NVRAM and Formater Replacement in the HP LaserJet 4240, 4250, 4350

The formatter board in a laser printer has several functions, but the most important ones have to do with communication. The printer communicates with the computer through a parallel cable or a USB cable or a network card, all of which plug into the formatter. And it communicates with the user through the control panel, which also plugs into the formatter. In this article, we will be more concerned with the second type of communication.

Communication through the control panel is in both directions. The printer lets the user know (by way of lights and, on higher-end printers, messages on the LCD display) its status: when it's warming up, when it's ready for data, when it's receiving data, etc. It also notifies the user when there's a problem – e.g., the printer is out of paper, or has a paper jam or some other sort of error condition.

The user can also communicate with the printer through the control panel buttons or keys. On low-end printers without an LCD display, this is restricted to simple things like resetting the printer or requesting it to print a test page. But on a printer that has an LCD display, you can also use the control panel to view and edit menu settings that control how the printer operates (theoretically, you can also do this on the low-end printers, but it has to be done from the computer, using software or PJL commands).

These menu settings, along with page counts, serial numbers, and any other information unique to the printer, are stored in an IC chip called an NVRAM (non-volatile random-access memory). Typically, the NVRAM is soldered onto the formatter board, so whenever this board is replaced, the printer must be reconfigured – i.e., the information from the old NVRAM must be rewritten into the new one. On most printers, this is a manual process – you have to go into the menus to re-establish settings, and into service mode to reset page counts and serial numbers. Ideally, you would have a Configuration Page (printed using the original formatter) as a reference for this information. If you are unable to print this page (this may be the reason why you are replacing the formatter!), you may have to guess at the information or get it from another source.

To get around these problems, HP did things differently in the LaserJet 4240/4250/4350 series of printers. In these printers, both the formatter board and the DC controller board have NVRAMs, so that all the information described above is stored in two places. If you have to replace either board, the printer automatically copies all the information to the NVRAM on the new board, using the other board – the one that wasn't replaced – as a source. Of course, if you have to replace both boards at the same time, you may still have the problems described in the last paragraph, but that's a rare case.

However, along with new solutions come new problems. Since all these printers use the same formatter (but see the note below about network and non-network versions of this formatter) and the same DC controller, the only way the printer knows its own identity is by a "tag" written into the NVRAM. If you don't use the correct procedure when replacing the formatter and/or DC controller, the tag may not get copied properly, and your printer may lose its identity. For example, your 4350 may now think that it's a 4250 – and perform like one (i.e., 10 pages per minute slower)! To avoid this, it's essential to use the correct procedure!

Here is the procedure given in the HP Service Manual:

If installing only one board (formatter or DC controller but not both), first install the board, then turn the printer on, and wait for five minutes after it reaches the "Ready" state. Then turn the printer off, and again turn it on and wait for five minutes after it reaches the "Ready" state. At this point, all information (including the printer identity tag) should have been copied into the NVRAM on the new board, but print a Configuration Page (this is found in the printer's Information Menu) to verify this. In our experience, the normal information (menu settings, page counts, etc.) seems to get copied almost immediately, but it may take the full five minutes (twice) to copy the printer identity tag.

If installing both boards, HP recommends doing it in two stages: first replace the formatter using the above procedure; then replace the DC controller, using the above procedure again. This will require four separate five-minute waiting periods, but that's a small and worthwhile investment if it avoids downgrading the printer!

The HP Service Manual has one additional procedure: if installing a "replacement" formatter (as opposed to a "new" one, although they don't explain the difference – our guess is that "replacement" refers to a used or refurbished board that has already been installed in another printer), they recommend starting

out with an NVRAM initialization procedure. In our experience, this didn't seem to make any difference – the correct information got copied into the replacement board whether or not we did the NVRAM initialization. But if you want to go by the book, be aware that the NVRAM initialization procedure given in the HP Service Manual is incorrect and doesn't work. Here is the correct procedure:

1. Start out with the printer powered off and all accessories and network cards removed.

2. Turn the power on, wait for the memory count to begin, and then press and hold the "Down Arrow" button.

3. After all three control-panel lights flash once and then remain on (this should take about 10 seconds), release the "Down Arrow" button.

4. Press and release the "Up Arrow" button.

5. Press and release the "Menu" button. The display should show "SKIP DISK LOAD".

6. Press the "Up Arrow" button until "NVRAM INIT" is highlighted.

7. Press the "check mark" key. The printer will perform the NVRAM initialization procedure and then continue with its normal power-on sequence.

HP claims that you will now have to go into the service menu and specify the total page count, the maintenance count, the service ID, the cold reset paper size, and the serial number. But in our experiments, these items got copied over from the other board even when performing the NVRAM initialization procedure.

Network and Non-Network Versions of the Formatter

We stated above that the 4240, 4250, and 4350 all use the same formatter, but this is not strictly true. There are two different formatters for this series of printers, but the distinction is between network and non-network models, not between different numerical models. For example, the 4240n, 4250tn, and 4350dtn all use the same formatter (because all have a letter "n" in the model name/number, meaning that they are network-ready), but the 4250 and the 4250n would use different formatters.

The non-network versions of these printers all have EIO slots, so they can be upgraded to network capability by adding a JetDirect card. But the network versions have this built into the formatter board, so when replacing this board, it's important to get the right version. The network version (for printers with a letter "n" in the model name/number) is Q3652-67905; the non-network version is Q3653-67904.

Conclusions

In conclusion, formatter replacement in the 4240/4250/4350 series of printers is simpler than in most other models – you should not have to manually re-enter menu settings, page counts, etc. But the trade-off for that is that you do have to follow a specific procedure when powering up the printer after the installation of the new board – and you must also do this after replacing the DC controller board. However, the procedure is easy to do, and worth the extra time, as your printer identity (and performance!) may be downgraded if you fail to follow the correct procedure. Just make sure you get the right board (network or non-network) for your printer, and follow the directions in this article, and you shouldn't have any problems.

—Dennis Kosterman