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RGB INK SIGNALLING SYSTEM

HP INC

RGB Ink Signalling System

1. Problem solved

Analyze the information improvement from Ink Supply System to the user using RGB lights instead of fixed colors.

Nowadays, in most of the LFP printers, the Ink Supply System has 3 colors signaling to indicate the user the status of each ink supply. This kind of signaling is simple but it is fixed in functionality and versatility to each LED color mounted on the PCA. Moreover, the cost of this system is high because each LED of each ink supply must have a wire and a driver.

It would be desirable to have an indicator which gives a more flexible information to the user (managing color, and intensity), cheaper, simpler to implement, easier to test and scalable.

The new RGB LED technology includes all the required electronics into each individual LED using a simple daisy chain connection between them.

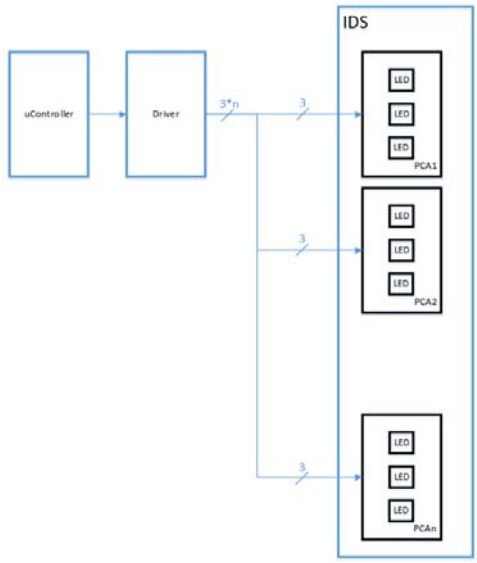
This RGB LED technology has the following achievements:

1. More information given to the user through a wide variety of colors and intensities
2. Reduce cost of the system minimizing the required number of wires and electronics.
3. Simpler to implement and drive.
4. Improving testing capabilities.
5. Scalability to more than 1000 LEDs.

2. Implementation

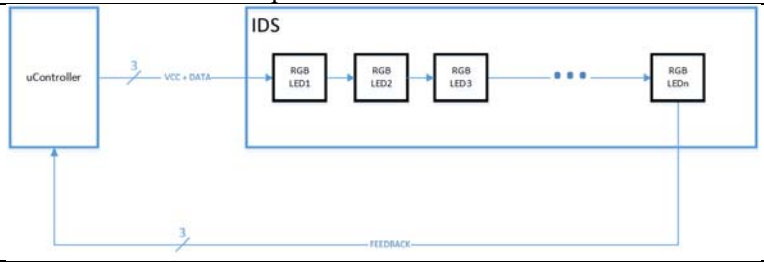
2.1 Prior Solutions

All the HP printers have a light indicator for the inks which give information to the user related to the status of the ink supply (not present, empty, error…). This information is represented using tree different fixed colors (red, yellow and white) to the user. The system is complex as each ink supply has 3 different LEDs which gives to the implementation a high amount of electronics and cables for their control (for example, in Skaar program 27 wires and drivers are needed to drive all the light system of the Ink Delivery System).

Prior Implementation	
Current Ink Supply Signaling PCA	

2.2 Description

The new system has all the LEDs connected in daisy chain (one led after the next one). This chain is being fed of data from a micro controller using only one data wire line and ends to the same micro controller getting the feedback from the chain.

New LED Implementation	
New Ink Supply Signaling PCA	

2.3 Documentation

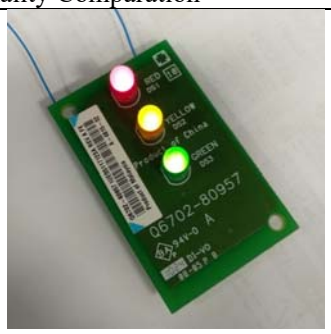
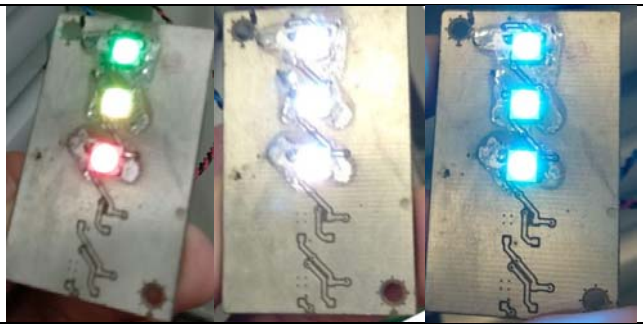
2.3.1 PCA

It has been developed a simple PCA which integrates RGB LEDs solving all the objectives listed before:

Ink Supply Indicator PCA	
	
New Ink Supply Signaling PCA	Current Ink Supply Signaling PCA

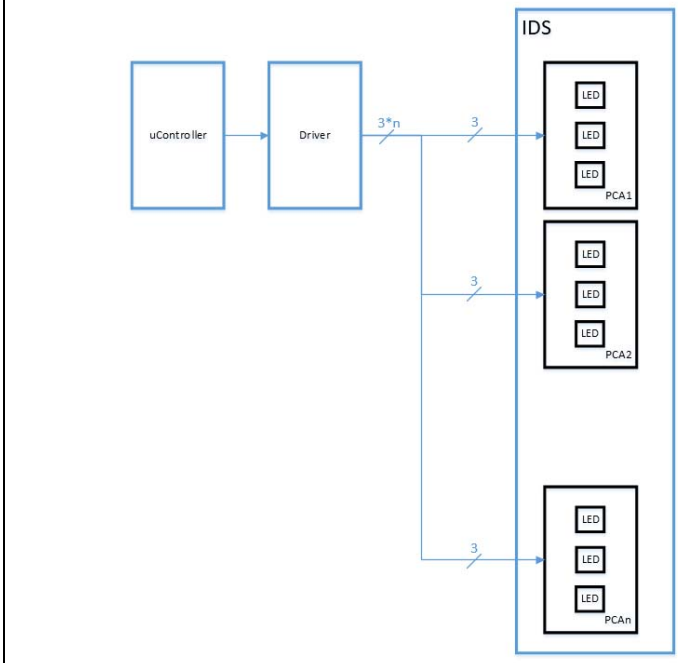
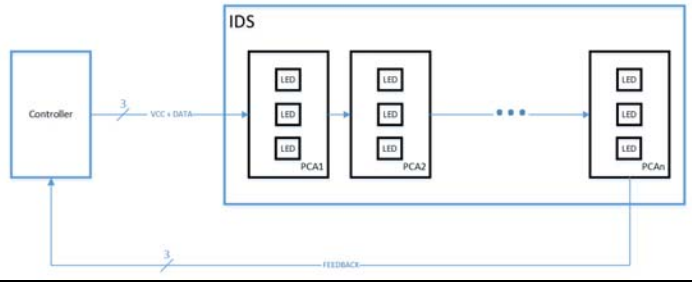
The new PCA could have 1 to 5 LEDs installed. It could have the same functionality just using one LED and could be improved as much as desired depending on each program scope.

2.3.2 Functionality

Functionality Comparation	
Current Ink Supply Signaling PCA	
New Ink Supply Signaling PCA	

The new PCA could have the desired color and intensity for each LED and could be programmed on live.

2.3.3 Implementation

<table>
<tr><th colspan="2">Implementation Comparation</th></tr>
<tr><td>Current Ink Supply Signaling PCA</td><td> 
</td></tr>
<tr><td>New Ink Supply Signaling PCA</td><td> 
</td></tr>
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The implementation uses a simple 3 wire cable (power supply, communication and ground) to connect all the system having the possibility of connecting a feedback wire to improve the testability. The cost of the system will be improved as well as the simplicity to manufacture the printer. Serviceability will be easier.

2.4 Advantages

This RGB LED technology has the following advantages:

1. More information given to the user thanks to the wide variety of colors (16 Million) and intensities (256 steps).
2. Reduced system cost minimizing wires and required electronics.
3. Simpler to implement and drive. Just one communication pin from a regular micro controller plus supply.
4. Capabilities improvement for servicing and automatic testing
5. Scalability to more than 1000 LEDs using the same hardware.

Disclosed by Jorge Muelas Barragan, Javier Chavarria and Jose Francisco Bravo de Vega, HP Inc.