also creates some problems. The 3930 uses two rows of
individual long, gold-plated "fingers" to make contact with the
cartridge. These "contacts" can bend back, or become mis-aligned, due to
improper cartridge insertion or wear.

Take a look at these "fingers", and just make sure they are even and
straight. Don't bend them too much, as they are brittle. Also make sure there
is no leftover ink on the contacts. Don't press

It should be easy to fix. However, you may go bankrupt replacing the
cartridges.

There are ink "refill" kits available, however, the problem is usually with
the clogging of the internal passageways and jets. So new ink won't help
much.

My suggestions:

Check the contact "fingers".

Try "priming" and "cleaning" the cartridges.

Try replacing the cartridges with known good ones (or new).

If you will not be using the cartridges for a while, remove them and place
them in a sealed container or baggie for storage (place them in the same
position as they are in the printer).

"What other printers are compatible with the PaintJet if I cannot get mine
 working and I need to use existing software"?

(From: Paul Grohe (grohe@galaxy.nsc.com)).

The "PaintJet" is a 180 DPI, "PCL" language printer. Just like the "newer"
DeskJets.

If your unit has a parallel or serial interface, you can use any one of the
older DeskJet printers (500/600 "C" series, DJ plus) - any that use the "PCL"
language) or almost any laser printer (HPII compatible - B&W only). However,
the newer printers are 300DPI printers, so the printouts will be 30-40%
smaller.

If it is a HPIB interface, look for a HPIB ThinkJet.

5.10) HP DJ340 shuts off during printing

(This may also apply to other battery powered printers.

"Whenever I send a heavily formatted print job to a DJ340 printer, it prints
 1/3 to 1/2 a page and then power shuts off! This so far has happened in
 TTAX97 and Netscape 4.03.   OS is Win95 and I'm using the latest driver for
 this printer.   The printer otherwise prints test pages and simple jobs OK."

(From: Paul Grohe (grohe@galaxy.nsc.com)).

I know this sounds silly, but how old are the batteries?

My guess is that the battery is probably getting weak. Heavy graphic content
and "fancy" fonts users (of which TTax and Netscape qualify) will "swipe" the
head more per line than the "text and lines" of the test pages. Moving that
print head uses a lot of power!

Does the unit work on the adapter – without the battery? If not, then it
relies mainly on the battery for power, and the adapter just charges the
battery in between jobs. A weak battery could be drained after a short time.

If it works without the battery, then the battery could be going bad, causing
the charger to dump too much current into the battery and "rob" some of the
power from the printer.

There is a "Troubleshooting" note in the printers "FAQ" on HP's site.

http://www.hp.com/cposupport/eschome.html

It basically says to check the batteries and make sure you are using the
correct power supply.

Try replacing the battery. If you bought it at a local store, take it back and
see if they have another battery to check it with.

5.11) Intermittent light/no print from Canon BJ330

"I have a canon BJ330 that starts printing light and prints nothing.   This
 only happens approx once every 2 months.   The unit has ink and it still thinks
 it's printing but there is no ink on the paper.   This has happened a couple
 of times and so far I haven't figured out what it is that I do to 'correct'
 the problem.

 I was thinking that there must be a way to clean the printhead that is not
 in the service manual.   Which I do not have, anyway."

On my DeskJet, I just blow gently into the vent hole on the ink cartridge.
I then wipe off blob of ink that forms on on the head and it works like a
charm – if you don't get ink all over everything.   Perhaps, try the following
first:

(From: russrite@magmacom.com).

Remove the sponge from the purge cap carefully, try washing in water
carefully, and reinstall it:

* Remove the top cover to expose the printer power on the printer
  when the printhead moves away from home position SHUT OFF the power

* You will see a rubber rectangle cap towards the bottom of it is the
  sponge (called an 'Ink Absorber')

5.12) Canon BubbleJet information

Parts Now! has a set of articles mostly on laser printer engines, but
there is one for Canon BubbleJets. These can be found at:

* http://www.partsnowinc.com/PRODSERV/serv03.htm

5.13) Canon BubbleJet printers not printing after cleaning

(From: Handy (handy@redshift.com)).

Take out the cartridge that you want cleaned. Find that hole that ink comes
out of, squeeze the cartridge until ink comes out of that hole - actually
drips. Put it back in the machine, clean it at least FOUR times. Usually on
the fourth time for some reason, it works. Just clean the one that you think
needs cleaning.

5.14) Canon BJC 600 problems

(From: Rob Connelly (connelly@ix.netcom.com)).

I have found that sometimes the BJC 600 series gets confused and needs to be
reinitialized. If you haven't already done so, unplug it from the wall, wait
60 seconds for the internal supply capacitors to completely discharge, then
plug it back in and try again. When you remove it from the AC line it goes
through a complete warm up cycle and resets itself.

Also, the contacts that mate with the print head are notorious for
oxidizing. You might want to carefully clean them (lightly) with a pencil
eraser and some isopropyl.

If these remedies don't work, the Canon 1-800 number will put you in touch
with their tech department, and they are really quite good at determining what
the problem is over the phone.

(From: Al Savage (asavage@iname.com)).

When I was working on printers, we'd see a few of the 600s in with corrosion
on the ribbon cable end under the printhead. NewKote apparently had a venting
problem with their copykat ink cartridges, where in some situations ink would
spurt (leak? drip?) and somehow corrode the ribbon cable.

I never tried to replace one and see if it could actually be repaired with
just the cable, but I did try vigorously cleaning the cable end: no conclusive
repair.

5.15) BJC 600 print head error - lights flashing

"Upon powering up the printer the two lights flash indicating a print head
 error. However by cleaning the electrical contacts (with alcohol) on both the
 print head and the printer the printer works,,, temporarily. Within a day or
 two the problem resurfaces. When the printer does print it prints excellent
 quality. The nozzles seem to be is good working order."

(From: Al Savage (asavage@iname.com)).

Although printhead failures are common on the 600 series, so is failure of the
ribbon cable to the printhead. This is an acknowledged problem from Canon,
when aftermarket ink reservoirs are used (i.e. Pirana or NewKote). Somehow the
ink gets up to the cable/printhead interface and corrodes it. When I was
working on them (about 18 months ago) Canon and NewKote were pointing fingers
at each other. It appeared to be a reservoir venting problem.

5.16) Epson Stylus Color IIS error light problems

"The error light on the Epson Stylus color IIs keeps blinking. The color
 cartridge is new. The black and white prints perfect."

(From: Robert J. Brancatelli (bronco@mkol2.dseg.ti.com)).

Most likely, the new color cartridge is not seating all the way. Move the
print head to where you normally do to swap the heads. Now, without removing
the color print head, lift the most forward lever up as far as it will go,
then bring it down to reseat the ink cartridge.

5.17) Epson Stylus 800 print quality

"I have an Epson Stylus 800 printer which is only used infrequently. I
 seem to have a problem with some of the jets clogging up after a while
 producing a banding effect and/or a blurring of text.

 The built in cleaning cycle does not clear the problem. Running the
 head over a pad soaked in Isopropyl Alcohol clears the problem, but
 after a week or so things start getting bad again.

 The user manual does not mention the need to change any cleaning pads.
 How does the cleaning cycle work and are there any checks or
 adjustments which might improve things?"

(From: Paul Grohe (grohe@galaxy.nsc.com)).

Inkjet printers do not like 'infrequent' use. They need to be 'exercised' every once and a while. Use 'em or loose 'em!

I'm not familiar with the Epson products, but on the HP DeskJets, there is a little rubber "seat" that the cartridge sits on when it is 'parked'. If it is gummed-up or damaged, it can cause the cartridge to slowly dry out.

The HP's have a little oval-shaped rubber 'do-hikey' that seals the area around the ink jets. It generally gets gummed up with dry ink, and does not seal completely anymore.

Check and see if there is something similar that covers the print head when it is not in use.

The "banding" can also occur as the cartridge starts getting towards the end of it's life. Also try cleaning the contact areas with a soft cloth. Poor contacts can cause similar problems.

If large ink droplets are forming on the head during printing, this is a sign of poor contacts or a physically damaged head.

However, most of the time it is caused by "clots" in the areas supplying the jets, or in the jets themselves. Sometimes soaking the jets in a tray of alcohol or water for a while can dissolve these "clots", but the success rate is not that great. Better to fix the root of the problem.

BTW: Avoid turning the cartridge upside-down. Always hold it so gravity pulls the ink down to the jets and keeps them primed. Turning it upside-down can allow air to be drawn back into the jets.

Then again, it may be time for a new cartridge!

5.18) Epson Stylus Color 800 clogged print head

(From: Alan G. Pope (agpope@phonetech.com)).

PROBLEM: Dryed black ink clog-up in the tube leading from the black ink cartridge to the print head. Black ink flow totally halted. New cartridges won't work.

BACKGROUND: Epson uses very fast-drying, water-soluble, inks in this printer, and if the printer sits idle for some length of time the ink feed tubes and the print heads become clogged with dry ink. Epson issues dire warnings about potential damage to the printer if attempts are made to flush these parts with any solvent, and recommends factory repair only.

On the advice of someone who has vast experience with such problems, I successfully used the following repair. procedure.

REPAIR PROCEDURE: Use a clean small hypodermic syringe with NO needle. Press on to the syringe nozzle, a 3/4 inch long piece of model airplane gas engine fuel tubing. This tubing is available cheaply from your local model hobby shop. It is a pale light blue colored plastic tubing. The MEDIUM size is the right one. The bore (ID) of the tubing is less than 1/16 of an inch. It makes a very tight fit when pushed onto the syringe nozzle.

Remove the cartridge from the printer, and pull the power plug immediately
to prevent any further printer movement.

Load the syringe with 2-3 CC's of scalding hot water, preferably distilled
water available at your grocery store. Then press the other end of the
tubing down over the little black nozzle in the bottom of the cartridge
holder. It must be a very tight fit.

Forcibly inject the hot water into the printer. If the clogging is really
severe, you may have to press the syringe plunger very hard. Continue
injecting until the syringe is empty, while making sure that the tubing
does not slip off the syringe or the printer nozzle. Repeat this injection
procedure 1-2 more times with more hot water if necessary.

Once the hot water goes through easily, the clog has been dissolved. It
may be necessary to wait 24 hours for the water to evaporate, but in my
case it was not. I simply replaced the black ink cartridge, and ran the
Epson's head-cleaning utility several times until the black ink started
coming through. Running the nozzle-check utility, to make a test pattern
print, will let you know when the ink flow is OK.

This same procedure should work equally well for the colored inks of this
printer. I suspect that the procedure will also probably work for some
other Epson inkjet printers as well.

Use this procedure at your own risk. All I can tell you is that it worked
beautifully for me. There was NO printer damage.

5.19) Epson Stylus 80 printer seems to operate but no printing

(From: Al Savage (asavage@iname.com)).

Sorry to be the bearer of bad news, but the both the purge pump and the
printhead in the Stylus series (300, 400, 800, ColorII) are very trouble
prone. I've scrapped a couple dozen of them. The cost of a replacement
printhead is more than the printer on sale.

They do print nicely when they're working, though. My experience is that they
don't work for very long.

5.20) HP DeskJet 560C Detailed problem description and possible solutions

"I have a HP DeskJet 560C, Model C2168A that is behaving badly. When I
 power it on initially, it appears to run through a diagnostic self-test
 (as evidenced by the sequence of LEDs on the control panel). It gets
 to the point where it moves the print head and that is where things
 go bad. I think it is attempting to report some sort of error code
 because it then flashes some of the LEDs in a repeating pattern
 (more on that later).

First let me describe mechanically what it is doing. When it gets to
the point in the power-up routine where it moves the print head, it
should do the following:

1. Move print head to the extreme right.

2. Prime the print head (???), a stepper motor on the right raises
   a mechanism to contact the print head.

3. Position the print head in a ready position.

OK, here is what it is doing (please forgive my feeble attempts to
describe in words what is happening):

1. I hear three distinct sounds (whirring of various stepper motors
   I think) before the print head moves.

2. The first two sounds seem normal from what I can remember when the printer
   used to work.

3. The third sound is the loudest and doesn't sound at all normal. It sounds
   as if the stepper motor that does the priming is oscillating back and forth
   between two "steps" (the sound is like a stripping gear).

4. The print head moves approx. 1" to the right.

5. The print head immediately moves approx. 1.5" to the left (note, this
   sequence of print head movements happens bang-bang (no delays between
   movements).

The end result is that the print head winds up about 0.5" to left of
the position it was in when the unit was powered on. If I continue
the power on sequences enough times it will end up at the extreme
left and will be accompanied by a much uglier, more sinister sound
of the print head slapping against the leftmost guard (as if the
printer is attempting to throw the print head through the case).

Now let me describe the sequence that happens with the LEDs. The
control panel has 9 LEDs arranged in three columns of three LEDs
each. The leftmost column of LEDs lies between the "CLEAN" button
at the top and the "Font" button at the bottom. The middle column
of LEDs lies between the "Alignment Test" button and the "Status"
button. Finally, the rightmost column of LEDs lies between the
"Install Print Cartridge" button and the "Quality" button. Here
is some ASCII art:

```
                              CONTROL PANEL
||=============================================================================||
||                                                                           ||
||                           Alignment         Install Print                 ||
||  RESET         CLEAN       Test              Cartridge                     ||
||                                                                           ||
||              ,--,           ,--,              ,--,                         ||
||             ( #1 )         ( #4 )            ( #7 ) o o o                   ||
||              '--'           '--'              '--'                         ||
||                                                                           ||
||              ,--,           ,--,              ,--,                         ||
||             ( #2 )         ( #5 )Busy        ( #8 ) o                       ||
||              '--'           '--'              '--'                         ||
||                                                                           ||
||              ,--,           ,--,              ,--,                         ||
||             ( #3 )Condensed ( #6 )Ready      ( #9 )Econo Mode              ||
||              '--'           '--'              '--'                         ||
```
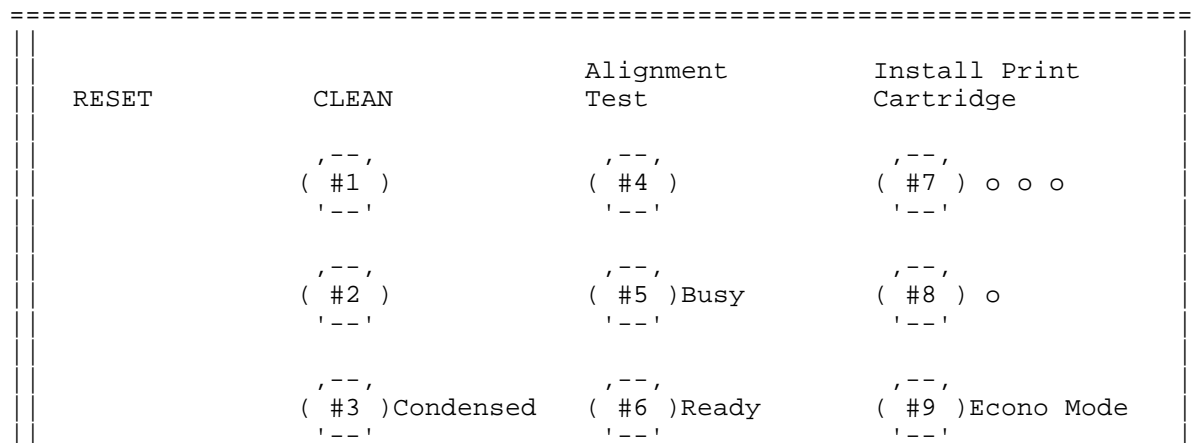
```
 ||                                                                         ||
 ||   Load/Eject       Font            Status          Quality             ||
 ||   Paper                                                                ||
 ||                                                                        ||
 ========================================================================
```

   I have numbered the LEDs (using my own numbering scheme) so that I can
   reference them below.

   Here is the sequence that the LEDs progress through each time the unit>is
   powered on. The sequence is always the same.

```
      LEDs On       Duration                Description
    -----------    ----------    --------------------------------------
  1. 123456789     2.5 secs      Happens immediately when I switch the
                                 power on.  Then LEDs 234789 turn off.

  2. 1    56       0.5 secs      This is a flash (longer than a blink).
                                 Then LED 5 turns off.

  3. 1     6       2   secs      Then LED 7 flashes on.

  4. 1     67      0.5 secs      This is a flash.  Then LED 7 turns off,
                                 LED 5 blinks on.

**5. 1    56       ----          Here LED 5 just blinks on then off.

  6.   234  789                  This starts the alternating sequence
                                 where I believe the printer is trying
                                 to report an error code.

  7. 1     6                     This is the rest of the alternating
                                 sequence.  The printer then repeats
                                 these two patterns forever (LEDs 234789,
                                 followed by 16).
```

   ** Step 5 is the point where the printer starts moving the print head.

   (From: Jason D. Pero (JDP6640@ritvax.isc.rit.edu)).

   The grinding sound from priming area is the jammed lever black stick
   that is pushed towards a bit towards right. If it good, it should be
   in upright position. If stuck too very right, unstick it by pushing
   it back to upright position towards left. This stick can be seen
   between the carriage rod and the printhead's purging rubber nipples
   and wipers. Also clean (gently!) the clear plastic strip with that
   fine black lines on it. First the clear strip must be removed
   first before doing this operation: The sensor is behind the printhead
   riding the clear strip, remove it by unengaging two triangular
   fingers inwards from outside and pull the sensor unit outwards
   towards back. Dust off inside that sensor gap and snap it back in.

   Finally clean and oil both carriage rod and the angled underside area
   where the bearing block contacts upward onto it. Oil that carriage
   motor carefully and all stepper motors.

   That should solve everything. This have happened to my 520, and my
   friends' 540 and 560C. Pretty common problem! Usual action when
   misbehaving is slamming either stops or do a "rushed start/stop" and
   some odd scary noises. All complains with pretty, interesting
   alterating flashes from the LED's on the control panel.

   Pure or almost pure alcohol stuff is best as it does not melt
   anything or rub marks off and some 2 in 1 heavy duty oil "blue band"

can. Top and bottom white shells comes apart easily after unengaging
four snaps, doing one at a time and pulling gently and with a small
flat screwdriver. Top off, the engine is free. disconnect with care
to both ribbon cables one for carriage motor, and the flat white
ribbon, or in some models that uses dual printheads, unplug another
stepper motor. All connections you need to worry about is only from
the mainboard side. Then the print engine lifts out without any
fastening hardware.

WELL DESIGNED 5xx series compared to many printers past and now!
I have a 520 chugging away after this fix and real cheap for that
printer from a owner who does not want it.

Only problem is cost of cartridges. :($50 of two versus $13 can of
toner powder for an Okidata 400 that will last thousands of papers.
Only problem is Oki. 400 LED laser thinks (processing graphics) very
slowly. Is there a hack to swap the proper circuit boards from
other similar Oki 400/800 series to make it work faster and more
useful than a pokey 186 cpu equipped Oki 400???

Your comments and suggestions on which brand of refill inks that is
perfect for those cartridges. I know how to refill it right after
experimenting on a bad cartridge and successfully refilling one good
cartridge from a bad cartridge (dead jet out of 48 jets I think).

(From: Glenn Allen (glenn@manawatu.gen.nz)).

It is not a stripped gear is it?

The old DJ500 used to have 2 levers on the right hand side at the back that
went up and down. Sometimes these got stuck and noises could be heard. Normal
paper feed problems here.

A problem with a DJ850 was that paper got stuck and to get it out I had to
remove the paper feed motor on the drive shaft, when put back it would bang
the left hand side of the case. Needles to say it needed the cog setup back to
right place it expects when powered on.

Those printers have an index strip that the printhead follows doesn't it? Is
this clean, i.e. Not ink all over the place.?

Lastly if you are repairing and turning your printer up and down, check you do
not lose the rubber cap where the printhead sits, and clears the guns, If you
do your cartridges will become clogged in no time.

Also clean the print head shaft, any gunk on it will cause the printhead head
to stick thus giving error light or worst powers down the printer.

5.21) Cartridge detection on HP DeskJets

(From: Fred Keen (fkeen@repeatotype.com)).

The HP printers test for the presence of a cartridge by checking the
electrical voltages on the contacts between the cartridge and the cable.
The slightest amount of dirt on the contacts can give a false reading
making the printer think that no cartridge is present. If cleaning the
contacts does not work you will have to buy a new cartridge.

5.22) HP Deskwriter 660 printer problems

```
"My HP Deskwriter is just over the warranty of one year and when I print
 text instead of white lines through the type which would indicate to clean
 cartridges or replace them, I get black thin lines almost smearing
 slightly the text."
```

(From: Dennis Bathory-Kitsz (bathory@maltedmedia.com)).

1. Take out the cartridges and clean their sides, which pick up hair.

2. Clean the cartridge-cleaning mechanism itself on the right, especially the
   foam pad.

3. Take out the cartridges and clean the bottom of their carriers.

For this last, there are good diagrams on HP's 660 support page. It's a
little tricky to bookmark, but this is what I have:

http://hpcc920.external.hp.com/cgi-bin/cposupport/faq.cgi?query=C4548A&productname=H

5.23) Little plastic parts in HP DeskJet printers and HP service policies

(From: Wayne Van Beelen (wbvanb@nbnet.nb.ca)).

The bad news is that the plastic these parts are made of seem to be a Teflon
hybrid and even the best epoxy doesn't last real well.

The even worse news is that DeskJets are disposable, just like Bic lighters.

HP will NOT sell you any internal parts.

They will not sell them to your dealer.

They will not even sell then to a so called HP service center.

All DeskJet service takes place in Corvallis, Oregon. A second possible
location is Mississauga, Ontario but I think they just forward printers to
Corvallis.

Here's the deal as I've been told; you pack up your printer and courier it
to Mississauga, ($40 Cdn.), pay $175 Cdn. for a refurbished version of your
Deskjet, and then pay another $40 Cdn. to ship the refurb back to you.
That's $255 Cdn for a used printer when there are any number of new
printers that can be had for a comparable price (and would also have a
warranty).

That, to me, means DeskJets must be disposable because nobody in their
right mind would pay that much for a three or four year old printer.
It's bad enough when you consider 540's, which back then had a 3 year
warranty, think about all the poor suckers buying newer HP's with only a 1

year warranty...

That's got to be enough harping on my part, the short of it would be that
if you've got it working and your cartridge parks okay, it might be best
to leave it alone. You won't get any worthwhile out-of-warranty help from
HP. Check on parts availability on any future new printers you might ever
buy. You can't assume that they won't forget you the day your warranty
expires.

5.24) HP DeskJet 560C - stripping gear sounds and more

"Does anyone know where the problem might lie with my HP printer? The problem
 is that when it is turned on, it goes through the reset sequence until it
 reaches the park zone, then it seems to miss a gear or something by the sound
 of stripping gears, then the lights flash alternately. My workaround to this
 is to turn it on, let it start across on it's reset sequence, turn it off,
 then right back on, and it will initiate just fine. Another anomoly is that
 when printing large color graphic files, occasionally, it will make it part
 way through the page and just stop with the same flashing error. After
 resetting it, it of course will print garbage unless I resend the data to the
 printer all over again. Any ideas? I've left a message on the HP site, but
 there has been no response."

Call HP - After much hassle they finally admitted it was a defect and replaced
it with a new 600 series. I had the same problem - but had to call Idaho to
get results.

5.25) HP DJ power supplies/wall adapters

It seems that this is one part that HP may not totally gouge you on!

(From: Paul Grohe (grohe@galaxy.nsc.com)).

Go to this page below, scroll down to the "power module options"
section, and pick the correct adapter part number for the UK.

 http://www.hp.com/cposupport/printers/support_doc/bpd02099.html

Then do a net search for that part number, or, contact HP directly. Last time
we ordered some, they were about $35US from HP.

5.26) Ink cartridge expiration dates

(From: Paul Weber (webpa@aol.com)).

One other thing about HP inkjet printers (DJ 550, 560, 850): Before you buy an
ink cartridge, look at the expiration date on the box. Don't buy it unless

you expect to use it before the printed date. That number really means that
the cartridge will NOT work after the date...no matter how it is stored.
Water and/or hot water rejuvenation rarely works on cartridges that are
outdated. The reservoir evidently turns to crap and won't wick the water in
or the ink out.

5.27) Non-use and refill of BJC-620 ink cartridges

(From: Roy (royf@iname.com)).

The people who talk about clogging, etc. must have never seen a BJC-620, in
which the printhead and ink tanks are separate. I've had a 620 for about 16
months and having printed almost nothing on it (have a laser for most needs)
have noticed that the ink tanks last about 5 months. My third set of
cartridges at $40 per set have just recently gone dry. (Actually only the
color ones are dry. The larger black one lasts longer.) I foolishly threw away
the first set of empties, but I still have two sets. I decided that I've sent
enough money to Canon and searched the web for a more economical
solution. What I found was Bob Nedved and his re.ink.kit refill kit at:

* http://www.reinkkit.com/

where, for $74.50 I got an amount of bulk ink equivalent to about $800 worth
of new cartridges. Included also are 4 syringes and 4 small screws. The
procedure is to make a small hole in each tank tank and seal it with a
screw. To refill, you remove the screw, inject a few cc of ink, replace the
screw, and clean the syringe with a little alcohol or distilled water. Filling
the first cartridge was a little messy, but once you get the hang of it, it's
a snap. The kit doesn't completely eliminate buying new tanks, because the
tanks themselves eventually need to be replaced, but it sure does cut the
annual maintenance cost, whether you only use the printer a little or if you
use it a lot.

(From: Bill Sloman (sloman@sci.kun.nl)).

Epson uses a piezo-electric print head, and an alcohol-based ink. If you don't
like paying for Epson's ink cartridges, use Pelikan's (I think that is the
brand I use - it is certainly one of the old-fashioned ink manufacturers).
They seem to use a higher molecular weight alcohol than Epson, so the
cartridges last me more like six months than three in the old (1993) Epson
Stylus Q800.

HP and Canon use a water-based ink, that is actually heated to boiling in the
print-head to spit out droplets - so the print head corrodes rapidly, which is
why their "ink cartridges" contain an new print-head and only about 15 ml ink,
as much as the print-head can reliably spit out.

Chapter 6) Laser Printers

Note: also see the chapter on Photocopiers as the operation and problems of
the two types of equipment are very similar.

6.1) On-line laser printer resources

There appears to be a complete textbook on laser printers: "A Laser Printer
Book" by Steven Burrows, on-line at:

* http://www.dungeon.com/~poota/lpbook/00-toc.html

While this doesn't have much electronic repair information, it certainly would
seem to cover just about everything else including some discussion of common
image quality and mechanical problems. How long such a resource will remain
freely accessible I have no idea (since he is trying to sell the hard copy
version).

The I.E.S.G. - UCB Laser Printer Repair Facility has some general
troubleshooting info, sources unknown and this appears to be in an early stage
of development:

* http://hera.eecs.berkeley.edu/~jjardine/laser1.html

Parts Now! has a set of articles on specific laser printer print engine
maintenance, repair, parts interchangeability, etc. These can be found at:

* http://www.partsnowinc.com/PRODSERV/serv03.htm

6.2) Warnings about vacuuming laser printer toner

This is less likely to be something you would do in a big way with a laser
printer compared to an office copier but if you are contemplating it, see
the section: "Warnings about vacuuming copier toner". There are several
considerations including the risk of explosion and/or fire.

6.3) Repeating images on laser printer

This likely means a faint ghost of the main printout at a distance equal to
the circumference of one of the rollers or photosensitive drum.

Depending on where the problem originates, this could be a bad wiper
(cleaning) blade, faulty corona, or incomplete fusing.

* If the distance between successive images is equal to the circumference of
  the photosensitive drum, it is a wiper blade, erase lamp, or corona problem.

  A residual latent image or residual toner is sticking to the drum and not
  being properly cleared.

* If the distance between successive images is equal to the circumference of
  one of the fuser rollers, then the fusing may not be complete due to damaged

rollers or an incorrect temperature setting.

It is easy to determine where the problem is located: Interrupt a printout
in mid-stride (where part of the paper is between the toner/developer and
fuser. If the un-fused image has ghosting, it is a fault in the area of the
drum. Also see the section: "Previous copy doesn't erase from drum".

6.4) Black evenly spaced lines on laser printer or copier

(From: Edward Klotz (eklotz@www.flash.net)).

90% of the time it is the toner cartridge (or drum), If it is still exactly the
same condition with the new cartridge, here is one exception: The fuser assembly
has a rubber roller, I had one with an indentation in one spot, allowing toner
to pack in the indentation & actually transfer a small character impression
onto the fuser roller, & then transfer it to the paper several times on each
sheet. The fuser is very easy to remove(2screws at the back). I temporarily
worked the indent out of the soft rubber, but eventually replaced the fuser
assembly.

(From: Dave Lee (leedj@uwec.edu)).

According to "Image Defects, Repetitive image defect ruler in LJ4", the cause
would me the "Primary Charging Roller", is 1.5 inches or 38 mm around. Start
with that, swap with another printer is possible, or order one, try Parts Now,
Inc, 800/886-6688 or The Printer Works, 800/235-6116 or Global Printer Service,
800/588-3554.

6.5) Optics disassembly?

"I would like to remove the mirror in order to clean it well. It mounts on a
 plastic bar that runs the width of the printer. The bar mounts by screws (2)
 at either end. I am worried that I will need some kind of aligning jig to get
 it back properly."

The short answer is: DON'T. Some aspects of the alignment are impossible to
adjust/correct/reinstall without factory jigs and test equipment. The best
you can hope for at home is trial-and-error. Most of the optics is probably
solidly glued in place anyhow so disassembly is difficult or impossible - but
it doesn't move much either! The long mirror itself is probably less critical
than the rest but there is no real need to disturb it.

To clean the optics, use (low pressure) compressed air, alcohol and lens
tissue, or as a last resort, alcohol and cotton swabs (Q-tips). However, some
lens and mirror coatings may be easily damaged - test in a corner first.

(From: Pete (PTCull@lbl.gov)).

You are correct in being worried. Alignment marks closest to the muffin fan
side of the engine should be noted before removal of the Beam-to-Drum
Assembly. Better yet, just blow the mirror clean with a filtered compressed
air source, leaving the mirror mounted.

Unless the mirror is very contaminated, I really wonder if you'll see the
improvement you believe you might? Some of these mirrors have very soft
surfaces and only should be touched with lens cleaner or cotton swabs.

If you still choose to remove the mirror from the engine, check to see if the
two extreme sides of the page seem even when referenced to the top edge, using
the "Engine Test print".

6.6) HP LaserJet FAQ

If your problem is with an HP LaserJet, before reading further, check the
following three sources of information:

* The "HP LaserJet Information" document at this site is a comprehensive
  collection of common problems and solutions as well as a listing of error
  codes and likely causes.

* The Printer Works /pub/printers has a very complete listing of HP LaserJet error c
  and possible remedies as well as some other model specific laser printer
  information.

* Also see the section: "Frank's repair notes: HP-IIP, HP-IIIP, Apple Personal
  Laser Writer".

6.7) HP LaserJet I fuser swapping and other tidbits

(From: Tony Duell (ard@p850ug1.demon.co.uk)).

What you need to do (if you're going to remove the whole assembly) is to
remove the (brown) cover that's flat on the printer chassis just behind
the 'tower' at the front that contains the interlock switch and AC control
boards (where you removed the fuser heater wires from). Under that cover
there's a little 4-way connector that links the fuser thermistor back to
the engine control PCB (DC controller). Unplug that.

Then you can remove the 4 screws that hold the fuser in place, lift it up
a bit, and free the heater wiring from the channel in the baseplate. The
whole fuser then comes out.

These fusers can be stripped and rebuilt - I've done it. If the old one
still heats up, keep it for the heater lamp that's in it - that lamp does
fail, and it's not that hard to replace. It's a quartz-halogen bulb, so
you shouldn't touch the 'glass'. The safest place to store it is in the
old fuser.

These printers are that bad. I've had one stripped down to individual
components (even dismantled the optical assembly), and have it running now.
But the SX engine (LJ2, etc) are a lot easier to dismantle into modules (and
in some cases harder to replace individual components on...)

6.8) HP LJ Series II bad bearing noise and other comments

"Got one that started making unpleasant noises about two weeks ago. It is in
 a church office environment, so they have to turn it off unless they need it
 for a short while. I took part of the cover off and decided it wasn't the
 top fan or the small motor on the right side. The sound comes from the right
 rear at the grilles at the bottom of the machine. It sounds like a bad
 bearing or something rubbing a fan."

(From: Ralph Wade Phillips (ralphp@techie.com)).

Bad lower fan. Part number RH7-1056. I'd check at http://www.pcservice.com
and register and order XX-RH7-1056 (it's under $20) and just replace that fan.

I'd also consider replacing the upper fan (go look for it with the search
engine - it's about the same $ for the generic 3rd party version) since a
failure there will ALSO cost you the fuser gears, thereby costing a fuser
assembly.

As to removing the bottom cover - Eh? Put the top back on, flip it over, and
remove those screws you see around the rim. Remove all cartridges also. Slip
the metal cover off, and viola - There she is!

Big warning - Do NOT run the machine with the lower fan disconnected. This is
known to damage the DC controller board (at least a $60 part, EXCHANGE - over
$300 purchase!), and can cause massive problems later down the road ... .

Well, buying 10 year old hardware and then wanting to depend on it not
breaking isn't very realistic. As reliable as the LJII/III is, they DO break,
especially lower fans, the 14T fuser gear, paper pickup roller, pickup
photosensor, AC power supply, registration assy. It's just that they'll
commonly print half a million pages in the process, and many contemporary
printers aren't designed for a service life a third as long.

To replace the lower fan, have a vacuum cleaner with a brush handy (or an air
compressor). Remove toner cartridge/drum unit. Close lid, remove all cables
(power, data), flip printer upside down. On a LJII, you're looking at steel
square pan; on a LJIII, you're looking at a large plastic tray and you have to
remove four Phillips-head screws to get it off first.

On both models: remove any optional memory card(s) by first removing the
access hatch for them on the left side. This hatch is the one *without* the
1/4" hole in it. Remove any circuit board you find under there: they just
pull straight out.

On the back of the printer, remove any optional I/O card (HP JetDirect,
Appletalk, etc) that may be installed next to the normal Centronics data port.
This isn't always *necessary* but when it isn't it just makes things easier.
Once again, just remove two screws and pull on the I/O card.

Now you can remove the lower pan. Nine Phillips head screws later, lift the
front edge of the pan, wiggle it to get it off over the Centronics port cable
clips.

Vacuum the pan out -- it will be filled with dust bunnies -- and any dust you
see collected on the mainboard. You can now see the lower fan. It's a
squirrel cage design. Remove the short wire harness and the four screws to
remove it. Note the position of the small bracket under two of the screws, as
you will need to put that bracket back!

Reassemble in reverse order. One screw on the lower pan does NOT go in the
left rear corner, but that's only a problem is you have the upper plastic off
as well. You can't put it in wrong if the upper half is still assembled.

The fan is about $20 wholesale, often close to $40 retail. Do NOT attempt to
disassemble and clean it. I've tried several times, and no matter what I try
it will either still be noisy, or will fail again within months.

6.9) HP LaserJet II Just dies and no sign of power after a short while

(From: Larry Sabo (sabo@storm.ca)).

"I have an HP LaserJet II that will just die after a short time. There are no
 power lights, not even an error message. If I leave it for a short time it
 will come back on after a power cycle. It is totally random."

Check the daughter board in the PSU at fault. On mine it had deteriorated
solder connections on *both* ends of the connecting pins. Remove it, resolder
the pins on the daughter board, then remount it. It's worked like a charm ever
since.

6.10) HP LJII with dark bands on first page

(Problem and solution from: Ken Eckert (eckert@sfu.ca)).

I have a LJ II that has the following problem:

"The problem is a dark horizontal band starting at line 1, about 1/2" wide,
 indistinct edges. Repeats down the page at same length as the optical drum
 circumference. Problem is present only on page 1 of a print job. All other
 pages are clean. When the engine is stopped at the beginning of the print
 process a large amount of toner is present on the OPC in a band. Band gets
 darker and larger the more time between successive print jobs is incurred.

 Swapping cartridges has no effect."

The problem turned out to be the chassis wiring harness from the DCA
controller to the HV module. There was a bad connection between the HV module
and the chassis connector only when the module was inserted. I ended up
extracting and soldering all the crimped pins in the connector. I suspect that
it was probably the HV reset line that was the problem.

6.11) HP LJII output jam

"I found a junked HP Laserjet II which initially jammed pulling in the paper.
 I have fixed that. It still jams on the output, though. It prints nicely,
 so it seems worth fixing. If I open the back tray, the sheet exits 90%
 before stopping with the "paper jam" error. With that tray closed, I get the
 accordion paper jam in the fuser area. I do not detect any rotation of the
 upper rollers to feed the paper out of the top. When opened, I can roll
 them by hand easily. I see no obvious gear wear or broken teeth. I also see
 deep scratches in the grey fuser, which is probably unrelated. The toner
 does not have any fusing problem that I see in a band down the page."

(From: Tony Duell (ard@p850ug1.demon.co.uk)).

I think you've got 2 problems here - the false paper jam with the tray open,
and a problem with the drive to the top rollers.

Let's look a them in that order.

There's only one paper sensor in the SX engine that I know about, and that's
part of the fuser. On the PCB at the left side of the fuser there's a slotted
opto-switch with a lever that detects paper in the fuser. There's also a single
transistor on said PCB that buffers/amplifies the output from the opto-switch,
Q332, I think. This sensor must change state one way (to indicate paper has
got to the fuser) shortly after the registration clutch operates and then
change state the other way when the paper has got out of the fuser.

You might start by reseating the cable at J206 of the DC controller board
(just in case it's bad connections) and then look at the sensor (mechanically
and electrically) on the fuser PCB.

Silly question: If the paper tray switches (on the DC controller board) aren't
operating properly, could the printer think it was feeding a shorter piece of
paper than it actually has, and then give a paper jam error? It's always
possible... Alas I don't know the coding for these 3 switches (SW201-SW203)

The other problem is almost certainly mechanical. Look at the gears on the
right hand side of the fuser (stripped teeth do occur here) and in the top
cover of the printer. Shouldn't be too hard to find where the drive has
failed. I suppose you could remove the outer casing and AC block, re-insert
the fuser and close the cover, and look at things while turning the machine by
hand.

6.12) HP IIP won't go past 'warm up'

"I have an HP IIP that goes through the "05 Self Test" mode but hangs
 when it gets to "02 Warm Up." The only thing I ever hear run is the fan.

 I am not getting any error codes otherwise.

 If I try to send a print job to it in this state, it seems to take it
 and the On Line indicators light up, but it won't print.

 Based on what I've read in the FAQ and in the archives, I'm guessing
 it is the DC Controller.

 I re-seated the connections going to the DC controller PCB and the
 power supply and everything else visually looks good.

 I do not have a service manual for this unit.

 Can someone tell me how to test the DC controller to see if it is
 defective or maybe shed a little light on what may be causing the unit
 not to make it to the "ready" mode?"

Any number of simple faults can result in the warmup sequence not completing.
Check these first before suspecting a blown power supply or controller.

It may indeed be as simple as a burned out bulb or broken door interlock.

(From: Dave Lee (leedj@uwec.edu)).

Here is what I found in my notes concerning your very same problem, Hope it
helps......

New "Service Today" from Parts Now, volume IV, number 1, issued in
Feb 95 is devoted to the "LX" engine units, IIP/IIP Plus/IIIP Series,
the Cannon LBP-4, Apple Personal LaserWriter. Lots of good stuff, error
50's, error 41's, fuser upgrades, "moaning", other squeaks etc.

Here is what it says:

    If hung on "02 Warming Up", trouble may be caused by cables on the door
    wear and tear. Also look at DC Cnt PCA, dual I/O, formatter PCA. Now
    also look at the solenoid for the MP pickup roller assembly. This can
    cause the 'hung 02 Warming Up' error if an open occurs in either the
    solenoid cable, or solenoid coil. To check, remove the formatter PCA in
    order to access the DC Controller PCA. Locate J209 on the DC Controller;
    pins 1 & 2 are the solenoid. Measure across the top of these pins, the
    correct reading is 200 ohms +- 10%. Replace the paper path door cable
    assembly, Part #RG1-1608-000 if the solenoid has high resistance.

(From: Jeff Churchvara (jeffc@pond.com)).

Experience would have diagnosed this one in about 10 seconds. I just
didn't know what I was looking at.

I started reading the FAQ and figured the worst. At first, I did not
have the service manual to go over this code. When I finally did get a
copy, I started checking the voltages and did not have +24V at the DC
Controller PCA.

All of what I was reading said to defeat the door interlock. At first,
this didn't make sense to me because the bar that should be attached
to the door was instead, laying on top of the switch and wasn't even
moving when the door opened. I didn't know enough not to look any
further.

Once I realized the bar should've been attached to the door, I started
looking for it's correct mounting. The screw holding the bar must have
loosened up and over time it broke the mounting nut right out of the
door.

I ended up resetting the nut (threaded sleeve) by adding a screw from
the outside. Then I pinched it in place with a second screw when I
re-anchored the bar. This made the bar pull away when the door opened
and then correctly contact the interlock switch when the door closed.

I forgot the basics of troubleshooting when I posted this one and was
making it more difficult than it actually was.

Thanks to all of you who responded and kept me looking in the right
direction.

6.13) Totally blank printout on laser printer or copier

(From: Ed Paolo (edpaolo@intac.com)).

Check to see if the image of the printout to be, is on the image drum. If it
is there and isn't being transfered to the paper then something like the high
voltage corona wire or hight voltage supply isn't charging the paper.

(From: FAXFIXR (justdfax@cdepot.net)).

There are two corona wires, the charge corona and the transfer corona. The
charge corona is the one you should look at. It is located in the toner
cartridge so the easiest way to check is try another cartridge, even one
that is out (or almost) of toner. If you don't have another, then you can
check yours. If you look at the cartridge in it's operating position, there
is a black mylar plastic film that covers a slit on top from end to end.
The mylar covers the corona wire but allows you to insert the little green
tool, found inside the copier, to wipe the corona. If the tool is there,
stick the pad into the slot and wipe it back and forth. If you hear a
slight screeching sound (like a violin) then the corona is there. If it's
not there, then the cartridge must be replaced.

6.14) HP LaserJet series II - error code 50 Service and clicking

(From: Peter Strezev (jup001@airmail.net)).

I had a LaserJet series II with exactly the same symptoms: 50 SERVICE and
that very clicking sound. I fixed that printer last week after quite a bit of
troubleshooting.

First: the clicking sound comes from a mechanical relay in the PSU, which
controls, together with an SCR solid-state relay, the sequence in which
power is applied to the heating lamp in the fuser. The sound itself is not a
problem, it is a symptom. You probably have a bad thermistor in the fuser
assembly, or the signal path from the thermistor to the control board is
corrupted.

If you are good with electronic troubleshooting, try the following:

* Remove the fuser assembly from the printer. Locate a 7-pin connector on the
  left side of the assembly (I am assuming the same orientation, in which it
  was while inside the printer). Turn the fuser upside down, so that the
  connector is on the top. Using an ohmmeter, measure the resistance between
  pins 3 and 4, counting from the one closest to you. The meter should read a
  few hundred KOhms (if you take off the plastic cover, which covers the
  thermistor and thermoswitch, you could access the thermistor and try to heat
  it with a soldering iron. The resistance should come down to a few K Ohms or
  less if the thermistor is OK).

* If you got correct readings, measure the resistance between the
  corresponding pins in the socket, where the connector goes to when the

       fuser is installed. It should be quite high, about a M ohm. In my case,
       I found only 30 Ohms, and this was the source of the problem. What it
       turned out to be, the little cable underneath the printer, which
       carries a bunch of sensor signals from the fuser to the control board.
       Two wires responsible for the thermistor data turned out to be shorted
       by an excessively tight cable tie. It might not be the same in your
       case, but who knows...

(From: Mark Wolfe (markw@wwa.com)).

Just to speed things up a little, override the printer open switch, and remove
the plastic cover from the right end of the fuser to get at the power
connector for the bulb.   Turn the thing on, and read this connector, should
see about 115vac, if you don't, check Q101 in the Power Supply.   The problem
you had sounded like a rarity, as it's usually the halogen light in the fuser,
or Q101 in the power supply.   Yours was the sensors going back to control
Q101. Anyway, if you ever have one of the power supplies opened, it looks as
if HP intended this triac to fail with it's whimpy heat sink.   Hope this helps.

I had the same thing happen to me on a IID, check the connections on
the fuser.   I swapped fusers with my III, and both printers worked,
swapped them back and both printers worked.   The power connector on
the right end of the fuser seemed a bit loose, could've had a bad
connection.   Anyway, IID is still going, and this was in august when
I did this.

(From: Chris Holmes (holmesc@sedgehill.lewisham.sch.uk)).

I dont know if Error code 50 is the same as Service 50 on the HP Laserjet II
but if it is you are in luck.

I once had this and spent about an hour and a half stripping cleaning
and reassembling it, and it worked! When I got back to civilisation I
checked the manual.   The official HP action for Service 50 is - switch
off for 10 Mins!

Still i'm sure the clean did it good.

(From: Frank Reid (reid@indiana.edu))

A fuser-heating fault in HP Laserjet II or III (or the Apple equivalent)
causes a capacitor on the dc controller board to charge. Discharge takes
10 to 30 minutes. If you repair the problem and restart the machine before
the capacitor discharges, the error indication remains.

(From: Stuart Elflett (stuarte@OntheNet.com.au)).

Does the 50 error now stay on constantly, e.g. if you turn the machine
on after a 30 minute wait, does it still say 50 error without doing
its self test?? If so, I'd head towards the D.C. Controller. If the
bulb in the fuser comes straight on, and the delivery rollers don't
turn a little before hand, I'd be looking at the AC Supply. Is your
fan spinning?? A stalled fan can often result in a 50 error. Is the
fuser heating up?? If you're technically minded, you could remove the
fuser and check the bulb for continuity.

Parts are commonly available almost world wide now.... you could check
my links page for some sites that provide parts.... there's plenty
more out there that aren't on my list..... try a web search for Laser
Printer Parts....... They're not too expensive, as long as you get
exchange parts where possible!! A manual would be a good purchase if
you intend doing the work yourself, however they are still relatively
expensive compared to parts!!

(From: David Gardner (gardneda@www.gc.cc.fl.us)).

Error 50 is called a fuser error, which it is, but I have found that it can also be caused by a bad High Voltage power supply or by a bad cable that runs from the power supply to the fuser.

6.15) Notes on HP LaserJet III error code 50

(From: Tony Duell (ard@p850ug1.demon.co.uk)).

[Error 50, SX Engine]

Remove the fuser (4 screws hidden down holes - it helps to remove the plastic cover from the left hand side (1 screw)). At the right hand side there's a 2 pin plug that goes into the AC block. Test for continuity between the 2 pins on the fuser. If it's open, then it's either the fuser lamp or the overheating-protection thermal switch that's open. It's pretty easy to trace the connections and test them separately if you can figure out how to dismantle the fuser (I can talk you through it).

If the fuser is OK, then remove the outer plastic casing, and the AC block under the upper fan [at the right rear of the printer. Remove the two screws securing the black plastic ozone filter housing, pull that housing straight up and off. Three vertical screws secure the base, plus one horizontal one on the outside rear. Then pull the AC block straight up. The fuser must be removed prior to removing the AC block].

Most of the time the thing that fails is the Triac, Q101 on the lower board in the AC block. This means the fuser can't heat up.

Here are a few notes on what goes on in the AC block (totally unofficial, BTW).

Lower board:

R101, L101, C101, C102, C103 form a mains filter. The output of that goes to CB1 (circuit breaker) with VZ1 connected across the output of that lot as a spike suppressor. The output of that goes to the 2-pin plug (J104) and thence to the DC power supply. Watch out for J104 if you run an AC block out of the printer as it carries live mains.

The fuser control circuit on the lower board isn't complex either. The live side of the mains (output of CB1) goes to T101 (current sense transformer) primary. The other side of the primary goes to the contacts of RL101 (fuser protection relay). There's a snubber SQ101 across the relay contacts. The other side of the relay contacts goes to one pin of J103 and thence to the fuser lamp. The other pin of J103 (and thus the other side of the fuser lamp) is returned to the neutral side of the mains via the triac Q101. This is triggered by SSR101. Oh, there are a couple of resistors (R102 and R103) in the triac gate circuit, and suppression components L102 and SQ102.

There's a 10 pin connector between the lower board and the upper board. The pinout seems to be:

Pins 1,2 T101 current sense transformer secondary
Pins 3,4 RL101 relay coil
Pins 5,6 Solid State relay (SSR101) input (6 +ve)
Pin 7 Fan control

```
       Pin 8 Fuser drive from the DC controller
       Pin 9 ground
       Pin 10 +24V (input)

       The last 4 pins are connected to the 4 pins of J101 which is connected to the
       DC controller. Shouldn't be hard to trace those.

       Upper board:

       This virtually never fails, so I'll simplify the description by missing out
       resistors, etc. You can trace the signal flow from this description anyway.

       The fan control is trivial - the fan control input drives Q159 with the fan as
       the collector load.

       The fuser control signal is AC coupled (C157) to Q157. The output of that is
       rectified/smoothed (D157/C156) and drives Q156. The collector load of Q156 is
       SSR101 on the lower board.

       There's also a protection circuit, which works as follows. Normally Q153 is on
       which turns on Q152 and Q151. This turns off Q155 which has the protection
       relay as its collector load.

       If the fuser control circuit fails so that Q156 stays on too long (which would
       cause the fuser to overheat), then C153 is discharged by D155 and the
       collector of Q156. This turns off Q153, Q152, Q151 and turns on Q155,
       energizing the protection relay and turning off the fuser.

       If the fuser takes too much current then the output of the sense transformer
       T101 becomes large enough to trip the comparator IC151 (LM393). This turns on
       Q154 which discharges C153. The rest of the circuit operates as above.
```

6.16) HP Laserjet error code 51

```
       "On self-test, pulls in paper, pauses, indicates "51 err."  Then pulls
        paper through mechanism while "02 warming up" is displayed.  Nothing
        prints, except for 2 horizontal black bars about an inch apart with
        grey in between them, about 1/3 from top of page.  Since we stole this
        fair and square, and since we have a number of good (but _not_ laser
        printer) techs around, I'm wondering where we might dig.  The book
        simply says error 51 means we should call HP service."

       (From: Tom Dunn (dunnt@cco.caltech.edu)).

       Error code 51 indicates loss of laser beam for over 2 seconds.  Check -5 V,
       also make sure there is no interlock mechanism damage, and +5 V at J451-1 on
       Laser Drive PCA. You may need new laser unit.  Good hunting.

       (From: John Holcepl (john_holcepl@nls.net)).

       This is a very common error on a HP Series II. An error code 51 is loss
       of beam detect. The cause is a bad cable between the DC Controller and
       the laser/scanner assy. P/N RG1-0908-000CN.  Sometimes just reseating the
       cable will make this error go away but it will come back eventually.

       (From: Eric Liber (liberes@westinghouse.com)).

       Here is the description of the possible 51 errors:
```

51 ERROR (Loss of Beam Detect)

  2686 Only:

    1. Bad laser unit or improper laser power setting.

    2. Replace Laser Diode Assembly.

    3. Replace Scanner Assembly.

  II, III Only:

    1. Replace Cable, Laser/Scanner to DC Controller cable (P/N RG1-0908-000).

  II, IID, III, IIID Only:

    1. Inspect the Fiber Optics Cable for cuts or kinks.

    2. Replace Laser/Scanner Assembly.

    3. Replace DC Controller.

  IIISi/4Si Only:

    1. Visually check or replace toner cartridge.

    2. Inspect Fiber-Optic Cable between Laser/Scanning Assembly and DC
       Controller.

    3. Reseat connectors J002 on the DC Controller and J601 on the
       Laser Drive PCA.

    4. Replace Laser/Scanning assembly.

6.17) HP LaserJet II bad bearing sounds

This also applies to many other laser printers using the Canon SX or similar
print engine.

"Developed frequency-changing whine of bad bearings. Not really sure whether
 a fan motor or main motor."

(From: Tony Duell (ard@p850ug1.demon.co.uk)).

A service manual probably wouldn't be a lot of help. The SX printers (HP LJII,
Apple Laserwriter 2, etc.) are very modular, and AFAIK, the official way to
repair them is to replace the defective module. Of course it's possible to
repair them at a much lower level than that, which is what I do to my pair.

There are 3 motors:

1. Lower fan. A tangential blower in the lower case next to the DC controller
   (Engine controller) PCB. This runs all the time that the printer is turned
   on. (Maybe the cover needs to be closed - I can't remember which 24 V line
   it runs from)

2. Upper fan. This sits on top of the AC block in the rear right corner (near

where the mains cable plugs in). It runs when the machine is printing, and drops back to a slower speed when the machine is idle.

3. Main motor. This is a stepper motor that drives all the mechanics in the printer through a gear train. Needless to say it only turns when the machine is actually printing.

By finding out when the noise occurs, it's possible to figure out what is causing it.

Firstly the good news. I have never had a main motor bearing fail. They're ball races anyway (Yes, you can strip the motor down and rebuild it). I've never had noise from the gear train either.

Now the bad news. Fan failure is common. The bearings are bronze bushes, and they fail. Sometimes lubrication helps a lot, sometimes things are just too far gone.

Lower fan. Remove the toner cartridge and paper tray. Turn the printer upside-down and remove the screws that hold the base cover on. Remove the cover. The fan is obvious, and is held down by 4 screws (there's a bracket at one side that comes off as well), and it plugs into the smaller of the PCBs in the machine. Remove it. You can then unscrew the motor from the fan and slide the motor + blades out. Then pull the blades off the motor, remove the circlip, and pull the motor apart. Examine the shafts and bearings. If they're not too badly worn, a drop of oil (3-in-1 or similar) will probably cure the fault. Otherwise you need a new fan - parts are impossible to obtain.

Upper fan. Remove the paper tray and toner cartridge. Undo the screws and remove the outer casing. Remove the 2 screws and lift out the fan duct + ozone filter (on top of the AC block). The fan is under it and is held down by 3 more screws and a 2-pin plug on the upper (fuser protection) PCB in the AC block. There are at least 3 different upper fans in use, so I can't give directions for dismantling them. But in general, the motor can be unscrewed from the side of the fan, and the bearing on the other side pulled out. Inspect them as above, and try a drop of oil.

Editor's note: If you buy a replacement for this, it will likely be a 24 VDC muffin style fan (like in your PC, except that is 12 VDC). HP or Apple will likely charge you $70 or more for this part!

(From: Frank Reid (reid@indiana.edu)).

If the upper fan fails, the fuser assembly will overheat and do about $200 damage. Cleaning the bronze bushing often solves the problem.

An obscure and obnoxious squeak sometimes comes from the anti-static brush on the end of the upper fuser roller (end opposite drive gear). A bit of high-temperature grease on the nearby felt pad will fix it.

6.18) HP LaserJet II triac replacement

(From: John (jneff@uidaho.edu)).

We have been replacing these with a SK10466 (800 V, 8 A, Vgt 2 V, Igt 50 mA).

(From: dhickey@knox.edu).

If it is in the AC Powersupply, try a NTE 56006.

Also check for 2 open resistors.

6.19) HP LaserJet Series II intermittent

"My new (to me) HP Laserjet Series II printer seems to have a power supply
 problem, although its previous owner said his supplier/servicer suggested
 the problem was 'probably due to a fryed mainboard' and promptly sold him a
 new printer. Lucky me. :-)

 It works fine for a while, then starts to cycle between "12 Printer
 Open" and "00 Ready" before the fan in the power supply area drops in
 speed at the same time. I notice that the lamp on my desk flickers
 occasionally, even when the printer shows "00 Ready". Tapping the
 cover at any time immediately brings on the "12 Printer Open" message
 and fan speed drop-off. The cycle eventually ends with a "67 Service"
 message."

(From: Larry Sabo (lsabo@freenet.carleton.ca)).

The cause of the problem was an intermittent connection in the DC power
supply, where the daughter board is attached to the pcb with a right-angle
connector. I got so tired of removing and reassembling the power supply,
I just jammed an empty plastic scotch tape role to hold it in position, and
it has worked like a charm ever since.

6.20) HP LaserJet IIP with 12 Open or no EP error

"I have tried to reseat the EP-L cartridge and opened and closed the fuser
  door many times, but can't seem to get this printer to work."

(From: Terry (tmredding@worldnet.att.net)).

Sometimes the spring tabs on the left side of the printer that are the sensor
for the cartridge get bent or are dirty. Also you get this error if the fan
is not working.

(From: Dave Lee (leedj@uwec.edu)).

Most times I find that its the Density PCA that causes the problem. Sometimes
its just dirt/dust in the two sensors on the right side above the toner
cartridge, blow these out and give it a try. Density Board is avail through
most laser parts houses, these are the ones I use:

* Global Printer Services, Phone: 800-588-3554
* Parts Now, Inc., Phone: 800-886-6688
* The Printer Works, Phone: 800-235-6116

6.21) HP LaserJet IID Error 13

(From: John H. Meyer (John_Meyer@compuserve.com)).

(I finally found the cause of the problem described below: One of the voltage
outputs on the main power supply was blown. Had the power supply refurbished
and everything works perfectly.)

"LaserJet IID gives Error 13 message immediately upon warmup. (This is
 paper jam message.) The paper path, however, is totally clear. I've
 taken things apart and cleaned the exit sensor and paper path. Unit is
 quite clean. I've downloaded information on Error 13 and have tried
 everything except replacing DC controller card ($200-$400 part). I took
 the unit to two different repair places. One tried swapping out the
 fuser assembly -- that didn't help, and that was all they were willing
 to do for their free diagnosis. MicroAge charge me $$ for a few hours
 troubleshooting and tried swapping out the main motor. No help. They
 also claim to have electrically checked the exit sensor. They said that
 the only thing left was to replace the DC controller card, but they
 didn't have one to swap in, so I'd have to pay up-front for the card.

 I didn't do this. Instead, I took the unit back home and pulled the DC
 controller card. I tested all the discrete parts (simple diode tests on
 the transistors), and they all test OK. Two questions:

 1. Does anyone have other suggestions of things to try?

 2. Does anyone have a recommendation on where else to get a DC controller
    card for less money?"

(From: Dave Lee (leedj@uwec.edu)).

Had almost the same problem about a year ago, problem was the AC Power Module,
just needed reseating. ACPM is located in right rear corner, just under ozone
filter and upper cooling fan. Fuser assembly must also be removed to get to
one of the 4 screws that hold the ACPM to frame. Remove the ACPM and then put
back in place, thats all I had to do. Has been working since Feb 1995.

But another thought about this, are you sure that something isn't jammed where
paper from botton tray comes up just in front of the registration assembly.
If you remove the reg. assembly, there is a clear plastic guide that is held
in place by 2 screws. Remove this and check to see if maybe something is
jammed by that sensor.

As far as a good price on DC Controller board, I would call Parts Now, Inc. at
1-800-886-6688 or The Printer Works, 800-235-6116.   I know that Parts Now
sells either repaired or used or exchanged boards, probably a LOT less than
what you were quoted.

(From: John Meyer (john.meyer@worldnet.att.net)).

Thanks for very complete reply. Your message sparks a lightbulb. When I first
took the cover off when this problems initially surfaced, I took the power
unit apart from the top (took of the little fan, and then started disassembling
it). When I put it back together, things worked. I then put the top main cover
back on, and things didn't work again. Nothing has worked since. However, I
never took the whole assembly out and therefore never got to the connector.
I'll try this and let you know what happens.

I don't use the bottom tray because the bottom paper path is prone to jamming,
and has been for years. However, it is possible that someone (I have a four
year old boy) may have jammed something in there. I have looked for such a jam

and haven't seen it, but based on your input, I will try again.

(From: Dave Lee (leedj@uwec.edu)).

As far as the jamming from bottom tray goes, 2 areas to look at:

1. Remove the registration unit, its the first assembly inside the printer.
   Open cover, its the part with the hinged assembly with a small green
   handle. (Not the fuser, this is right inside the printer). Remove both
   paprer trays, registration assembly is held in by 4 screws. Under that
   is clear plastic guide held in by 2 screws. Remove this guide, and you
   should be able to inspect path from bottom tray for an obstruction. Also
   check the clear plastic guide, something may be caught in the guide.

2. Paper pickup roller for bottom tray may be glazed or very dirty. Clean
   with damp rag (water will work) although some "Fedron" cleaner is best but
   hard to find.

Do this after you get the error 13 fixed so you don't compound the problem.

6.22) HP LaserJet IIP and LaserJet series 2 error code 52

"I have a HP LaserJet IIP, which does not print, but displays Error Code 52.
 Don, a man who is willing to help me fix mine, has a HP LaserJet series 2
 that works. How similar are theses two machines? Is there any chance that
 one can swap parts to find the problem?"

(From: srob@iprolink.co.nz and Michael Schuster (schuster@panix.com)).

Totally different. Different cases, electronics, toner cartridge and system.

(From: Lewis King (echo@infogo.com)).

Error code 52 is 'Scanner Malfunction' and there have been posts here that
indicate that this is fairly common and is usually the cable leading to the
scanner mechanism. These printers, and the CX before them, use insulation
displacement connectors. Quite often the connection gets flaky and pressing
down on the wires where they enter the connector will fix a problem (worked
on my Xante Accel-a-writer when it was telling me I needed a new DC
controller board).

The part you need is the scanner motor... I can't remember the part
number, but it is the same as the scanner motor for a IIP+ and a
IIIP. The scanner motor has three screws holding it in, in the box
where the laser attaches to the side. As you pull off the scanner you
will notice a square microprocessor on it's board. the bottom side of
that board will probably have a dark spot where that processor got too
hot. I fixed about 50 of them that way.

I will find out what the error code means and get back to you.

(From: Tony Duell (ard@p850ug1.demon.co.uk)).

That sounds like the classic scanner motor failure on these printers. It's a
very common fault, alas.

The 'Official' repair is to replace the scanner assembly (the entire unit -
the black plastic box - on top of the printer), and if that fails to cure it,

then change the DC controller board. But you can normally fix it a lot cheaper
than that.

Here's how (I believe) the unit should work:

There's a frequency generator (FG) coil on the motor PCB, just like the one in
a VCR. The signal is fed down the cable to J203 on the DC controller and then
converted to a TTL signal by IC202A (LM393 comparator). It enters the gate
array (IC206) and comes out again when it is fed to a TC9142 chip (IC203)
which compares it to a reference clock also from the gate array. The error
output from the PPL is conditioned by IC201b (LM358) and fed back to the
scanner motor. There is feeds the control input of the TA7259 (IC401) chip
which drives the motor windings.

First check that the cables are connected to J203 and J401 (inside the scanner
unit). The most common fault is that IC401 has failed and probably burnt out
R401 (8R2) with it. Fortunately, this chip is not custom - in the UK it's
available from (e.g.) Grandata, so a VCR spares place might have one.

If you've still not got it working, get back to me, and I'll talk you through
the test points on the PLL on the DC controller board. Hopefully the gate array
is still good, since I've not found a source of those.

Oh yes, how to dismantle the scanner to replace the chip.

Firstly remove the outer casing from the printer. Then unplug the 2 cables on
the scanner unit - one on J451 (on the laser PCB) and one on J401 (under the
little flap on top). Undo the clamp screw in the back right corner, swing up
the clamp and remove the beam detect fibre cable. Then remove the 4 screws
and lift out the scanner unit.

Now, *carefully* cut back the melted-over studs and lift off the top
cover. Keep dust to a minimum (obviously). Remove the circlip on the scanner
motor spindle on the bottom of the unit. Remove the rotor and hexagonal
mirror, taking care to note where all the washers go. Remove the small screws
and lift out the PCB.

6.23) HP LaserJet IIP printer error code 12

(From: Michael (action@netdoor.com)).

Your problem is likely to be the "Density Control PCB" that if you had the top
cover off the unit, it would be a little board with a lot of wires (mainly
purple, I think) going to it. It is in the front on the top.

About $40. Not saying that's it for sure, but I've seen it three times in the
last 4 months.

(From: Frank Reid (reid@indiana.edu)).

I agree, but it could also be the assembly of photoelectric sensors and
their wiring harness (about $25). Before replacing components, clean the
sensors with compressed air and re-seat their connectors on the dc
controller board.

6.24) HP LaserJet IIP error code 51

```
"I have here a HP Laserjet IIP which gives errocode 51. The manual
 says something about a beam-detection. Do you guys 'n girls think this
 is to repair for relatively little money?
```

(From: Osceola Electronics (osceola@netonecom.net)).

```
On my IIP+, I had to take it all apart.  I had to remove the main board and
open the main cover to the laser area and clean the fiber-optic pickup and
lens.
```

6.25) HP LaserJet III powers on but appears dead

```
"When I flip the power switch on, I can hear it power up, but the none of the
 lights comes on and the LED panel is also dead."
```

(From: David J. Pittella (ddc_pitt@ix.netcom.com)).

```
Since you say the unit 'powers up', I assume you hear the engine power up (fan,
drive motor, etc).  Assuming this is a Lajerjet III (not IIIp or IIIsi, etc.),
you can do an engine test by removing a small cover on the bottom of the right
side, removing this cover will expose a metal plate with a hole in it. The hole
exposes a switch on the DC controller which will print simple line test
pattern.  This will at least confirm that the engine is working.

The front panel LCD display and status LED's are driven by the formatter board.
The formatter gets its +5 power from the DC controller via (2) screws that
secure the formatter to the CD controller.  If you remove the bottom plastics
and bottom pan, the formatter is the large main board. The DC controller is the
smaller board with several connectors attached to it.

I am also making the assumption that the cable leading from the formatter to
the front panel is attached at both ends?

You may also want to remove any options, (memory, optional I/O) as one of these
options could be preventing the formatter from initializing and possibly lead
to a blank display. BUT, the best guess here is that the formatter is not
getting power  - check those screws between the DC controller and formatter!
```

6.26) HP LaserJet III paper jam

```
"I have two LaserJet IIIs that complain about a paper jam on power up,
 right after the self test (i.e. before I've even had a chance to send
 anything to the printer)."
```

(From: Terry (tmredding@worldnet.att.net)).

```
The most likely cause of this problem is the exit sensor arm or
photointerrupter or the dc controller board. Standing in front of the
```

printer with the top cover up it will be in the far left lower corner.

6.27) HP LaserJet III fuser overheating

(From: Glenn Allen (pclogic@xtra.co.nz)).

I had the same problem on my HPII. I traced it to D155 shorted on the Fixing
Heater Saftey PCB , this is in the same casing as the AC Power Assembly where
the power cord plugs in. There was some sort of corrosion there.

I replaced it with a IN4148 diode as it is only a signal diode.

6.28) HP LaserJet III error 50

"My HP Laserjet III is giving a "50 Service" error. So something is wrong
 with the fuser. But the lamp is not burned out. Also, the fuser roller is
 pretty clean.

 When I turn on the printer, the light in the fuser comes on for a second.

 Then there's a click from the power supply (or around there), and the light
 goes off.

 The 05 Self Test message comes up.

 Then Warming up. (takes a while)

 Then, both online and page feed lights go out and "50 Service" appears.

 The power supply and fan are working and the ozone filter is clear."

(From: Geir Knutsvik (geirk@netpower.no)).

What about the fuser? Does it make heat? I have in some cases have faulty
opto electronics for sensing paper and drawers result in Error 50.

In worst case it cold be the main pcb ...expensive... check dc controller.

(From: Mark Wolfe (markw@wwa.com)).

5 bucks says it's Q101 in the power supply (crosses to NTE 5620). I've seen
quite a few where this was the problem.   Check the power connector at the
right end of the fuser, it's under a plastic cover.   There should be about
115 VAC there during the warm up, you'll have to stick something in the cover
open switch to get it to power up.   If there is 115vac, it's the lamp in the
fuser. If there isn't 115, it's save to say it's Q101 which is the triac
that supplies the fuser.   Get a new heatsink with the new triac. Cost here
with tax to fix the problem is $7.07 + my labor. :)

(From: Terry (tmredding@worldnet.att.net)).

This error can be caused by missing 24v, bad Thermistor, Fuser Bulb or
Thermoprotector. Replacing the fusing assembly is quite easy

by removing the 4 silver screws that secure it.

6.29) HP IID error code 50

(From: Tony Duell (ard@p850ug1.demon.co.uk)).

A problem on the DC controller (in particular C210) can cause intermittent
ERROR 50's

Mechanical failures of the fuser will not cause ERROR 50 (AFIAK). After all,
the fuser temperature is maintained even when the mechanism is not turning. A
broken gear in the fuser will cause paper jams, but not much more.

If you've got the machine in bits on the bench, and you are *sure* the fuser
is not overheated, try shorting C211 on the DC controller board momentarily
with the power off to clear the error.

6.30) HP LaserJet IIP+ error code 50

"My owners manual tells me that if this error persists after a 15 minute
 power interruption then service is required.
 Is it feasible for me to perform this service myself?
 What is the risk factor that my printer will be FUBAR if I attemp this?"

(From: Don Hickey (dhickey@knox.knox.edu)).

It could be one out of a number of items that are actually bad. Most likely
it is the fuser assembly. However it could also be the Ac Power Supply, Dc
Controller or the cable going from the fuser to the dcc. Most of the time
the lamp on the fuser burns out or one of the thermal switches.

(From: (Frank Reid (reid@indiana.edu)).

Test for continuity through the large terminals on the fuser. That will
tell you if the lamp and thermostat are good. If they are, then the problem
is in the AC power supply (cubical box under the upper fan). Remove the
printer case, observe the fuser lamp upon power-on. If it lights immediately
and then goes off with an audible click, the triac in the power supply
is shorted. ECG 5620 is a replacement. Be careful desoldering the plated-
through holes.

6.31) HP LaserJet IIP - 52 error

"The problem with the machine is as follows:

  1. I bought the printer used from friends a year ago. They sold it because
     the printer would crash when they sent it a large print job. I do that

very rarely, and thus this happened very infrequently. I would just shut
off the power and then turn it back on and it would print the same job
just fine.

2. In December the printer would go through the initial diagnostic routine,
   but when the first print job came it would at first sound fine, but then
   make a longish whining noise and then display the error message "Printer
   Error 52" (I looked that up in the Users' Manual: "This error message
   indicates a scanner malfunction.") I reset the printer, and then it would
   work fine.

3. The problem as described in 2) gradually occurred more frequently: I would
   have to reset the printer several times for it to print. After it started
   to print it would work fine until I turned the printer off for some time.

4. Finally even after letting the machine warm up for hours it would not
   print at all, even though it went through the diagnostics on power-up.

5. Model Number of the laser printer is: HP33471A, manufactured: April 1990
   Serial Number: 3049J01EOB

(From: Charles Kyle (kyle@citynet.net)).

I have repaired a lot of the HP IIP printers with error 52. It has
always been the scanner motor assembly. The assembly can be repaired
by replacing the motor driver IC and possibly a burnt resistor or by
ordering the scanner motor assembly.

Laser Impact carries the scanner motor assembly for the HP IIP. The
part # is RG1-1771-000. it is easy to replace and costs about $60.
Their phone number is (800)879-5882.

"I have a HP Laserjet IIP printer that no longer works and I need some help
 diagnosing. The printer does not print any text pages but instead gives an
 error 52 on the LCD screen. The owners manual says that an error 52 is a
 scanner malfunction. However the authorized service center said that this
 error was a memory error. The cost of having them fix the printer is more
 than the printers worth."

(From: Rich (richcar@flash.net)).

The service center gave you the wrong info. It is a bad scanner motor or a
bad dc controller. I have found, that on a lot of laser printers for this
error and others, that if you re-seat all connections internally, to all
PCB's, the problem will go away. (About 50% of the time) If this doesn't work
you can check the voltages on the dc controller itself. The dc controller is
the PCB under the formatter, (If you were looking down on top of the printer)
and directly above the scanner assembly.

J212 on the dc controller:

Pin 1: Gnd (blue)
Pin 2: Gnd (blue)
Pin 3: +24 * (red)
Pin 4: +24 * (red)
Pin 5: Gnd (blue)
Pin 6: +12 (orange)
Pin 7: Gnd (blue)
Pin 8: +5 (brown)
Pin 9: Data signal (yellow) (shouldn't matter)

* Paper path door closed or pwr supply interlock defeated

These are the voltages the dc controller uses. (From the pwr supply)

```
The scanner assembly. is the most expensive part and on exchange you can get
one for about $150-200. But don't quote me on that.  Contact Printer
Works or PC Service Source to find out.  I don't have their numbers but
you should be able to get them from the 800 directory. 800-555-1212
```

6.32) HP Laserjet IIP error 52 - chip replacement

```
(From: Jon Fick (fickpci@aol.com)).

I was finally able to fix the printer by replacing the chip on the scanning
motor board rather than replacing the whole board.  That's a $10 fix rather
than a $80 fix!

The surface-mount chip and an associated surface-mount resistor apparently run
hot in this application, and over time, darken the back of the printed circuit
board.

* The resistor color bands indicate that it is 1 ohm.  It measured 0.8 ohm so I
  left it in place.  I was able to obtain some data sheets for the chip.
  Although the data sheet diagram is written in an oriental language it appears
  that the resistor could indeed be a low value in that location so I didn't
  change it.

* The chip part number is HA13456AMP.  It is a surface mount device, a quad
  package.  It's leads are meant to be soldered, not plugged.  With Solderwick
  and a small iron the old chip came off easily.  Be careful of the heat,
  though, because it appears that the surface of the board can become slightly
  delaminated.  I also used a stereo microscope so I could be exacting as I
  applied the heat.

I covered the scanner rotor before attempting anything because I didn't want to
have to clean the mirrors afterwards.

I also have the same chip in a different package that might actually be more
robust.  It is the HA13456A, a long DIP package with triple-width ground tabs
in the middle of each side.  It is electrically equivalent from what I can tell
and might be a good substitute if the flat pack fails early.

The printer came right up, and self test immediately printed two pages!

The chip came from: B & D Enterprises International, PO Box 460, Main &
Liberty Streets, Russell, Pennsylvania, 16345.

Their worldwide number, as well as tech support (really helpful) is:
814-757-8300 (800-458-6053 in the USA).

Their 24-hour fax number is: 814-757-5400

VISA, MASTERCARD, AMERICAN EXPRESS are accepted worldwide.

Each chip was $7.55.  They have a $15 minimum order, so I ordered two, partly
to make the minimum order, and partly to have a spare.
```

6.33) Laserjet IIP PS board

(From: Brian Mathews (icontech@volcano.net)).

I have repaired many of these power supplies and I usually replace the triac,
two resistors (22 and 150 ohms?) and the eight pin DIP (usually marked SHARP).

6.34) HP LaserJet III Problems

"This LaserJet III has me stumped. It has a persistent error 50. I tried
 everything in the service manual, but to no avail. If anyone has an idea
 how to fix this, it would be most welcome"

(From: Ted Szypulski (szypulsk@esslink.com)).

Sounds like an open fuser lamp, like mine was. I have an LJ4. HP
would only sell a rebuilt fuser assembly. My cost was $150.00. The
fuser assembly on the 4 comes out the rear real easy. There are two
captive screws to loosen and then it just unplugs. I removed mine and
took it to another LJ4 just to be sure that was the problem before
buying a new one. My testing with an ohm meter also proved the fuser
lamp was open.

I hope the LJ3 is similar and this is of some help.

6.35) Shifted print on HP LaserJet III

"The LaserJet III in my office has acquired the annoying habit of shifting
 its printed output about half an inch down on the paper. This sometimes cuts
 off the page numbers. It typically will never happen on the first few pages.
 Once shifted, it stays that way, until I turn it off. I'm kind of clueless,
 the manual doesn't mention anything like this."

(From: Frank Reid (reid@indiana.edu)).

Replace the pickup roller. Clean the transfer rollers with naphtha or
mineral spirits. If that doesn't work, replace the transfer assembly
(set of metal and rubber rollers after pickup roller; removable by 4
black screws). Inspect the solenoids on the DC power supply: The
rubber pads sometimes become sticky and hold onto the armatures, thus
messing-up the timing. If that happens, scrape the old pad off, clean
the armature and core with solvent, and replace the pad. I use squares
of double-sided foam tape and then use naphtha to remove the glue from
the outer side. If you remove the old pads but don't replace them, the
printer will be more noisy, and permanent magnetism in the solenoid
cores may affect timing.

(From: Joop van der Velden (joopv@solair1.inter.NL.net)).

Two possibilities: a mechanical problem with the paper transport, or a
escape sequence reprogramming the printer paper format(ting)

```
Try to print some test pages from the printer itself (no pc connected)
If that gives the same problem, try cleaning the paper path and transport
an paper separation mechanism.
```

6.36) Paper jams on HP LaserJet IIIP

```
"More and more I get HP Laserjet IIIP printers here with all the same
 problem: 13 Paper jam. Every time I look at the driving-mechanism and
 move it with my hand, but it all seems to work fine. I suspect there's
 a common cause to all this. I think it's got something to do with the
 electromagnet in the tray, but I'm not sure."
```

```
(From: Frank Reid (reid@indiana.edu)).
```

```
If the paper is getting crunched accordion-style, the 'drum-drive clutch'
is probably broken.  It's a couple of small white gears inside the
right-side cover of the machine.  The plastic tends to crack in a ring,
separating the gear from the shaft.  To confirm, mark the green drum in
the toner cartridge:  If it doesn't turn, then the clutch is surely at
fault.  Apple "Personal Laser Writer" and some other brands use the same
print-engine.
```

```
If the machine won't pick up paper at all but the pickup rollers are good,
look for a bent piece of metal preventing movement of the bar that raises
the stack of paper just prior to pickup.
```

```
A third possibility is stripped plastic gears on the fuser assembly.
```

```
(From: Lars Arvidsson (arvid@plea.se)).
```

```
My guess is the paper intake rubber reel, you see it if you pull out
the paper tray. It gets old and dry, and it needs to be sticky
to get a grip on the sheet. It gets worse at dry weather, cold and dry.
Try to clean it with alcohol, then coat it with some balsam turpentine
(don't know if this is the right translation, it's a liquid used for
diluting artist oil paint).
```

```
Allow it to be absorbed for a few hours, then wipe of the excess.
The reel is sticky again...or just replace it - but that's no fun. ;-)
```

```
(From: Rick Norton (RKNORTON@worldnet.att.net)).
```

```
I repaired an HPII with a similar problem using automotive belt dressing on
the rubber pickup surfaces.  Spray a small amount on a rag and wipe on
surface. Allow to dry for 15 minutes. The printer has been working for 3
years without a problem.
```

```
(From: Dr. John Betts (Dr@browser.demon.co.uk)).
```

```
Don't ignore a more mundane cause - that paper is stuck inside the fuser,
particularly if someone has used inferior grade labels.
```

6.37) HP Laser Jet IIIP Power up problems

(From: Pete (PTCull@lbl.gov)).

"I have a HP Laser Jet IIIp, The problem is when it is switched on, the
 printer can do one of two things; the panel lights up and displays 05 Self
 Test and then switches off after around 3 Seconds, and other times nothing
 happens at all."

If you have a voltmeter, J212 on the DC Controller is a good place to start
checking. Blue wires are earth/ground, brown is +5VDC, orange is +12VDC, and
the red wires have +24VDC.

However, it sounds like a nice time for known good spares or another known
good LX engine to borrow known good assemblies from.

6.38) HP LaserJet IIIP - error code 52

"I have inherited a dead HP LaserJet IIIP printer and would like to hear
 your thoughts on its chances.

 The machine goes through its warm up routine OK but if I do an internal
 font printout or print from a PC then it sits quitely for about ten seconds,
 then raises in pitch for a second and simultaneously displays: 52 ERROR.

 The manual states that this error is a 'scanner fault'.

 I have dismantled the unit down to the laser and rotating mirror but can see
 no obvious faults. Perhaps the motor that drives the mirror is burnt out or
 the laser is dead??

 HP have quoted me a repair price equivalent to a new Oki!!!

(From: Frank Reid (reid@indiana.edu)).

That symptom can often be cured by re-seating the cables between the laser
assembly and the dc controller (smaller board under bottom cover). Also
check the optical fiber running from the laser scanner housing to the dc
controller: Sometimes it goes bad or the end gets dirty. If you can shine
a flashlight through it, it's probably ok.

(From: Ralph Wade Phillips (ralphp@prysm.net)).

About 50% dead laser and 50% bad DC controllers (photoreceptor
dies, or interface chip it drives is dead ... gives SAME error!)

Without a spare printer for parts, it'll cost you about a new
printer for parts ... sigh.

(From: John Fiskio-Lasseter (johnl@yin.earlham.edu)).

Not necessarily. There are a number of places where you can simply buy
the parts themselves, often refurbed - even a DC controller and laser
assembly together would be cheaper than getting another printer.

Adam, at a guess, I'd say that you really are looking at a failed
laser/scanner assembly. Of the possible causes, that's the part that gets
the most wear and tear, and the most likely to fail under normal operating
conditions.

A few places to try for parts:

Hewlett-Packard: Part # ID: (916) 783-0804, Sales: (800) 227-8164.

The Printer Works: (800) 235-6116.   (These people have the coolest catalog
                                       in the business!)
Laser Impact: (800) 777-4323

Both PW and LI will do repair, parts sales, and exchange parts sales, and
you may find them a good bit cheaper than Hewlett-Packard.

Also note that the engine parts from all other HP LaserJet II's and III's
are interchangeable with yours. So are the engine parts (except the DC
controller) from the Apple LaserWriter II printers. Other printers based
on the same Canon SX engine are: QMS 410, Brother HL-8e, and several
others that I can't remember off the top of my head.

(From: Steve Pepin (steve.pepin@mogur.com)).

You may not need to dump the printer or even pay for a new scanner assembly.
I had exactly the same problem with mine and it turned out to be only the
cable that attaches the scanner assembly to the main PCB. It's only a $28
part and you can possibly simply repair the one you have. I don't know how
mine failed, but that is what our local HP service center replaced.

(From: Frank Reid (reid@indiana.edu)).

Correct! I repair at least 100 of those things per year. The connections
fail far more often than the $canner. The problem can usually be solved
by removing and re-seating the connectors on both ends of the cables that
connect the scanner and laser to the 'dc controller' board (smaller board
under bottom cover).

(From: TAltmeyer (taltmeyer@aol.com)).

Sometimes the driver-IC for the mirror motor is defect. It's a circuit from
Hitachi HA1XXXX, i can't remember the number exactly. A half year ago
i had such a printer with error 52 and i replaced the chip and all was fine.

The chip is a little bit difficult to get but if your're encouraged enough
you can get it (after a lot of telephone talking) from your local hitachi
distributor. It's much cheaper than a complete unit :)) . The scannerunit
itself was made by Canon (as the complete printerdrive is made by Canon)

6.39) HPIIIsi - 'User Maintenance' message?

"What cause a working HPIIIsi coming up with 'User Maintenance' message
 in the lcd window. If you pop up the cover and reclose, the message goes
 away and printer keeps on printing fine."

(From: Jim Hunt (jhuntjr@b-c-i.com)).

I believe this is the message you get after printing 200,000 (I might be
wrong) copies which is a reminder to replace the fuser unit. This comes in
a kit with new pickup rollers and several other pieces. It is pretty easy
to replace

6.40) HP LaserJet IV - intermittent error code 50

(From: Brian Mathews (icontech@volcano.net)).

I have seen this problem quite a few times and I check the fuser lamp to
find it was manufactured by USHIO. After replacement with a Toshiba lamp
(not an endorsement, just what the supplier sends) the problem is gone. I
haven't ever had this problem and not found that brand of heat lamp in the
fuser......

6.41) HP LaserJet 5 SIMM codes

(From: David B. Gustavson (dbg@SCIzzL.com)).

Here are the empirically determined SIMM codes for the HP LJ5:
(o for open circuit, g for grounded jumper)

```
Pin 70 69 68 67
    o  o  o  o  treated as an empty slot
    o  o  o  g  53.00.02 error
    o  o  g  o  53.00.02 error
    o  o  g  g  53.00.02 error
    o  g  o  o  53.14.03 error
    o  g  o  g  16 Meg RAM
    o  g  g  o  2 Meg RAM (=LJ5 70ns)
    o  g  g  g  4 Meg RAM
    g  o  o  o  53.14.03 error
    g  o  o  g  16 Meg RAM
    g  o  g  o  53.14.03 error
    g  o  g  g  4 Meg RAM (=LJ4 80ns)
    g  g  o  o  53.14.03 error
    g  g  o  g  16 Meg RAM
    g  g  g  o  53.14.03 error
    g  g  g  g  4 Meg RAM
```

Since there are several codes that have the same RAM size, it's possible
that they correspond to different RAM speeds or other differences that
might matter. I connected my $129 16MB 70ns 32-bit-wide 72 pin SIMM in
the g o o g pattern, and so far it seems to work OK.

If anyone has more info, such as speed or other characteristics that
ought to match the ambiguous codes, I'd be very interested.
Some of these codes correspond to the RAM/ROM PostScript SIMM, but
those seem to be driven from a logic array and might have more
complex behavior. In particular, no static code was interpreted as
such a PS SIMM, but that might be because it already found one
in another slot.

With a duplexer, the LJ5M barely functioned with the original 6MB RAM,
had to run it at 300 dpi or it would just not bother to duplex.
Borrowing 4M from my old LJ4M raised it to 10M, which raised the
performance ENORMOUSLY. 16M raises it to 22M, which is surely major
overkill, but for $129+tax at Fry's, why go for less.

```
So far the software on my Mac is refusing to control the duplexing
features, e.g. the "which edge is the binding edge" choices are
always disabled, but turning it on at the printer works (unselectively).
But maybe this is due to some beta printing environment stuff I'm using.
```

6.42) HP LaserJet random behavior - no ground

```
Aside from surge supressors not being effective (to the extent that they ever
are) without a proper safety/earth ground, here is another example of possible
symptoms:

(From: Leif Gastgivar (lgastgiv@technis.syh.fi)).

I bought a new HP Laserjet 5L printer and I just plugged the printer into
the socket. After a time the printer started to print out pages by its
own. I checked out the manual but I couldn't find out the problem. But
after a wile I find out, that the printer wasn't connected to the
ground. After I fixed the problem, it will have been working properly.
```

6.43) Determining if HP LaserJet partial print problems are scanning or logic

```
This would apply if, for example, an HP-LJ3 prints only left side of the page.

If the boundary is sharp and constant, logic is likely but not always.

If the boundary is fuzzy and/or ragged, blockage in the optical path is more
likely - a label or Post-It(tm) note that escaped, or even a wad of dust or
other debris.

(From: Tony Duell (ard@p850ug1.demon.co.uk)).

Does the printer have an 'Engine Test' switch (a button on the DC controller
PCB on the LaserJet 2, and one on the side of the LaserJet 1)?

This will cause it to print a test page (of vertical lines normally) even
if the formatter board (the thing that translates the incoming data into
a bit stream to send to the laser) is defective.

If you can find such a button (it's hidden on the side of the lower cover
on the Laserjet 2), press it and see what happens. If you only get half
a page, then the fault is almost certainly optical (Check for defective
mirrors, etc as mentioned earlier in this thread). If you get an entire
page of lines, then the fault is in the formatter board. I have no info
at all on any formatters other than the Apple Laserwriter 2NT one, alas

(From: Ralph Wade Phillips (ralphp@gcstation.net)).

On one side of the bottom, there's a cover that can be removed
after removing one screw.  After that, the button is visible through a hole.
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Only push this AFTER it warms up all the way - it's ignored until the engine
is ready!
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6.44) LaserJet IIID and others paper not picked up correctly

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"The printer will print perfectly on both sides if the paper is fed into
 the sheet feeder.  If the paper is fed from either of the paper
 cassettes, the paper not picked up from the cassette.  There is a mark on
 the paper where it appears the roller has been rubbing on the paper."
```

(From: Al Savage (asavage@iname.com)).

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Piece of cake.  Replace the pickup rollers.  You can clean them, but it won't
last.

Now, the bad news: it's not real easy.  Or, like most things, it's really easy
once you've done it a couple of dozen times.

The rollers themselves are about $5 these days, and have been redesigned to
eliminate one problem they used to have: you can't put them on backwards
anymore!

LaserJet IIID: remove all exterior plastic: three screws up top accessed after
opening the lid.  One screw horizontally near AC power cord receptacle.
Release nasty catch of top lid from side plastic at just above AC receptacle.
Try hard not to break top lid while doing this. :)

Now you can access two screws retaining front edge of side panels to front
panel.  Remove two vertical screws holding left side panel to rear of printer
chassis, near fuser.

Unhook front panel operator panel cable, remove front panel assy.

Remove six small screws retaining front chassis subframe to (scanner, HVPS, DC
PS), plus about five larger screws holding power envelope feeder subframe to
front.

Remove DCPS on right front of chassis: remove three vertical large screws (two
in front, one at right rear).  Disconnect main motor harness from DCPS.
Disconnect gray fibre optic cable from black clip at left front edge of DCPS,
or it will be damaged, and you'll add another large batch of screws to
remove/replace!  Then remove DCPS by grasping firmly and pulling straight up.
This takes considerable force, as there are connectors at the bottom that you
are separating.

I recommend removing the registration assy prior to removing the paper pickup
assy, but it can be done without.  To remove the registration assembly, remove
four vertical screws (three black, one chrome, most likely on III series) from
reg assy, which is the part with the green "handle" just inside the paper
path, as you look straight down into the printer.  The left rear (shiny) screw
will likely have a short ground wire under it on a III.  With the DCPS out,
the reg assy will just lift straight out.  Note carefully the bronze ground
lug at the left front of the reg. assy.  It must be rotated forward at
reassembly or the forward black roller (small diameter, 9" long) on the reg
assy won't be grounded, and you'll get all kinds of odd print quality
problems.  Look at it now, BEFORE removing the reg assy, to see how it's
```

supposed to look.

Using long #2 Phillips, remove two small screws retaining the pickup assy (the
shaft with the grey PU roller on it, plus the black or white spring clutch on
the right end of the shaft) black plastic bearing blocks. Lift up PU assy,
slide 2" to right (the reason you had to remove the DCPS), then swing left end
forward to where the reg assy used to be, and remove.

To replace the PU roll: remove E clip on left end of shaft, slide off all the
washers, spacers, etc, noting the order carefully. Roll just falls off!

On reassembly, don't forget to reconnect the main motor's wire harness. One
of my common problems.

If you're going to do the lower PU roll, do it now, prior to reassembling the
top half. Remove the lower side plastic panels -- one horizontal screw in
back for each side. I seem to recall screws in front too, but my memory fails
me on this one.

After removing the sides, remove the E clip on the left side of the lower
pickup assy, then remove the bronze shaft bushing. Don't loose it.

On the right side, remove the three small horizontal screws on the clutch
plate, disconnect the clutch's harness from the chassis harness and harness
hold-down clip, then rotate the clutch plate and slide the lower PU assy out
the right side.

Replacing the PU roll is identical to doing the top one at this point.

Now you know why I charge 1.5 hours to do top & bottom rolls. Plus, I pull
the lower pan and vacuum it out, Fedron the reg assy, and replace upper/lower
fans if needed.

The IIID is the best laser printer HP ever made, barring the Si series. Well
worth the effort and expense, even if you have to replace the fuser too. I
like them a lot.

Done right, a proper PM of a IID or IIID involves removing the upper unit from
the lower to properly clean the skewed feed roller, but that's another 30
minutes, plus cleaning the refeed assy. You can "kinda" clean that lower feed
roller (not the PU roller) if you have small hands and a long Q-tip, but it
really isn't a good job.

PS: oh, yeah. I wrote this all from memory, and I haven't done one in
a couple of weeks, so I just *might* have overlooked something. But
the major steps are there. Keep track of the various screws, they're
not all interchangeable.

6.45) Laserwriter LS

"I have a Personal Laserwriter LS; am getting 'fuser assembly
 malfunction' error. Does anyone have experience w/this, know the
 likelihood that I need to replace the entire fuser assembly, or how I
 can find out? Also, is there a place to get a used assembly, and is it
 difficult to make the repair myself? Stores charge $200 parts and
 labor for the replacement, and this printer's not worth that
 investment."

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(From: Frank Reid (reid@indiana.edu)).

The fuser lamp often fails in that model.  The replacement is Apple
part number 890-0427.  I think it costs roughly $25.
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6.46) Apple Lserwriter I/O

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"I just picked up an Apple Laserwriter II NTX which appears to be working.
 The problem is I need to find out what this thing has for I/O, and what
 the dip switch settings are.   It appears to have a 50 pin centronics
 connector, along with a DB25, an appletalk port and one other port."

(From: Chris Jardine (cjardine@wctc.net)).

Working from memory (I was an Apple Dealership Service Manager about 5
years ago). The LW II NTX had Parallel (36 pin), RS-232 (I believe 9
pin), Appletalk, and I believe SCSI which was used for a font cache
Hard Drive and that should have used the DB25 (if it is a female
connector)

When you turn on this printer the test page will tell you what the
settings currently are and you can change the switches until you get
what you need. I wish I could remember what the settings are, but, you
know after 5 years some things go!
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6.47) Apple LaserWriter prints double/repeated images

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The characteristic is faint repeated printing a couple of inches down the page
as well as from the previous page.

(From: Tony Duell (ard@p850ug1.demon.co.uk)).

* Try a new toner cartridge. I _think_ there's a problem that will cause this.

  (The wiper blade which is inside the toner cartridge on these printers may
  be warped/defective --- sam).

* The preconditioning lamps are not coming on (more likely).

On a Laserwriter 2 series (the most common one IMHO):

With the top cover open, look for 2 ping contacts in a little white pillar
attached to the cover on the left-hand side. When the cover it closed, it makes
contact with 2 similar contacts on the PCB on the left side of the fuser.
Check for continuity (but not 0 resistance) between the 2 contacts _on the
cover_. If it tests O/C, remove the toner cartridge (you did that, right?),
then the little metal plate (grey metal, held on by 1 screw) behind it, then
undo the 2 terminal screws under this, undo 2 more screws on the large
grey metal assembly, and remove it. Inside this are 5 bulbs in series, one
of which has probably blown. You can get replacements from the PrinterWorks

If those bulbs are OK, then check the power transistor on the PCB on the left
end of the fuser.
```

6.48) Apple LaserWriter IIg runaway scanner never stops

(From: Dave Lee (leedj@uwec.edu)).

A good possibility is the cable from the scanner to the DC controller. It
might just need to be re-seated. Might need replacing.

6.49) Apple Laserwriter II NT error codes

"Where can I find the meaning of the flashing error codes on a Laserwriter
 II NT printer? It is flashing both the paper jam and the paper out light.
 The fuser doesn't heat up."

(From: Ralph Wade Phillips (ralphp@gcstation.net)).

It means that the fuser isn't getting to proper heat. This might
be a blown fuser, might be a bad AC Input Block, might be a bad DC
controller.

Before I fought TOO hard, I would pull the fuser assembly and check the
115VAC inputs for continuity. If you don't have any, then I'd say you
most likely have an open fuser lamp, and it will need to be replaced.

If you have continuity, I'd change out the AC Input Block, and
work from there.

The DC controller being dead is rare, but it *can* cause the same symptoms.

(From: Mark Wolfe (markw@wwa.com)).

Do what the other guy said, but instead of replacing the AC Power
Block, check the triac at Q101 inside the ac power block. Common
failure on this engine.   When you do fix it, put a good heat sink on
the thing.

6.50) Apple Laserwriter IINT 'clicks' with intermittent fuser error

I have a LaserWriter IINT with an intermittent fuser error. When the printer
is switched on, sometimes it cycles normally and works fine; but sometimes,
the startup cycle sound is followed by a soft click, and a few moments later
the green light gives way to double blinking red. I have attached a voltmeter
to the fuser lamp contacts; when the soft click is heard, no voltage reaches
the fuser.

(From: Tony Duell (ard@p850ug1.demon.co.uk)).

The click is almost certainly the fuser protection relay dropping out. This
relay is located in the AC input block assembly at one end of the fuser, under
the main cooling fan.

This relay is on the lower board in that module, and is driven by the
protection circuit (a few transistors, not hard to trace out if needed) on the
upper board. It operates if the fuser drive signal from the DC controller is
active for too long at a time - it prevents the fuser from overheating if one
of the CPUs on the DC controller goes crazy

OK, things to check:

1. Look for dry joints on both boards in the AC input block. They are *very*
   common here.

2. Check the thermistor in the fuser. Clean it, check for dry joints, check
   that it is pressing against the fuser roller.

3. Reseat all the connectors on the DC controller board associated with the
   fuser and AC input block.

4. If that doesn't cure it, you'll need to hang a scope off the fuser drive
   signal (one of the 4 wires from the DC controller to the AC block - the
   other 3 are ground, +24V and fan speed control) and see if the fault is in
   the DC controller (Signal does stick high) or the AC block.

6.51) TI MicroLaser Plus laser printer reports 'Main Motor Err'

"I have a Texas Instruments Microlaser Plus laser printer which after I turn
 it on, reports that the self-test passed but then displays an error on the
 LCD: 'Main Motor Err'.

 This laser printer uses the Sharp JX9500 engine and I was able to find
 out how to get it into diagnostics mode. I selected "Test Print" and
 it returned "Service (C2) 01". The stepper motor appeared to be working
 correctly along with the fuser lamp."

(From: All Laser Service (laser@ix.netcom.com)).

The lubricant used on the gear train tends to gum up and the motor
strains to the point that you receive a main motor error. Take the
complete gear train apart and clean it. You will need to disassemble
all the gears and clean both the gears and the axles. Also take a look
at the developer and drum cartridges as they are driven by this gear
train. If they are jammed this will also cause your problem.

6.52) Fuser problem/printer parts

(From: Robert Blackshaw (blckshaw@clark.net)).

"I have a ti-microlaser printer that worked great until a gear in the
 fuser assembly cracked. This gear drives the rollers in the fuser. If
 anyone can tell me if there is a place to get used parts or a kit of the
 common parts that fail in the fuser etc. it would be a great help. Also
 looking for any other info on this printer such as: schematic, user manual,
 and part numbers for the photoconductor unit, developer unit and toner
 cartridges."

Try The Printer Works at http://www.printerworks.com.

I fixed an HP Laserwriter II (same engine as the NT) with exactly the same
problem, a $0.49 gear on the fuser assembly. On top of it all their catalogs
are like service manuals with exploded diagrams of everything.

6.53) Swapping fuser parts

"I have a couple of Scrap Brother HL-8 Laser printers.

 Both have defects in the Toner Fixing unit (Fuser roller?). Which is
 the unit that melts the toner onto the paper.

 One unit has VERY BAD scratches on the Toner fix roller itself, which
 causes a bad streak on pages.

 On the other unit the heating element on the Toner fixer has blown.
 The big question is can I take the heater from one, and place it in
 the roller of the other? Anyone done this? A new roller unit will cost
 me 90 quid, so a couple of hours to actually do it is worthwhile, as a
 working laser printer will be the result."

(From: JStev55598 (jstev55598@aol.com)).

No problem if you are careful when swapping over the fuser lamp you will
have a working printer which is a darn site cheaper than a re-con unit.
One thing to bare in mind is what made the lamp fail in the first place.
Although it has usually got to the end of it's natural life sometimes a
failure in the temperature sensor or a power supply fault can cause the
lamp to overheat.

When turning it on for the first time after replacing the lamp check that it
switches on and off after it's initial warm up . You can sometimes see the
lamp when it is on through a vent in the side of the printer by the end of
the fuser roller.

6.54) Panasonic 4420 laser printer error code E31 and other comments

(From: Al Savage (asavage@iname.com)).

E31 is the most common reason for a 4420 to fail.

The manual says that 'fusing unit failed to reach x degrees in 90 seconds' or words to that effect. Makes you think of fuser problems, right? Bulb, thermal fuse, thermistor? Well, only about 1 out of 10 times.

The problem is solder blown off two pins in the AC power supply, located on the front left side of the printer (after removing plastic cover) as you face the front. Easy fix, if you're moderately handy.

E31 and dirty feed rollers (and paper pickup roller) are about the only things that fail on a 4420. Well, you do need to replace the developer and drum every so often, and they're pretty expensive, but they're long-lived, too. Much lower cost-per-page than any HP product.

I happen to think the 4420 was Panasonic's best-made laser printer. The 4450 is over twice as fast, at 11 pages/minute, but you can't really run laser label through it. And it's MUCH harder to service.

6.55) Copy counter fuses

"I have a Panasonic KX-P4420 laser printer. It locked up with a message
 about 36K service.

 I issued the incantation to reset this message. It now works again,
 but the display is flashing 'Change DEV' and 'Change Drum'. This
 makes it more difficult to use the menu system. I'd like to turn them off.

 From the dealer's explanation, I gather that there are fuses in both
 the developer and the drum. When you install a new one, the machine
 senses the fuse, resets the counter then blows the fuse. If this is
 true, I should be able to bridge the fuses with another and reset the
 counters.   Maybe even a resistor will do it. Or maybe even a reset
 switch somewhere?

 Can anyone tell me how to reset the error messages for the developer
 and the drum? I'm willing to disassemble the thing to do this."

(From: Jeff Roberts (jroberts@axionet.com)).

* To turn off change drum message turn machine on while depressing "<" key

* To turn off change dev message turn on machine while depressing "^" key

(From: Mark Wilson (mawilson@worldnet.att.net)).

There must be something additional to that. I tried it on my 4420 and
it did not work. Can anyone shed additional light on this??

(From: Jeff Wilkinson (laser@ix.netcom.com)).

The fuse on the drum unit burns out when you first install it. This
momentarily shorts the input to a counter IC and resets the counter. I
would be very careful about shorting it with a piece of wire, even
though the circuit is current limited it is just not a safe practice.
Of course you could always replace the drum! The same is true for the
developer unit. The developer and drum unit should have been replaced
at both 18K and 36K pages as they have reached there useful life
expectancy. E-mail me if you want more info, I believe I have the value
of the fuse required here someplace.

(From: Mark Wilson (mawilson@worldnet.att.net)).

I believe there is a module with a microfuse, similar to the one on
the toner cartridge. If this is so, you have to replace the
microfuse (preferred) or short it with a piece of wire (not
recommended). The fuse burns out after so many pages,
triggering the drum message. When the drum is replaced,
it has a new (intact) fuse.

6.56) Laser Printer info

"Is there any info available on the net on how Laser Printers work, & how to
 fix them? I've worked on a few, & am learning the hard way, but could use
 all the help I can get."

(From: Robert Blackshaw (blckshaw@clark.net)).

Lotsa luck! I have an HP LaserJet 500+, an Apple Lasewriter Plus, and a Xante
AcceleWriter which were DOA and which all now see active duty. The only
piece of information that I have that is very useful is the HP Printer Service
Manual P/N 02686-90920 that I got *after* solving the LaserWriter Plus'
problems.

I went through Border's Books and other computer book shops looking for
anything covering laser printer internals with no luck at all. It's your brain
and logic, and luck.

One thing that will cause you grief on the older CX engine based printers
are those *insulation displacement* connectors they used. Occasional no
contact problems are usually solved by pressing the wires into the plug.

6.57) Strange running time meter/copy counter

"I have disassembled (read: cannibalized for parts) an old Cannon laser
 printer a few months back. I found a mysterious part in it. Perhaps
 somebody can enlighten me as to what it was thrown in for...

 It looks just like a standard fuse, as found in power supplies. The
 usually-glass part is made of white plastic. There is a window on one
 side, made of a clear material(glass, plastic?) And there is a scale
 next to the window, 0 to 10.

 In the window is some substance that looks like mercury from end to
 end, but there is a "break" somewhere in the middle (around 3 or 4
 on the scale)."

(From: Tony Duell (ard@p850ug1.demon.co.uk))).

The substance is mercury, AFAIK, and in the 'gap' there's a small amount
of some electrolyte. Passing current (very low current) through the device
electroplates mercury from one column to the other, thus making the gap
appear to move along the tube.

It can be used in 2 ways - if a constant current is passed through it, it
records the total time that the unit has been in use. That is the more
normal way to use it.

However, in the CX, it's fed with a short pulse of current at the start
of each page. Thus, a small amount of mercury is transferred for each
page printed, and the device does, indeed, operate as a page counter.

6.58) Laser Printer prints heavy on one line about 2 inches from bottom

"What could be causing my Brother HL8e laser printer to smear/or blur one
 line of text about 1-2" from the bottom of the page. At this point, 90%
 of the page has already fed through the printer with no problem. Can't see
 any botched labels or other obstructions. It doesn't always do it, but
 at least 50% of the time if there is text at that point on the page,
 there will be a heavier print on that line. I don't know if you would
 call it blurring, it's kind of like it's printing twice double at that
 point. Is it the rollers? Which rollers should I replace?"

(From: Frank Reid (reid@indiana.edu)).

If changing the toner cartridge doesn't fix it, the lower (rubber) fuser
roller may be bad. Those (at least in HP printers) sometimes don't pinch
the paper tightly enough during fusing, causing smears.

The fuser has a teflon-coated hollow metal roller with a heat lamp inside,
and another roller which pinches the paper against the hot roller during
fusing. The lower roller is made of high-temperature silicone rubber.
Those sometimes go bad as described above, but if you have replaced the
whole fuser assembly recently, it probably isn't the problem.

Look for any rollers between the pickup roller and the fuser, and clean them
with naphtha or mineral spirits. If there is a black roller with foam-like
surface, that one is electrically conductive and is part of the mechanism
that places electrical charge on the paper. Clean it with alcohol and do
not get fingerprints on it. Clean everything in the paper path: If there is
a corona wire (instead of the conductive roller), clean it with a Q-tip
dipped in alcohol.

6.59) Image tilted/skewed/crooked on old IBM laser printer

"I have an ancient IBM Laserprinter E P/N 1039229 that has an
 aggravating problem: the printer prints fine except that the image
 is skewed on the page. There are no problems with the image itself
 other than the fact that it is a little crooked. I suspect that the take
 up wheel (D-shaped with rubber coating) is the culprit because the
 paper does not jam. Anyone have any experience with this? I don't
 want to replace the wrong part!"

Bad rubber is a very likely possibility. There are rubber restorer
chemicals - don't know how well they would work. Sanding the top
layer may help. Replacement would be best if you can locate parts.

6.60) Fuser Roller collects toner on laser printer

"I have an AST TurboLaser/PS (also known as an DEC LN03, a Brother, etc, etc)

 When I bought it someone had let a ring of melted toner collect on the fuser
 roller until it had burnt through the coating and ruined the roller.

 So I replaced it and ran a few thousand copies through the printer. Now I
 notice that the roller is beginning to collect a bit of toner again. Just
 how does someone clean that roller without pulling the coating off? I tried
 the usual wiping with a paper towel and that removed some of it but there is
 still a hint of it left and a few more copies begins to let it accumulate
 again."

(From: FAXFIXR (justdfax@cdepot.net)).

I would bet the "picker fingers" or "separation claws" are in need of
replacing. They are the claw type pieces that ride on the roller and
prevent paper from sticking to the roller. The end that rides on the roller
will build up a coating of toner and crud and will wear a groove thru the
teflon coating of the roller. Once the teflon coating is gone, toner builds
up in the groove and shows up on each page as a faint line.

HP original laser printer 2686A: bargain or boat anchor?

"Printer is (i'm told) supposed to print a test page full of assorted
 characters yet only prints multiple parallel lines. Also, i'm unsure of
 the proper hookup to Win95, parallel or serial interface. To clarify, I
 bought this thing used from someone who 'knew nothing about it' and the HP
 web site volunteers little information."

(From: Gerald Chafee (GChafee@worldnet.att.net>)).

If I remember right the original Laserjet has a "test switch" located
towards the back that only tests the print engine and is supposed to
only print parallel lines. I think that you can take the printer
off-line from the front panel and get some sort of printout by holding
down a self-test switch on the front or a combination of switches.
Somewhere I have a service manual for this unit and I will try to look
it up.

BTW, the LJ I's were invariably a serial port only printer which made
them a pain to interface. They do give a good print for such old
technology, but you only have 1 or 2 resident fonts and I believe there
was no graphics capability. You had to use cartridges to get any other
fonts.

(From: Mike B. (osiris@avana.net)).

It's printing correctly. If I remember, there are two ways of testing
this thing. You are hitting the 'test print' button on the side. This
is the parallel lines test. There is another test button on the front

panel that when hit, causes the cascading alphanumeric printing sequence.

With Win95, you should be able to use the HP Laserjet driver with no problems.
Since you have Model #2686A, I think the 'A' stands for parallel connection.
In that case, just connect it like any other parallel printer, and make sure
that you have the proper Win95 drivers.

Why doesn't the HP site help much? :-). They just want to sell you one of
their new, whiz-bang models :0

This printer is a great workhorse. I believe you will still find lots of
support for it from other places. There is a place called Laser Connection
that supports/services these printers.

6.61) Okidata printer that's streaking

(From: Dan Fraser (dmfraser@rogers.wave.ca)).

These printers need a new drum every 4-5 toner refills. They are designed that
way to fool you into buying them as the toner is cheap. Then they get you
later at drum time. The drum is a consumable and does NOT last the life of
the printer. Resign yourself to a new drum every 4-5 toners or so. That's the
system.

(From: Chris Laudan (chris.laudan@zetnet.co.uk)).

Yup, agree with this. The cleaner unit has a fine clear plastic strip that
removes old toner from a roller, in time this develops fine kinks or scratches
which let old toner stay on roller, hence streaks. If this strip is OK and
machine says need new cleaner unit, you *can* carefully empty cleaner unit and
carry on, but you must be careful not to damage strip doing this. Best to
replace unit as above,

6.62) First page smudges on OKI OL400

"Sounds like my second hand (sorry, previously owned) OKI OL400 has a
 problem with the fuser roller, too. Up till now I've just printed two
 first page copies of everything I needed 'clean'.

 Please does anyone know if the fuser roller is an integral part of the
 OKI OL400/800 Image Drum Cartridge replacement kit? If not, any ideas
 on the part number, please?"

(From: Al Savage (asavage@iname.com)).

Note that an OL400 is nothing like an OL400e. Almost no parts interchange
including the drum/developer assemblies.

(From: Brian Hughes (bkhughes@gisco.net)).

The problem you're both describing is caused by the "wiper blade" in
the drum cartridge, not the fuser! OKI doesn't sell the part and says
when you have this problem you must replace the entire image drum

assembly $$$$

The cure is really quite simple: I remove the entire drum cartridge
and place it on newspaper under subdued lighting (you don't want to
"shock" the drum). The corona wire assembly can be recognized by the
sliding blue knob on top; I release the left side with a small
screwdriver tip and remove it. After removing the two screws I have
just uncovered, I lift the blade free. Gently wiping the accumulated
toner off the blade allows me to see the rubber better. If I see that
the blade has "curl", I can then weight it down on my bench for a
while to reverse the curl before I reassemble it. Sometimes all it
takes is the cleaning. I have done this with my own "preowned" OL400,
and now enjoy like-new printing.

The one that stumps me is where to find a fuser lamp, OKI will only
sell the fuser assembly (major part!).

DISCLAIMER: Due to the possible health hazards of toner dust, I have only told
you what I have done...it is your choice, and your responsibility to take
precautions should you disassemble your printer.

(From: George Hurley (ghurley@voicenet.com)).

That smudge on the first page is your OL400 telling you that
your image drum is getting old - they're about $240 from Staples, or $180
rebuilt. HOWEVER, the actual cause of the smudge is the failure of the
toner wiper blade inside the image drum assembly. This acts like a
windshield wiper and scrapes excess toner off the drum. When it hardens
with age, it stops working as well as it should. This blade can be
replaced at fairly low cost - I bought one for $25 and suspect that I
overpaid, and it took about ten minutes to replace the old one. You'll
eventually need a new drum assembly, but this repair should squeeze
another 10-15,000 pages out of the drum.

I forget who I bought the blade from, but LaserImpact should have one.
You can reach them at 800 777-4323 - if you ask for tech support, they
can probably give you instructions on how to do it.

6.63) Laser printer test equipment

At least one company offers a device specifically for testing of laser
printers. This is obviously not going to be something you will want if
you deal with 1 laser printer every few months. However, where dozens of
printers a week are involved, check out: http://www.LaserWizard.com/.

6.64) Frank's repair notes HP-IIP, HP-IIIP, Apple Personal Laser Writer

(From: Frank Reid (reid@indiana.edu)).

All of these use the same Canon print-engine.

* Paper jam: Paper is crunched accordion-style near the toner cartridge, does
  not reach output rollers:

  The toner-cartridge drum is not rotating due to a failed "drum-drive
  assembly." You can mark the periphery of the light-sensitive drum to
  confirm that it is not rotating.

  Remove the top and right covers of the printer. The drum-drive assembly is
  a white plastic gear/clutch attached to the gear that drives the toner
  cartridge. Inspect for cracks, replace if necessary. OEM part # RG1-1777-
  100, Apple Part # 890-0609. You must partially dismount the entire gear
  assembly to replace the drum-drive assembly, however, sometimes the new
  clutch can be slipped onto the old shaft (which does not wear out): Not all
  shafts are identical.

* Paper jams or gets wrinkled as it exits the top of the machine; works ok if
  the selector is set for front delivery:

  The upper output-rollers deteriorate (perhaps due to ozone) and become
  mushy: Replace the roller (Apple "face-down delivery assy." part # 971-
  0043 does not fit HP machines, but you can remove the roller and replace
  that only.)

* Paper jam: Paper does not progress past pickup rollers:

  Inspect the pickup-rollers. If the gray rubber is smooth and shiny on the
  tips of the cams, replace the rollers. Replace obviously-worn rollers as
  part of preventive maintenance during other repairs.

* Paper jam: Paper will not feed from front of machine:

  When paper feeding begins, a mechanism lifts the paper stack so that the
  pickup rollers can grab the top sheet. Inspect the lifting mechanism:
  Sometimes parts at the sides become bent, preventing it from working.

* 50 Service:

  The fuser lamp often burns out because the seals fail and let air into the
  lamp (resulting in opaque purple/yellow deposits inside the quartz tube).
  Replacement is easy, requiring minimal disassembly of the fuser. Rarely,
  the lamp-control circuit in the power supply fails.

* 51 Service:

  The laser-scanner motor commonly fails. Replacement is simple but getting
  at the scanner requires removing several layers of sheet-metal and circuit
  boards, the black plastic cover of the scanner housing, and the plastic
  lens: That may take an hour on your first attempt, 15 minutes with
  experience. Typically, the IC which drives the scanner motor overheats and
  visibly discolors the circuit board. HP-IIP, -IIIP and APLW all use the
  same scanner.

  Normally, you can hear the scanner motor running; it whines like a tiny
  jet-engine starting, a few seconds before the machine begins to feed paper.

* "Door open" or "No EP" indication, although door is closed and toner
  cartridge is installed:

  Inspect photoelectric sensors, clean with compressed air. If problem
  persists, re-seat the appropriate connectors on the dc controller board, or
  replace the entire sensor harness. Failure of the circuit board that holds
  the contrast control can also cause this indication.

* Groaning sound while feeding paper:

Replace the separation pad (~1x5cm bar with cork-like surface). No tools
required.

* Prints are mostly black, characters barely visible:

The high-voltage terminal on the toner cartridge is making bad contact.
Placing washers under the two mounting-points of the (white plastic) high-
voltage insulator on the cartridge will often extend the terminal enough
for good contact.

* Printer equipped with optional bottom paper-tray delivers one page followed
by a blank page, then halts unless door is opened and closed. Possible "41
Service" message (misleading! - means laser-scanner error):

The detachable paper-feeder contains two solenoids. Under the armature of
each is a rectangular black foam pad. If the pads become sticky (as in the
HP-II), the paper-feed timing is disturbed. Remove the solenoids, replace
the pads. I use double-sided foam tape, then use naphtha to thoroughly
remove any glue from the upper surface.

I never encountered this problem until November 1995, then saw several
cases in rapid succession: The entire lot of HPIIP-type printers may be
reaching an age where this failure is common, so I now inspect the
solenoids for stickiness as part of the preventive maintenance of any
printer I repair.

Also inspect for broken solder connections on the pins which connect the
paper to the printer.

* Paper stops just prior toner cartridge:

(From: Edward Klotz (eklotz@www.flash.net)).

The worn D-roller assembly can be replaced in about 15 minutes. May as well
replace the separation pad also (5 more minutes, fixed at least 6 with new
D-roller assemblys from LASER impact out of Texas - about $28 last time I
purchased). Also ozone filters are available, very inexpensive (may save a
repair down the road).

6.65) Tony's entry into laser printer repair

(From: Tony Duell (ard@p850ug1.demon.co.uk)).

You may be interested to know how I got into laser printer repair. It's a long
story, but here goes...

I was given a non-working Canon LBP8A1. I pulled the case and started fiddling
about and discovered a PAL on the formatter board with a stuck output. The
cure was obvious -- replace the PAL.

Alas Canon didn't like that solution. No parts were available, and no
manuals. At about this time I discovered that the original printer for a
computer that I happen to love - the PERQ - was a CX-VDO -- the same printer
without the formatter. And I managed to obtain the PERQ interface board,
admittedly non-working.

So I totally dismantled the printer in the hope that I could figure it all

out. I had a pile of screws, gears, lenses, mirrors, bearings, etc. And PCBs
covered in unidentifiable chips.

A lot of work with data books (and questions to newsgroups) identified most of
the chips. A lot of hacking about got me enough of the pinout of the CX DC
controller connector to guess roughly what was going on.

Then I had some luck. The guy who'd given me the PERQ card remembered that the
CX-VDO had a ribbon cable from that connector to the outside world. And Bob
Davis, who had obtained all sorts of stuff when PERQ Systems folded, dismantled
his personal machine and ohmed out cables, etc.

Slowly it all went back together. I figured out how to align the scanner unit
using the IR detector I use for testing remote controls. I figured out how to
test (and repair - there was a defective chip and a shorted capacitor) the
main PSU. And I worked out how the status LEDs were connected.

I made up what I thought were the right cables, put it all together and fired
it up. The test page was fine. I was getting there. Put the PERQ card
together, plugged it all it. It sort-of worked. The page was black apart from
a 16 pixel strip at the left. But Bob had been helpful and had sent me info on
the operation of this card. I was my fault. I'd missed out a jumper which
connected a clock to the data FIFO. After that it worked fine.

I now believe that these printers *can* be repaired at home, no matter what
Canon say. And if Canon won't help people, then somebody else should...

Chapter 7) Photocopiers

Note: also see the chapter on Laser Printers as the operation and problems of
the two types of equipment are very similar.

7.1) Warnings about vacuuming copier toner

"I know there are special vacuum cleaners for use in picking up toner in
 laser printers. What is the problem with using a cheap ordinary vacuum
 cleaner? Is there a fire hazard? Thanks for any comments."

(From: (jollyrgr@mc.net).

If you vacuum toner with an ordinary vacuum, a static charge from the
toner will build up in the vacuum and shock you. Toner works by static
charge. Moving it, as in vacuuming, causes it to give up its charge to
the vacuum. Without having a complete ground throughout the entire vacuum
can cause charge to build up to quite a high potential. Be safe, use a
toner vacuum.

Now if the paper does not get fused, the toner can be rubbed off. This
toner, and any spilled toner still retains some charge. As it is moved
though an ordinary vacuum, charge is transfered to the various parts of
the vacuum. (Much in the same way charge is transfered to a person
walking across a carpet in dry weather). When the charge builds up, it

has to find a way to ground. In the case of the person walking across the
room, the charge is discharged when they touch a metal object such as a
light switch cover or door knob. In the case of the vacuum, its the
vacuum that builds up the charge. When the person using the vacuum
touches the charged portion, the charge is transfered to them (ZAP!!). If
the person is holding the part of the vacuum that is getting charged, they
get charged as well. Only now they get zapped when they touch something
else. A friend of mine worked in a print shop at one time. He spilled a
bottle of toner. Instead of getting the toner vacuum used on the copy
machines, he used an ordinary shop vac. The metal pipe was attached to a
rubber hose. As he vacuumed the toner it was he that got charged. It was
when he touched the grounded portion of the vacuum as he was turning it of
that he got shocked.

Toner vacuums have all their parts grounded (pipe, hose, canister,
motor ect.). These parts are all connected by wires to the ground
terminal on the power cord, shunting any built up charge immediately to
ground.   So it is not the conduction of the toner to the electrical ac
line but from the charge the toner itself has.

(From: jlager@tir.com).

I don't know about any fire hazard, but I DO know what that stuff will do
to an ordinary vacuum cleaner from lessons well learned! Toner/Developer
is the finest stuff you may ever see, and will instantly clog all the
pores of a regular vacuum bag. You'll go broke just buying bags. And...
don't wash any of your clothes/rags with hot water that it has penetrated
because it will make the stuff solidify. All my advice is based on
repairing copiers over the years.

(From: Ed Wright (motogump@cris.com)).

The point here is that vacuuming toner, which is carbon black and latex,
will create a static charge. Using a vacuum that is not intended for
this purpose can cause the following. You can blow sensitive components
on circuit boards, expecially bias boards on the developer units of the
larger copiers and the transfer belt power packs of the smaller
machines. Another worrisome possibility is an explosion. I have seen
two old toner capable vacuums ignite the toner dust as it went through
the vacuum. I admit this is a very rare phenomenon but I would think it
would be even more likely in a vacuum not designed for sucking up toner.
I would suggest reading on the side of your toner bottle. Most bottles
caution about disposing of toner by incineration, the stuff is explosive
if the air/fuel mixture is right. It probably wouldn't do much harm but
I bet it would play hell with your office.

(From: Le Baron O. Ferguson" (ferguson@math.ucr.edu)).

Thanks for the response. I think I should state for everyone reading
that I am now convinced that there IS a serious fire hazard. One person
who responded (by email) has seen two of them "light up."

7.2) Comments on copy problems

(From: Copenhagen Cowboy (cowboy@fastlane.net)).

Copy problems can be hard to figure out, but given the evidence the copier
gives you, you can now probably determine what to check.

Black or dark lines are mostly caused by dirty optics (not enought light
getting to the Drum) Blank copies might be a broken corona wire, or even
failed High Voltage board. Black copies can mean a bad exposure lamp (broken
or burnt out) or failed exposure lamp thermal fuse. Black copies with even
blacker images in them could be overtoned (too much toner in the developer
unit) or bad drum ground (the drum cannot discharge {the voltages have
nowhere to go, so they just stay on the drum). Bad drum grounds usually
pull developer, and you get the grit on the copies.

7.3) Diagnosing 'blank copy' problems

"I have just cleaned a Sharp SF 755 which was quite dirty but now will
 not copy at all! No error codes paper hot on exit, all seems well but
 the paper is blank."

(From: Bruce L. Miles (henry31@prodigy.net)).

Two things to try:

1. Peek inside and see if you can detect a latent image on the drum. If an
   image of your test document exists on the drum, then the main corona unit
   is working at least.

2. Perform a 'Skyshot Test'. Leave the cover off the glass and take a picture
   of, well, the sky. It is a good idea to cover the leading edge (left side)
   of the copy glass with a piece of paper so that the fuser doesn't try so
   hard to jam on a solid sheet of heavily tonered (blackened) paper.

If the skyshot print comes out white (it should be entirely black since the
amount of light hitting the drum compared to reflection from actual copy is
nil), and you DID have a latent image on the drum, the prime suspect would be
the transfer corona - it is not receiving the high negative voltage needed to
pull the positively charged toner off the drum and onto the paper. The
culprit could be the corona wire being broken, the corona assembly not making
a good connection into its high voltage socket, or even some weirdness going
on with the high voltage power supply - i.e., supplying proper voltage to the
main corona, but nothing to the transfer corona.

7.4) Copies too dark 1

"I have an old Savin model 7010 copier that works just fine
 except it prints to dark. I have to keep the "lighter darker'
 control to max "lighter". I have replaced the (expensive)
 OPC cartridge and cleand all the wires and mirrors etc.
 It works best right before it runs out of toner, of which
 it uses up to fast. Any info will be appreciated!"

(From: Thierry Thdereck (thdereck@aol.com)).

There also other reason a copier is darker than it should:

* The lamp is old and has not enough light on the drum,

* You may also have wrong voltages (currents) which polarize the drum,

* The voltage on the toner developer may be incorrect ...

So you may have lot of work if you don't know the right setups before
having good copies.

7.5) Copies too dark 2

"Canon NP-2015s ... prints very dark, with "water stained" appearance. All
 controls full light gives a 'readable' copy with a dark grey background. I
 have been told everything from 'wrong toner' to moisture in the toner. The
 guy who brought it to me doesn't know. Before I vacuum out the toner & stick
 a $25 cartridge in it, could this be a bias problem?"

(From: Bernard Morey (bmorey@aardvark.apana.org.au)).

Have you tried cleaning the corona wires? There are generally two modules.
Pull out and clean with cotton-swabs (Q-tips).

(From: Lionel Wagner (ck508@FreeNet.Carleton.CA)).

If your dark grey background is not uniform, you will have to vacuum out ALL
the old toner, and thoroughly clean the roller that transfers it to the drum.
Do not use abrasives, as the surface of the roller is very critical. If this
restores even grey background, you can think of adjusting the bias voltage.

7.6) Copies too light

Aside from a misadjusted 'darkness' control, improper voltages, dirty corona
wires, and worn drum, don't overlook the trivial: your paper may be incorrect
or damp.

(From: Morton Lee Cohen ya484@@vtn1.victoria.tc.ca)).

I am a former copier tech. that worked on Konica copiers. To get good results
from your copier, a periodical maintenance should be perform on the copier,
every so many copies or once a year, depending on which event occurs first.

During a PM, the optics, corona wires, drum gets cleaned. The Fixing unit gets
cleaned, and serviced. The Developer gets replaced. And adjustments are
performed, if needed only.

The developer transports the toner to the charged area of the drum and
developer gets weak over time. Developer is made up of iron filings.

7.7) Previous copy doesn't erase from drum

"I recently purchased a Mita DC-111 copy machine, and I finally
 it to make copies, now I have on big problem. When I do more
 than one copy, the drum doesn't fully erase itself, thus leaving
 ghosted images on the remaining copies that are made. I don't
 know much about copiers, and I really just lucked into getting
 it to actually make copies. Any help would be appreciated.

(From: Jeff Roberts (jroberts@axionet.com)).

Make sure it is the drum that is not cleaning by measuring the distance
between the origional image and the ghost image on the page. that distance
will be the circumference of the drum if that is the cause.
The drum assembly should come out as a unit. Take it out and make shure to
quickly remove the drum from the unit and put it in a dark place so that it
doesn't become light shocked. then look for a blade of some sort, it may be
neoprene or rubber. it is usually on a actuater assembly that can push it out
to make contact with the drum and then retract it back (possibly a
solenoid/cam) this blade does the cleaning by scraping the excess off the
drum. If it is hard or brittle it will have to be replaced but cleaning it
with a 70% solution of rubbing alcohol may be enough. After cleaning it rub
some toner along the edge to re-lubricate it and reassemble and try that.
Also check that the drum unit is not clogged up, the waste toner goes
somewhere and if it uses a sump and the sump is full then it will ghost no
matter how clean the blade is.

(From: Vance Harlow (musk@aol.com)).

On copy machines and laser printers with long life drums (ones where toner can
be refilled without replacing the whole drum assembly) the wiper blade will
usually fail long before the drum does on machines that are not used
frequently or used to print one or two copies at at time. If the service
department is not aware of the problem, or the manufacturer doesn't supply the
blade as a separate part, you'll usually end up getting stuck for a whole new
drum assembly when all that's needed is a wiper blade (this is the rubber or
plastic blade that bears on the image drum, not the felt wand, BTW).

Usually the clue will be that the first few copies are bad, but then quality
improves. If that's what's happening, usually replacing just the wiper blade
will cure it.

Since the blade costs only $10 or so, it can be worth giving it a try before
replacing the drum assembly. This has worked on both my Canon 1010 copier and
various OKI and GCC laser printers.

Finding the blade can take some doing - when I called the local Canon
distributor, they couldn't give find a part number, even though I'd bought a
couple years earlier and knew it existed as a replacement part. Luckily, one
the the service techs was able to dig up the number. OK doesn't list them at
all - they only sell the the whole assembly. But you can get the blades for
most laser printers, and some copiers, from American Ribbon and Toner or
Computer Friends. Since the drum assembly on the old Okis like the 400 and
800 series, and the GCC/Mac versions lists for $250 or so, one frequently runs
into them with bad drums for $0-25. I've revived a half dozen of them simply
by replacing the blade - knowing this trick is like having a free source of
laser printers! the OKI blade pops right in with only minor disassembly; the
Canon is a bit more trouble.

Computer Friends also has a teflon wax for reconditioning drums - they claim
it will protect the coating, fill in small scratches and treble the life of a
throw away drum, and vastly prolong the life of long life drums. I've tried
it so far only on an old 1010 drum, with mixed results so far (worked great at
first, but now copies are getting dirty - don't know if it's the wax acting

up, the drum going despite the wax, or other problems. They also sell the Oki
drums for about $40, and drums for many other printers but not copiers.

7.8) Copy quality degrades with use

(From: Lionel Wagner (ck508@FreeNet.Carleton.CA)).

If you are lucky, cleaning the optical path: mirror and lens will help.
Cleaning the corona wires is a routine necessity. Use two Q-tips,
one on top, the other on the bottom, of the fine wires and travel the
length. Soak the Q-tips in lighter fluid, my favorite all-purpose cleaner.

Probably the photo-sensitive drum has aged. A sure sign of this is
a difference in density between the first and last copy of a long
(50 copy) print run. This is particularly noticeable after the
copier has not been used for some time.

(From: BRADS TV (bradstv@aol.com)).

I have found that dirty mirrors and optics will cause smudging, dark copies
and generally poor quality copies. Try cleaning these mirrors in the optical
path. NOTE these mirrors are first surface or front silvered mirrors and they
scratch easily. Also look carefully for the complete light path from the
exposure lamp all the way to the drum, you will find several mirrors mounted
at angles to direct the image to the drum . You are right in the fact that the
drum can cause poor copies but cleaning first might be the first step. Brad

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7.9) Copier error codes

Most modern copiers produce an error code of some sort when, you guessed it,
they detect an error. However, there is no standardization. So, other than
posting to sci.electronics.repair or checking this FAQ, how does one determine
their meaning?

(From: Sid Ashen-Brenner (sashen@midusa.net)).

Affordable Photocopiers (http://www.photocopiers.com) may have a Service sheet
for about $15.00 that would contain the codes for your copier. I got the one
for my Mita DC 1255 from them. They also sell parts and supplies at a fairly
reasonable rate.

7.10) Canon PC25 copier problems

"The lamps goes on my Canon PC-25 but I get nothing but black copiers.
 I'm told the problem could be a broken corona wire. Where is the corona
 wire located? What does it look like? How do I determine if it's broken
 and how is it replaced? Thanks in advance."

(From: Lionel Wagner (ck508@FreeNet.Carleton.CA)).

I doubt the cause is a broken corona wire. If this were the case you would
get white copies, instead of black. Check the bias lamps are coming on. They
are a string of small lamps located 'downstream' from the transfer corona
(located at the bottom of the drum).

"I have an elderly Canon PC25 Copier, which still runs well apart
 from two problems.

 The first is an intermittent fault which makes it turn out blank
 paper, usually on switching on but occasionally during a run. I assume
 this is a faulty joint on a circuit board because opening the machine
 and slamming the top down usually cures it for the moment.

 The second is that the light/dark slider has to be at one end of
 its range to get satisfactory copies.

 Are these common faults on this model with a recognized cure?
 Although it is expensive to run, I seldom need enough copies to justify
 purchasing a new one."

(From: Lionel Wagner (ck508@FreeNet.Carleton.CA)).

You're right about the bad connection fixed by the vibration of closing the
cover. Your exposure control is probably at darker than normal to compensate
for aging of the photo-sensitive drum. Some compensation is possible by
adjusting the high voltage or (I prefer) the toner wheel bias voltage. I'm
assuming your corona wires are clean, of course.

7.11) The mysteries of developer

(Responses farom: Nate Morrison (nmorriso@plains.nodak.edu)).

"My owner's manual never mentions developer anywhere. This copier uses
 toner cartridges which mount above the dispenser and drop toner into a
 mechanism which distributes it to the drum. There is a white plastic
 bottle which catches excess toner and eventually fills up and needs
 replacing. They say to replace the bottle, but I just empty it, wipe
 it off and reinstall it. Only the toner cartridge and the bottle are
 mentioned in the useless owner's manual."

Well, that's all they think you need to know. They want you to call the
dealer if the copies are crappy.

The reason you should just toss the used toner bottle is the dust--it is
messy and not good for your respiratory tract.

Some copiers use developer; others don't. How long it lasts before it
runs out is basically in how the copier is engineered. Some gets carried
away every time you make a copy. Pretty soon there isn't enough to carry
toner to the drum anymore.

"So, if my copier needs developer, how do I obtain it? Where does it
 go? I suspect that I purchase a bottle of these 'iron particles' and
 dump it into the slot where the toner drops into, but I don't want to
 do *anything* until I know the right thing to do."

If you need developer, you can get a kit from the local service shop.
You'll pay plenty, to be sure, but not as much as if someone came out and
did it for you. It might not be a bad idea to invest in a service
manual - I got one for our Minolta for around $20.

"Why is this rather simple maintenance procedure kept a secret from the
 owner? Is Mita trying to make money for their authorized repair
 outlets?"

Well, that's another of those reasons they want you to hire the
serviceperson at a ludicrous rate. (the local place gets $99/hour!)
You have it pegged.

Another reason is that they want to promote the idea that _their_ copier
is service-free. Telling any prospective buyer that in 50,000 copies it
will require professional service is NOT a selling point. :-) The
copier is designed so you can change toner and paper and that's it.
Anything else is always "see your authorized dealer" in the useless
owner's manual.

7.12) Problems with Ricoh copier

"Some time ago I got a big and heavy RICOH xerox copier and I have got
 a problem with it:

 The output of the device is very poor: Passages which should
 be black are only light grey. If the contrast is turned on
 to the maximum the whole sheet gets grey. The copies look as if
 there would be only a little bit of toner on the drum. In order
 to solve the problem I already checked the optics, the corona
 wires and voltages and I filled up the toner. My question now
 is whether it is possible that the drum is defect? What else
 could cause such a failure?

 Since the device is quite old (1988) spare parts are not easy to get,
 but the mechanics looks quite well so I do not want to loose the
 device."

(From: Copenhagen Cowboy (cowboy@fastlane.net)).

I am a Copier Repair Tech and have a few suggestions for you. First, what does
a Blackout look like? What I mean is, make a copy with the lid up, and check to
see how Black it is. Note to see if there is any "Grit" on the paper. Most
likely if there is no Grit, and the Black area is Grey, then I would suggest
changing the Developer (or you might even have a Developer Drive Problem
[gears and stuff]). If there is a fine layer of Developer on the page, you
probably have a Drum Grounding problem.

7.13) Toner sensors?

I took one of those apart and found something that looked like a piezo
element with 3 wire connections to concentric rings. I looks to me like

some sort of resonator but I have not attempted to analyze the circuit.

My wild guess would be that the frequency changes with low toner or something like that.

(From: Morton Lee Cohen (cx163@FreeNet.Carleton.CA)).

Probably the disks stir the toner for even dispersion, and break a photogate to tell the controller PCB that there is toner there. Some Cannon laser printers/photocopiers use magnetic sensing of the toner level. Most Okidatas use the photogate sensors with magnetic toner agitators.

7.14) Comments on copier cleanliness

Copiers are about the ickiest equipment to dismantle with all that black toner over everything!

(From: Morton Lee Cohen (cx163@FreeNet.Carleton.CA)).

There is toner over a lot of places in copiers, not so much due to customer problems, but due to lazy service technicians, trying to raise their average call per day ratios. Service Technicians often get calls to do Periodical maintenance on copiers late in the day and rush to leave an account at 5pm, so many overlook non-important parts of the copier to clean during a maintenance of a copier.

And as far as the toner sensor goes, lots of times toner cakes on the sensor and the copier never tells the customer that it needs toner, when the copies start getting light, that the copier starts pulling developer from the developer tray, and that it gets messy.

Not all copiers are created equal and not all service technicians are created equal, either also. Some will always be better than others. But the best policy is always to tell the truth. My telling the truth, you tell the customer where the problem exists.

Never lie, because if you lie, one always has the remember what they lied about. From the writers of Star Trek - The Next Generation. And I practice that in dealing with customers and myself.

7.15) Gray tinge on Xerox 5260 Copier

"Earlier this year, I inherited a Xerox 5260 personal copier. It works well except all the copies have a grey tinge to them, even when the auto-exposure control is set to light. The grey background is visible over all the page, and gets noticably darker when the auto-exposure control is set to dark. Is it time to replace the copy cartridge?"

(From: Lionel Wagner (ck508@FreeNet.Carleton.CA)).

Your toner/developer wheel bias voltage may be wrong. When light strikes the photosensitive drum it does not completely discharge it. The toner/developer bias voltage must precisely match the residual

charge or grey background will result.

7.16) Streaky copies

(From: Bernard Morey (bmorey@melbourne.DIALix.oz.au)).

Well, I discovered that streaky copies are caused by dirty corona wires
(fixed easily, although 1 unit was held by a screw-in plate, rather than
the usual pull-out method) and that dirty corona wires seems to be caused
by excessive toner deposition (haven't figured that out yet).

(From: Lionel Wagner (ck508@FreeNet.Carleton.CA)).

If the streaks are white, in black areas, clean or replace the corona wires.
If the streaks are narrow black and run the entire length of the page,
replace the soft plastic wiper blade on the drum (and hope the drum is not
scratched). Black smudges are related to the toner/developer purity.
Replace both.

7.17) Toshiba parts

"Can anyone tell me where to get old / deleted spares for Toshiba
 photocopier model No BD-3110, or where to get the following for the
 mentioned copier.
 TEC High Voltage Unit (HVT-T)..Model No AFT-375-A

(From: Filip M. Gieszczykiewicz (filipg@repairfaq.org)).

Greetings. Give URL: http://www.europa.com/~tait/copiers.htm
a go. They have all the usual stuff (rollers, picker fingers,
lamps, masters, etc) for many Copiers. My $200 order is in the
mail :-)

[dig dig]

Drat, they don't list prices for anything but toner for that one.
Their number is 1-503-293-8071 but you might want to try something
closer to home (than Portland, Oregon - 1/2 world away :-) because
the shipping *will* kill you...

7.18) Canon PC20 cold fuser

"I'm trying to repair a Canon PC20 copier, on which the main problem
 is a cold fuser.

 The fuser lamp has blown, but it looks as though it might have
 overheated before doing so : in two places the tube has expanded

```
        as though it got very hot while under compression from the spring
        endcaps. The 47R sacrificial resistor in the fuser lamp relay circuit
        (I think it's there to stop the control circuit holding the lamp on
        permanently) has also gone open circuit.

        What would cause the lamp to overheat ? The thermistor (which was
        coated in toner) appears to work : it measures about 300K at room
        temperature and falls a few 10K with finger heat, so it's not open
        circuit (though it might be incorrect).  I'd like to check out the
        rest of the copier before buying spare lamps etc. - can anyone tell
        me what the thermistor should measure (hot & cold) so I can test the
        control circuit and fool the copier into working?"
```

The thermistor may be working. It sounds like a bad triac or whatever is used
to actually switch power. Get a 300K pot as a sub for the thermistor during
testing.

(From: Adrian Godwin (agodwin@piresearch.co.uk)).

I had a go with this : about 4K fools the control board that the roller is
hot, and allows the rest of the cycle to run.
However, this _doesn't_ cause the heater power to switch off - in fact, only
turning the resistance almost to zero has any effect, and at this point it
appears that the controller attempts to burn out the 47R resistor.

This might make sense, except that as far as I can see there's no way that
the control board COULD turn off the heater power without burning this
resistor : the fuser lamp is powered through a relay which is excited by
the main 24V supply via this 47R resistor. There's no way that I've seen so
far that the controller can turn off the lamp other than to short out the
relay (which burns the protective resistor). So I wonder if there's no
control -
just a monitor for the copier control board and an overtemperature safety
circuit that disables the fuser lamp (and simultaneously disables themain
motor control triac). This surprises me, as I have a Canon SX-based
printer where the lamp power cycles (though not using a relay, as it's quiet).

(From the editor).

There must be a triac or other mechanism for cycling power to the lamp - its
temperature must be tightly controlled regardless of line voltage fluctuations
and ambient temperature. (--- sam)

7.19) Broken Sharp Copier

"My Sharp copier is dead again, it's an old one. It is flashing "U1"
 which I think means internal lithium battery is dead, but it won't
 reset. Somebody emailed me the secret code once, but I have since

(From: FAXFIXR (justdfax@cdepot.net)).

The prefix is always CROP (clear, repeat, zero, pause) and the code for a
U1 reset is 13 then press the copy button. So it would be C R O P 14

7.20) Resetting Sharp Z-25 copy count

```
This may be necessary if you run the copier past the recommended life of the
drum but still get acceptable performance.  You then need to trick the copier
into thinking a new drum has been installed.  Other copiers may require
similar treatment as well.

(From: YonyMar (yonymar@aol.com)).

You need to reset the counter inside the copier. When you buy a new drum,
it resets the counter, however it can only do this once. Unplug the copier
and remove the drum and toner cartridge, at the back of the machine where
the drum would slide in look for a small metal lever, push it in with your
finger to reset the counter. The counter numbers are covered by a black
plastic cover.
```

7.21) Sharp SF-71 copier will not reset

```
"I have an old Sharp SF-781 copier which will not reset.  The diagnostic code
 "H1" is flashing on the display and the copier will not reset to the
 operation condition, using the keyboard clear sequence.

 I have been able to reset the "H1" code before, but this time no luck."

(From: copymann@usa.net).

H-1 means an open thermal fuse on the upper fuser roller. Remove the
cover on the fuser rollers and you will see a ceramic fuse located on the
top plate. Check the fuse for continuity. If bad replace it with one with
the same temperature rating, ( or close to the same ) Sometimes you can
find them a radio shack. If not email me and I will send you one. If you
order the fuse from sharp it is pretty expensive. If the fuse is good
check the lamp in the upper fuser roller or the upper lamp triac. 99% of
the time it is the fuse.
```

7.22) Sharp SF-7100 copier drum replacement

```
"I have a Sharp SF-7100 copier. When I call about a replacement drum, people
 tell me it uses a Master. What is a Master?  Can I install it myself.  Does
 anyone have a service manual for this copier?"

(From: Lionel Wagner (ck508@FreeNet.Carleton.CA)).

The Master is the SURFACE of your photo-sensitive drum.  In a brilliant
design concept, Sharp allows you to easily replace a thin (in your case)
cardboard sheet, that effectively gives you the performance of a new drum
at a fraction of the cost.  There is no wiper blade, residual toner is
removed by polarity reversal and is re-absorbed in the developer.
Cardboard Masters for your machine are in short supply.  Let me know
if you can find some.  You may wish to upgrade to an aluminum backed
```

Master used in model SF760, but they are much more expensive.

Chapter 8) General Problems

8.1) Panasonic 1124 power supply problem

The following, of course, also applies to many other printers and other
electronic equipment, for that matter.

"I have a Panasonic 1124 printer which keeps blowing the only 250V 3A fuse
 on board. The fuse burns as soon as the power is turned on.

 I unhooked the components which connect to the logic board - i.e., printhead
 and tractor feed.

 Is it possible that the problem is in the power supply? If it is, what can
 it be? (The bridge rectifier consists of four hefty diodes)."

(From: Bruce A Haugh (yrp456@freenet.mb.ca)).

With the power supply disconnected from the rest of the printer circuits,
blows the fuse, the problem is with the power supply. I have a Raven
PR-9101 (made by Panasonic) that has the exact same symptoms. Turns out
that one of the secondaries on the power transformer has shorted. You'd
need schematics to confirm voltages.

(From: Robert McCallum (simply@sk.sympatico.ca)).

I've fixed quite a few panasonic printers and yes 90% of the time when the
machine is dead, it's one or more of the bridge diodes.

(From: Kerry Messana (messana@capital.net)).

It's fairly simple to diagnose where the problem is originating. If you unplug
(if possible) the output cable from the power supply and it still blows the
fuse then the power supply is at fault. As for what could be wrong, well, I am
not familiar with the particular supply. If it is a linear supply a good place
to start is the bridge circuit. If it is a switching supply you could also
start there but there are more possibilities further on.

(From: John A. McCulloch (advp@notnow.com)).

Another very common problem with the whole Panasonic 11XX series of printers
is the zener diode and pass transistor. When the diode shorts, the transistor
blows, and I mean *blows*!

8.2) Cannon LBP-8 A1 Printer 40 and 22 errors

(From: GTRIST (gtrist@aol.com)).

The 40 and 22 errors normally refer to a problem with the cabling etc. Make
sure that you have it cabled properly. Also, it can be a bit tricky changing
from parallel to serial I/O. Make sure that it is indeed selected.

Chapter 9) Fax machines and scanners

9.1) Fax/scanner striping

"One of my fax machines produces some black stripes in copy mode and on the
 documents received on another machine. Are these stripes caused by a
 malfunction of the optical diodes bar, some other electronic failure or by
 dirt?"

(From: Paul Grohe (grohe@galaxy.nsc.com)).

Probably by dirt or a paper shreds stuck in the optical path.

A common cause is Liquid Paper. Somebody makes a correction and sticks the
not-yet-dry correction into the fax. Then the still-wet correction fluid makes
a streak on the pickup window as it passes by. Subsequent faxes will now have
streaks.

I had the same problem. It turned out that the ink from a faulty page stamp
had dripped down onto the mirror.

Generally, the paper is moved and the optical path does not move. So if there
is something blocking the optical path, it will show up as one continuous
image, or stripe. The "blockage" can be a paper shred, ink, dust or even a
loose wire.

The image is usually bounced off a long, wide mirror and then into the CCD
pickup somewhere in the bottom of the machine. If anything is in this path, it
will cause that problem.

Open er' up and just look around inside for dirt and loose debris. Then
inspect the *ENTIRE* optical path. BUT DON"T REMOVE ANYTHING!!! You don't want
to mess up any alignments.

If the fax is old, or is in heavy use, you'll probably find that it is in need
of a good cleaning. Clean the mirror and blow out any dust or junk.

Also check the automatic paper cutter (if it has one) for paper shreds.

9.2) Brother Fax machine feed problems and cleaning

(From: (Al Savage) asavage@iname.com)).

I suggest you look carefully at the paper feed mechanism. Brother has a
reputation with me for feeding the scanned documents poorly, resulting is
overscanning the same area two or more times, which results in "stretched"
text or graphics. If this seems to match your symptom, cleaning the feed
rollers will probably cure this.

The downside is that a couple of the Brother fax machines that I've had to
clean force you to do an unbelievable amount of teardown work to get to some
of the feed rolls. Fortunately, I don't work on them anymore .

9.3) Brother IntelliFax 950M transmits black messy lines

"I have a Brother IntelliFax 950M plain paper fax that transmits with black
 lines or dots. When making just a copy the prints are just as bad. The
 prints are tiny square dots that make up these lines. It looks like
 digital problems and not dust on the lens. I'm not very familiar with
 plain paper faxes. It looks like a scanning failure. I'm guessing at a
 scanner or some other circuit board. Receiving faxes are ok. Has any one
 had experience with the Brother Intellifax 950M? Also, Brother has a part
 called a NUC printed circuit board. Would this be some sort of scanner?

(From: MECHSHOT (mechshot@aol.com)).

This problem is a known fault because Brother assembled these units with what
turned out to be defective scanners. They would fail after some time,
typically withing 2 to 3 years. I know, we have 3 that failed and they were
all built around the same time. The good news is Brother will supply the part
(worth about $120) if you pay for the labor (usually around 55-85). Contact
Brother Customer Service (the 800 number is in your owner's manual) and they
will refer you to an authorized service center. Get a bunch (if possible) of
different shops in your area, they charge different labor costs. You must
supply your machine's serial number to see if it is eligible for this program.

Then customer service will make out work order, send it along with part to
center of your choice.

All of the centers I spoke to were aware of this problem and were
confident once fixed, the units were very good and reliable afterwards. Check
local office equipment repair houses for more info too.   Hope this helps.

9.4) Hewlet Packard LaserJet FAX (HP C1740A)

"This machine is copying and sending fax with a line about 3 cm across
 straight down the paper. This is a thick black colour. Any ideas as to
 the cause? I have already checked that there is no paper jam or any block
 to the sensor.

(From: Robert Macy (robert.macy@engineers.com)).

I'm not familiar with the HP LaserJet FAX, but I assume the LJ scans in a page
and then sends it, or copies it. Since the black stripe is unique to sending
or copying a document (does not appear on incoming faxes), the problem is in
the HP's acquisition system.

It can either be the illumination of the page over that small section (no
light, looks black) or it can be a whole section of the linear CCD went out
(the whole section is losing any charges built up, looks black) or it can be
the memory where the image is shifted into (dead RAM section, looks black).

I don't know how the HP illuminates its pages. Is it a flourescent tube
across the page, or a row of LED's? Knowing HP's penchant for reliability I
would almost assume the engineers went after LEDs. And the section that
lights up that 3cm width could have died. However, if it's illumination that
died, usually the edges are "soft".

If it uses flourescent light (remember I said I'm not familiar with this
scanner), then it sounds like the CCD, or memory, has gone funky on you.

If the memory where the image is stored has a section that died, then you
could end up with such a stripe also. Even my ScanMan Plus by Logitech has
occasionally put a black strip on the first 10% of the pixels. To solve that
I have to do a full power OFF reset (not reboot, but full power OFF)

You can look for the illumination uniformity with your eyes. Just make sure
there is no section that's darker by a noticeable amount (not necessarily
black, but just a lot dimmer)

Put a sheet of white paper in the machine and put a scope on the output of the
CCD & sync from the line reset. Make sure that the CCD is supplying active
light information across its whole field of view. If not, you can go from
there.

If the data coming out of the CCD looks good, then it's probably the memory
holding that line. You can probably change the line storage RAM and fix it.

These are just guesses based upon how I perceive the HP LaserJet to work.
Hope somebody that *knows* this unit jumps in with more specific help.

9.5) Paper sense problems with Brother Fax

"I have a Brother 470 FAX machine that appears to have a broken micro-type
 switch that detects there is paper WITHIN the front feeder.

 Also sometime it jams paper at the rear. It looks like it cuts the paper off
 (the copy or document report) a little short and the roll of FAX paper pulls
 it back towards the roll. Thus when the roller advances the paper next time
 it gets jammed as it isn't in the feed slot?"

(From: "NO UTN" (utn@pi.net)).

My experience with brother fax:

There are 2 detectors at the output of my Brother Fax, do not know type but it
uses a roll of thermal paper.

Detector 1 simply uses an IR LED and IR receiver to sense the paper.

Detector 2 is on the cutter, when cutting paper the motor turns by means of
a worm-wheel a wheel that moves a handle that lets the cutter move. On the
wheel is a detection switch, there is a ring on the wheel from which one part
is taken away to be able to detect the home position. If cutting starts the
wheel has to be turned in a maximum time, if not the wheel is turned back and
cutting stops. The Fax gave and error message. Solution: put some oil at the
motor and it works again.

Chapter 10) Miscellaneous Problems and Procedures

10.1) Cleaning the fuser roller

Of course, the stuff mentioned below is probably banned now.

(From: uiop@cyberramp.net).

When I worked servicing copiers for Canon, we took the roller out, the wiped
it down with tri-chlor-ethane, which did a great job.

(From: Joseph Patrick (jpatrick@edge.net)).

The best way to clean a fuser is to use a very light coat of silicon oil.
This is used on the heated fuser as well as the pressure roller.

The function of the fuser is to bind the ink to the paper through heat and
pressure it should not accumulate any ink during normal use, it doesn't remove
or collect toner normally, unless the surface is dirty or deteriorated. The
teflon on the main fuser should be slightly shiny much like the surface on a
Silverstone(tm) frying pan.

The item you were thinking of is the drum wiper blade which is a part of the
drum assembly and is usually responsible for streaks / smudges that persist on
the photo drum's surface and make permanent smudges on copies.

I learned of the silicon oil treatment from a 3M service rep. I was using
alcohol in the copiers I serviced up to that time. He showed me the way to do
it by wiping the fuser components with a non linty rag with a little oil on
it until the rollers were completely clean then drying them with another cloth.
The job naturally was done with the rollers fully dis-assembled but in his
case could be done with minimum removal just so the rollers could be turned
and reached without touching the drum assembly, the oil would kill it.

10.2) Streaks on laser printer output

(From: Bruce Tomlin (btomlin@crl.com)).

There is also a drum cleaner blade which cleans excess toner off of the
drum between pages. On a regular copier, this would show as streaks or
even a double image that only shows when you print more than one page at
a time.

10.3) HP plotter communications problems

"I'm repairing HP plotter 7550 and there are some
 chips that I suspect to be broken. They are related to
 serial communications (thats what is broken). The chips
 are labeled as 1820-3321 and 1820-3322. I suspected that
 they could be 1488 and 1489 but changing them did not fix the problem"

(From Paul Grohe (grohe@galaxy.nsc.com)).

Been there, dunnit...

The serial interface on the 7550's is...well...weird!

Without the proper cable, the interface will seem "dead" or
unresponsive.

First, you need to use the *male* 25 pin connector, not the
female one (which you may automatically assume).

It requires a specially wired serial cable (you can build it
yourself). A standard modem cable with a F-F adapter will not
work. There are a few handshake lines that need to be wired. Note
that you will also need to get a *female* plug for the plotter
end of your serial cable.

There are also some menu setups required.

HP has a diagram of the needed cable and menu setups on their FTP
site. Get these two documents:

 ftp://ftp.hp.com/pub/plotters/support_doc/cable.txt
 ftp://ftp.hp.com/pub/plotters/support_doc/7550a.txt

Everything you need, short of RTFM, is in these files. There are
some other plotter docs at:

 http://www.hp.com:80/cposupport/indexes/pwin_dos.html#support

The 7550 suffers from paper pickup rollers that dry/wear out and
have trouble picking up the paper from the tray. If you look at
the rollers, there is a flat portion. The edge of the "flat" part
wears down and becomes rounded, causing it to no longer pick up
paper. Try to keep the paper tray as full as possible.
Overfilling the paper tray will cause it to pick up multiple
sheets, and that can cause a real mess!!

Check the paper feed slot and pinch rollers for shredded paper.

Also, check and make sure the screw that holds the pen carousel
together is tight. If this screw becomes loose, it will cause pen
loading problems.

It's a "helluva" plotter when it works!

10.4) Okidata FAX machine - Printer Alarm 4

"I am currently working on a Okidata fax machine Model Okifax 2100.
 The display reads: PRINTER ALARM 4[TEL], CONFIRM AND 'STOP'

 If anyone has seen this problem and would be kind enough to share the
 fix it would be greatly appreciated."

(From: Darrin Acreman (darrina@profax.com.au)).

In all Oki plain paper machines, 'Printer Alarm 4' is caused by the fuser
section failing to reach the correct operating temperature. The most common
cause is a blown thermal fuse in the fuser section.

Chapter 11) Unresolved

11.1) Packard Bell Laser Printer - Strange bug

(From: Jordin Kare (jtk@s1.gov)).

"Just picked up a used Packard Bell laser printer with some problems and
 could use help...

 Print engine is not one I'm familiar with. It's an 8 ppm engine
 that uses separate drum and developer assemblies. The drum
 assembly is attached to the top section, which hinges upwards.
 The developer assembly is attached to the bottom section, and uses
 a replaceable cylindrical toner cartridge similar to that used
 in older Canon NP-series copiers. The whole developer assembly
 can also be removed.

 Paper tray mounts underneath unit, and paper follows an "S" shaped
 path through printer, stacking face-down on top. Front panel has
 a ~16 char. LCD display and typical button/LED set (ON LINE, Form
 feed, Menu, Test, Reset).

 (Sorry, don't have the model # to hand. Printer was built in late 1993.)

```
     Printer executes power on self test OK, warms up, and goes on line.

     Problem 1:  Take it off line and push test, and the motor whirs briefly,
     then stops.  The LCD display then reads:  'ERROR 74-M: MOTOR'.  Reset has
     no effect; printer must be power cycled to get it to restart.

     Interesting variation:  The top section is held down by two large catches
     at the right and left sides of the printer.  The 'hooks' are released by a
     button on the top section.  It's possible to get only the right-side hook
     to catch, leaving the left side 'loose' and raised by about 1/4 inch.  In
     this condition, the printer will start up and work fine (except for problem
     2 below) for many pages.  Eventually, it will stop with ERROR 74-M again.
     Pushing down the left side will cause an immediate ERROR 74-M.

     I assume there's something binding or sticking a bit in the various rollers,
     such that the motor draws too much current or otherwise triggers an error
     when the top is latched down.  Releasing the top on one edge reduces the
     pressure on the various rollers and thus the load on the motor.  But I can't
     find any obvious points of sticking.

     Problem 2:  When the printer *does* work, with the cover popped, the leading
     edge of the page, down to the first line of print, is dark grey.  The grey
     is faint on the first page or after a restart or long idle, but uniformly
     dark on all pages thereafter.  It tends to be striped along the page (varying
     darkness as you move left-to-right; uniform as you move top-to-bottom).  The
     grey disappears at the first line of text.  There's also a slight "ghost";
     text printed near the top of a page is repeated faintly further down the
     page, apparently displaced by one rotation of the drum.

     This seems most likely due to a bad cleaning blade or clearing corona.
     Anyone have any suggestions other than replacing the drum assembly?
     Also, anyone recognize this print engine, so I can track down
     parts via sources other than Packard-Bell?"
```

Chapter 12) Service Information

12.1) Copier forum

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This is a newsgroup style bulletin board for copier selection, troubleshooting,
repair and appears to be a good archive if you should need to find something
not in this document - hard to believe, but possible :-).  However, it is
separate and distinct from any Usenet affiliation as far as I can tell.

        http://copynet.tinfox.com/forums/copier1/forum.html
```

12.2) Fax machine repair and consulting

While this is a commercial site, they do seem to have a considerable amount
of FAQ-like information as well as links to FAX manufacturers and other
resources.

Web: http://members.aol.com/faxrepair/fax_page.htm
Email: FaxRepair@aol.com

12.3) HP LaserJet parts

HP has a parts identification search facility at:

http://outfield.external.hp.com/cgi-bin/uncgi/spi/main?sel_flg=toplevel

You must register but on-line searching is free (there is also a CD
available).

(From: Dave Lee (leedj@uwec.edu)).

Dor HP Laser printers, try:

* Parts Now, Inc, 1-800-886-6688, http://www.partsnowinc.com/
* The Printer Works, 1-800-235-6116, http://www.printerworks.com/

12.4) Printer parts

(From: Tony Duell (ard@p850ug1.demon.co.uk)).

I've heard good things about a company called 'The PrinterWorks' for HP
(and other Canon) laserprinter parts. They have a web page with an on-line
catalog and search facility at:

* The Printer Works
  3481 Arden Road
  Hayward, CA 94545 USA
  Phone: 1-800-225-6116
  Web: http://www.printerworks.com

All kinds of parts are available even down to that little brush stored inside
your HP LaserJet Series II: The SX engine parts catalogue shows that the part
on page 350 (feeder assembly) as part number RF1-1177-000. It costs $1.23 plus
shipping. Or, that 27/21 tooth fuser driver gear (RS1-0287-000). It costs
$1.10 in quantities of 1.

(From: Dave Lee (leedj@uwec.edu)).

* Parts Now!, Inc.
  Madison Wisconsin.
  Phone: 1-800-668-6688
  Web: http://www.partsnowinc.com

I have used them for the last 4-5 years for HP Laser and ink jet parts. They
also do some Panasonic parts.   Great tech support, good prices, same day

shipping, etc. They have treated me very well. Also, service information
on a variety of printers.

(From: Paul Strider (pstrider@phys.ufl.edu)).

* PC Service Source
  2350 Valley View Lane
  Dallas, TX 75234
  Phone: 1-800-727-2787
  Fax: 1-972-406-9081.

(From: George Hurley (ghurley@voicenet.com)).

* LaserImpact
  Phone: 1-800-777-4323.

They'll even fax or mail you a diagram of printer subassemblies so you can
identify the exact part you need.

(From: Dave Noseworthy (davenos@pesl.com)).

* Try http://www.katun.com/. They are a business machine (i.e.,
  copier/fax/page printer, etc.) part supplier to office equipment dealers. If
  they won't sell direct to you, I'm sure they'll indicate a local dealer.

(From: SargW1 (sargw1@aol.com)).

* Laser Products Co.
  1010 E 18th St.
  Kansas City, MO 64116
  Phone: 816-421-7830.

(From: Sid Ashen-Brenner (sashen@midusa.net)).

* Affordable Photocopy, Inc.
  http://www.photocopiers.com/

You may be able to get a Service Sheet with the error codes (among other
information). They also sell parts & supplies.

12.5) LaserJet II Where is the fuse?

(From: Tony Duell (ard@p850ug1.demon.co.uk)).

There are 3 fuses/breakers to my knowledge:

The mains circuit breaker is in the AC block (right hand side of the
fuser). It's hidden by the fan duct, but that's quite easy to remove if
you have the casing off. The breaker is a little rectangular object with a
button on top, on the lower PCB. Press down the button and try again.

The Low Voltage PSU contains the other 2 fuses. One is in the mains side,
and is a normal 20mm cartridge fuse. If you remove the casing and the
bracket round the front of the printer (6 screws), you can see this fuse
on the PSU PCB. This fuse is a listed spare part at 'the Printerworks',
which is strange, since the only time it should fail is if there's
something majorly wrong with the PSU, and no other PSU spares are
available.

The other fuse is a thermal one, clamped to the heatsink in the top right
corner of the PSU PCB (looking at it from the component side). This one
protects the 24V pass transistor that on the same heatsink. I've never had
to replace this one, so I don't know what the rating is.

If all the fuses are good, then you need to do some more troubleshooting.
Firstly, check for mains at the 2-wire connector to the LV PSU. If that's
missing, then you need to remove the mains input block (easy, once you've
removed the fuser), and sort it out. It's _very_ simple, and should pose
no problems.

If mains is present at the input to the LV PSU, check its outputs. Remove
the base cover, and sit the printer on the right hand side. The LV PSU
output is on the 14 pin connector in the middle of the engine control (DC
controller) PCB. The front 2 pins are ground, the next 2 are +5V, and the
rearmost one is +24V. If they're missing, you have a PSU problem.

Good luck in that case - Canon flatly refused to supply me with any spares
for the PSU. They claimed that it would be dangerous to repair it. Quite
why it's more dangerous than any other SMPS that I've worked on remains to
be seen.

12.6) LaserJet III Where is the fuse?

"I am looking for the fuse of an HP LJ III. I shorted an exposed wire
 to ground at the fuser unit with my screwdriver. It was exposed
 because someone broke the cover of the fuser unit. Now the printer
 gets no power, the front display does not light, the fan does not come
 on. I looked for the fuse in all obvious places to no avail. Any
 hint is appreciated.

(From: Patrick Mulvey (pmulvey@li.net)).

A number of the fuses that are in the laserjets are hard to spot. There is
a small component on the boards that is a small black disk. You will have
to follow the wiring from the fuser back to the board and look for this
small component (fuse). I have on one occasion lost power to the paper feed
motors installing a card access device (defective harness shorted the
motor to ground), and found the "fuse" after looking everywhere. Looks
like a disk cap but leads are on opposite side of the disk and its mounted
parallel to the PCB. Hope this helps...

12.7) Copier and laser printer manuals

(From: Gerald Chafee (GChafee@worldnet.att.net)).

I have had good luck purchasing manuals from a company called "Wright-Moore
Corp, P.O. Box, 66019, Indianapolis, IN. 46266-6019. I have bought a ton of
Toshiba parts and manuals for less than a quarter what any Toshiba repair
parts distributor quotes and I know that they are a distributor for Mita. The
only possible problem is that they want to deal with someone that has a
business license (read resale or Tax ID certificate). If you know someone that

will let you use their name and / or address, Wright-Moore doesn't care if it
is copier or laser printer connected. They do have an 800 number which I don't
have in front of me but is listed with 800 directory assistance.

12.8) Canon information

Canon has a faxback service at 1-800-526-4345. Quite a bit of technical
information is apparently available for their printers.

12.9) Epson printer switch settings

(From: Kim (103114.1526@compuserve.com)).

Check Epson's web site?. There is a FAQ that may give you some info at:

>   http://www.epson.com/connects/faq.html

If you can access to their ftp, you will find the DIP Switch setting file
for your printer at:

>   ftp://ftp.epson.com/impact/LQ85DS.TXT

12.10) Printer schematics?

"Working "on my own" Okidata microline 590. Need a print of mother PCB
 and regulator PCB. A copy of the schematic will save time and let this
 OLD TV tech enjoy life....   Thanks"

(From: Joe Wagg (jwagg@fs.cei.net)).

Good luck. Even the Okidata service manuals don't have schematics. The
easiest and most cost effective way I know to fix these printers is to
send the board off to be repaired. I'm not sure about the price, but
the logic board for that model is probably around $100, assuming you
send yours in to be repaired. This way you get a known good board with
a guarantee. I suggest using Laser Impact, address below. Hope this helps.

(From: Uncle Monster (unclemon@bellsouth.net)).

Try "Ted Dasher & Associates" (http://www.dasher.com), 1-800-638-4833. Ted
sells refurbished HP equipment out of Birmingham, AL, He may sell you the
parts, info or a trashed printer with the parts you need.

12.11) References

Here is the start of a list....

1. Maintain and Repair Your Computer Printer and Save a Bundle
   Stephen J, Bigelow
   Wincrest/TAB Books, a division of McGraw-Hill, 1992
   ISBN 0-8306-2563-2, ISBN 0-8306-3507-6 (paperback),

2. Easy Laser Printer Maintenance and Repair
   Bigelow et. al.
   Windcrest Publishing
   ISBN: 0070359768

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