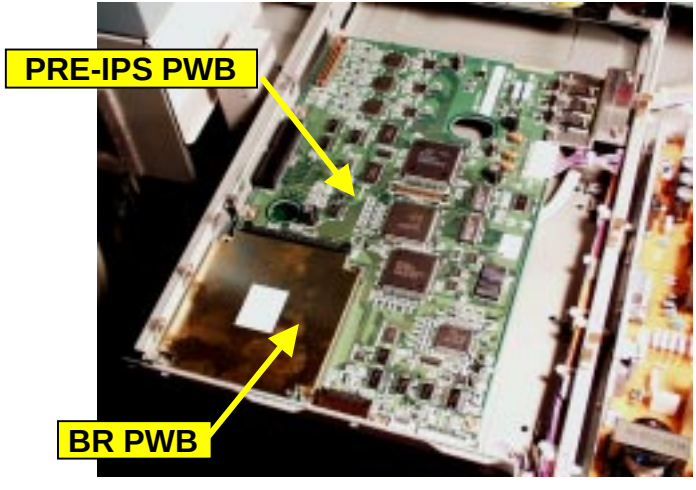
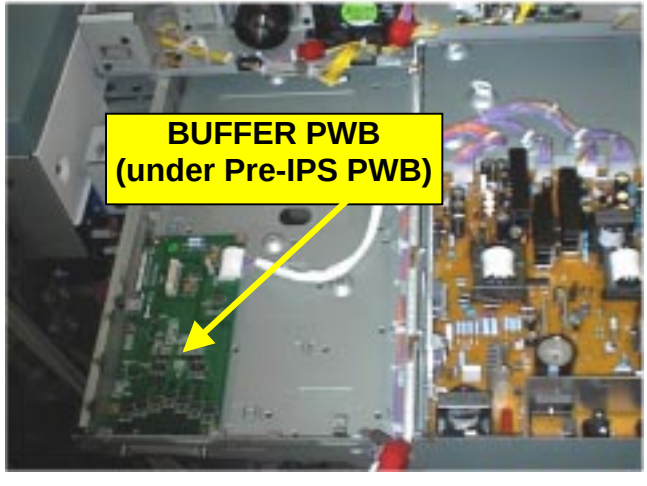
Image Processing and IIT PWB Functions

Image Processing is divided into two groups of PWBs, the Pre-IPS PWBs, and the IPS PWBs, These PWBs are only included in the DADF configuration and perform all image processing associated with image sensing and scanning.

The remaining PWBs in the image processing path are common to all machine configuration.

The next set of photos show the location of the PWBs described in this section of the P of O.





The **BR PWB** is located inside a gold case on top of the Pre-IPS PWB.

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Image Processing and IIT PWB Functions (continued)

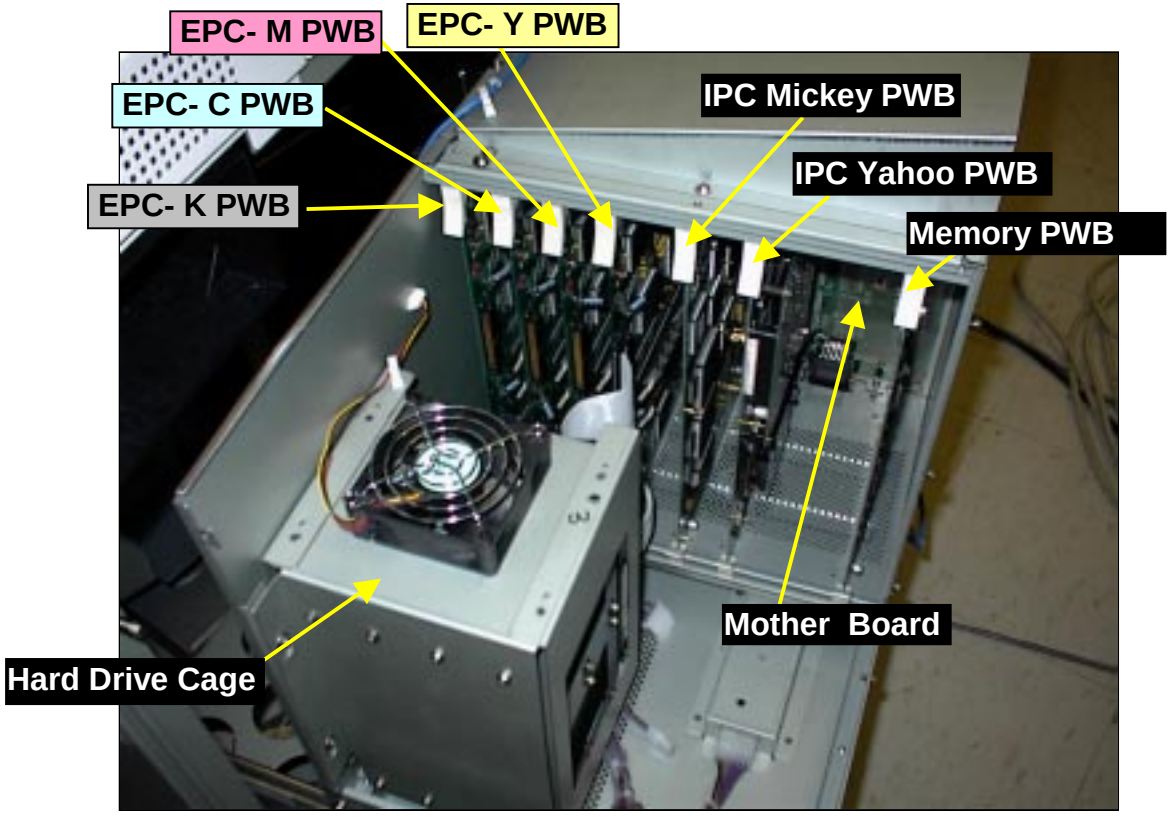

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Image Processing and IIT PWB Functions (continued)

Pre-IPS PWB

The Pre-IPS PWB accepts six line of analog color data from the CCD PWB. These are in the form of two sets of three color lines: Red, Green and Blue. The Table 1 below, lists the Application Specific Integrated Circuits (ASICs) contained in the Pre-IPS PWB.

Table 1, Pre-IPS PWB ASICs and their functions

ASIC Name	Functions
Analog Interface	1. Amplifies the analog signal 2. Offsets DC offset for varying analog AC signal 3. Multiplexes between two analog inputs for each color
Analog-to-Digital Converter	Converts analog input to digital value between 0 and 1023 (10 bit resolution)
IIC	1. Converts W-Reference 2. Corrects W-Level 3. Corrects shading using 7.5 kilobytes of RAM for each color 4. Corrects gap using a 7.5 kilobyte FIFO (First In First Out) chain for each color 5. 1 X 5 Filter 6. Generates the CCD PWBA 9.97 MHz sample and shift clock.
SID	1. Senses original document size 2. Senses background color (ENL [Equivalent Neutral Lightness]) 3. Senses original color (ACS [Automatic Color Sensing]) 4. Corrects color (ACC [Automatic Color Correction])
TRE	1. Enlarges/reduces image in one direction, when enlargement / reduction is requested by user 2. Rotates/repeats image, when requested by user 3. Creates mirror image, when requested by user

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Image Processing and IIT PWB Functions (continued)

NOTE: Figure 2, shows the signal flow through the Pre-IPS PWB.

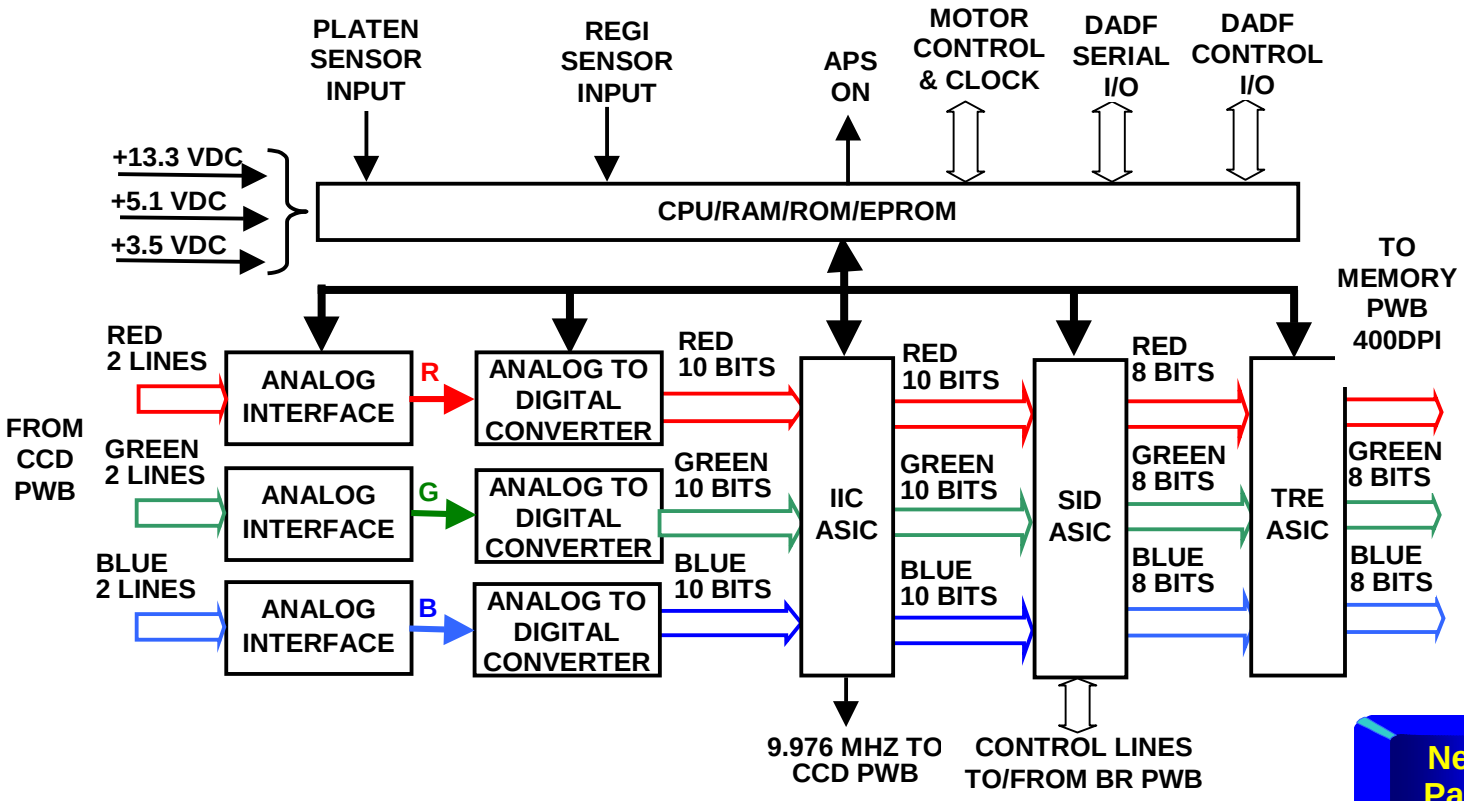

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Image Processing and IIT PWB Functions (continued)

In addition, the Central Processing Unit (CPU) on the Pre-IPS PWB accepts inputs from the following sensors:

1. Platen Open Sensor, indicating the presence of paper on the platen
2. IIT Registration Sensor, indicating when the Full Rate Carriage passes is in the True Registration Position
3. DADF Automatic Paper Sensing (APS), indicating how far the document original extends from the True Reference Position

BR PWB

The BR PWB contains the currency detection function. This board is required by the government to prevent counterfeiting. No further information is available.

Memory PWB and Memory Hard Drives

Each scanned image is stored in a memory subsystem comprising a Memory PWB and 5 Memory Hard Drives (one drive each of C, M, K and two for Y). As partially shown in Figure 3, the image is accepted by the Memory PWB from the Pre-IPS PWB and is provided to the IPS PWB. Each image pixel is defined by eight bits for each of three colors: red, green and blue. Each color RAM on the Memory PWB has a standard capacity of 32 MBytes or an optional capacity of 64 Mbytes of RAM. The standard 96 MB total of RAM capacity is large enough to store a single 11" by 17" image or two 8-1/2" by 11" images. Once processed the single color images are actually stored on the Hard Drives.

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Image Processing and IIT PWB Functions (continued)

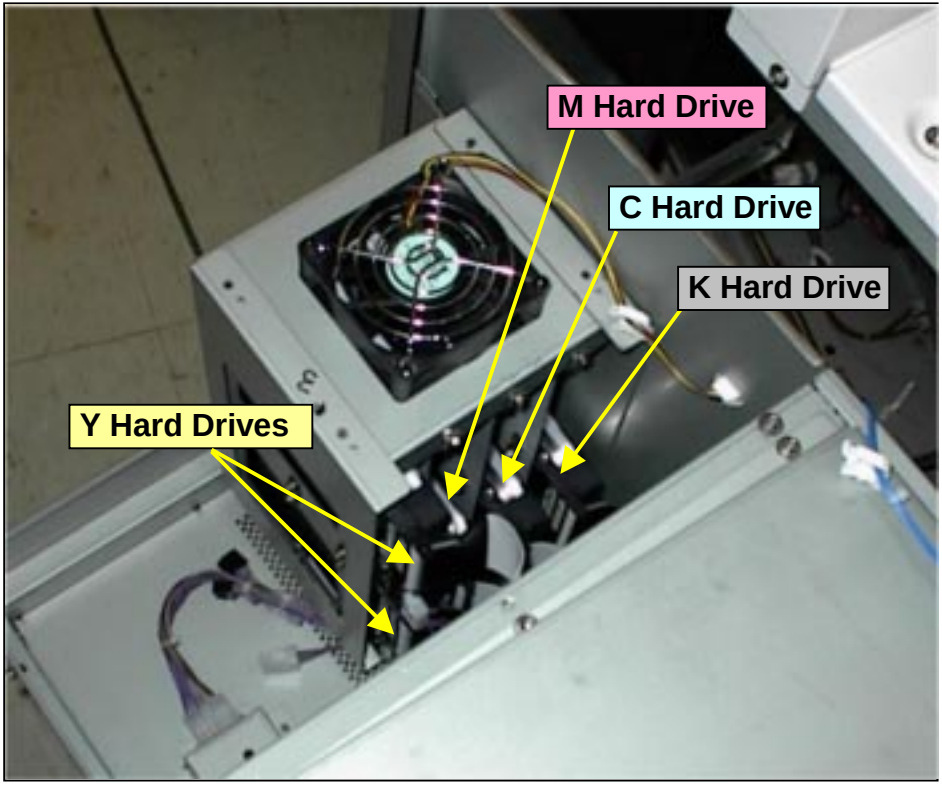

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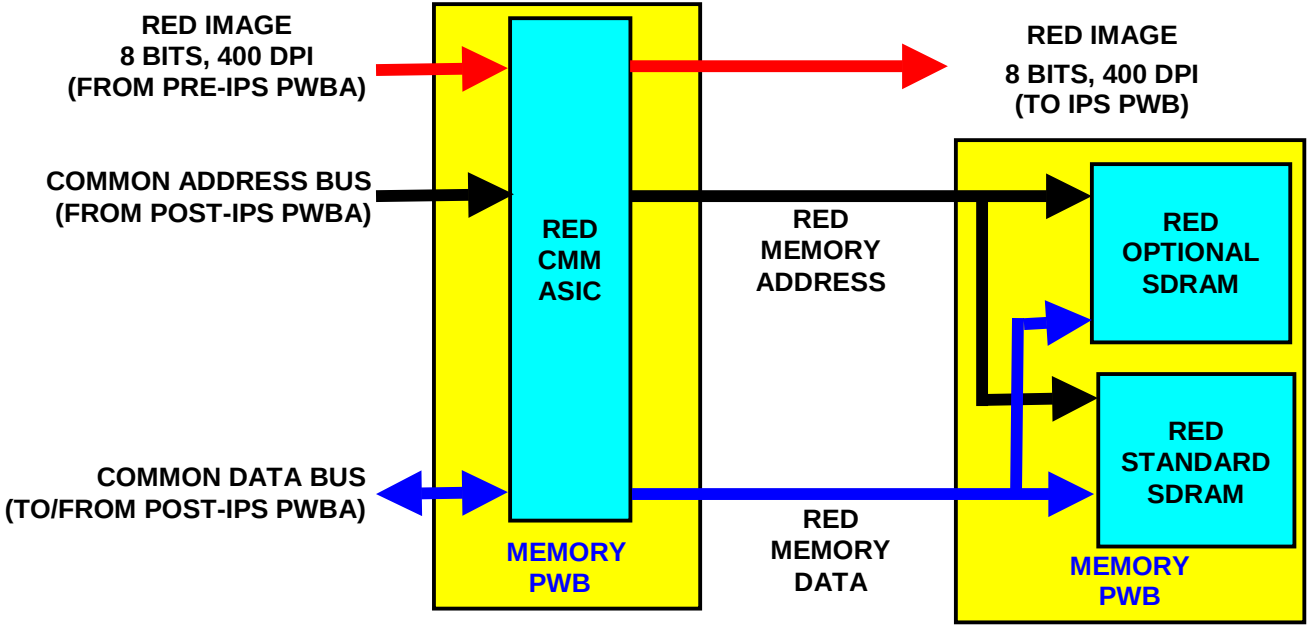
Image Processing and IIT PWB Functions (continued)



Red Memory Block Diagram

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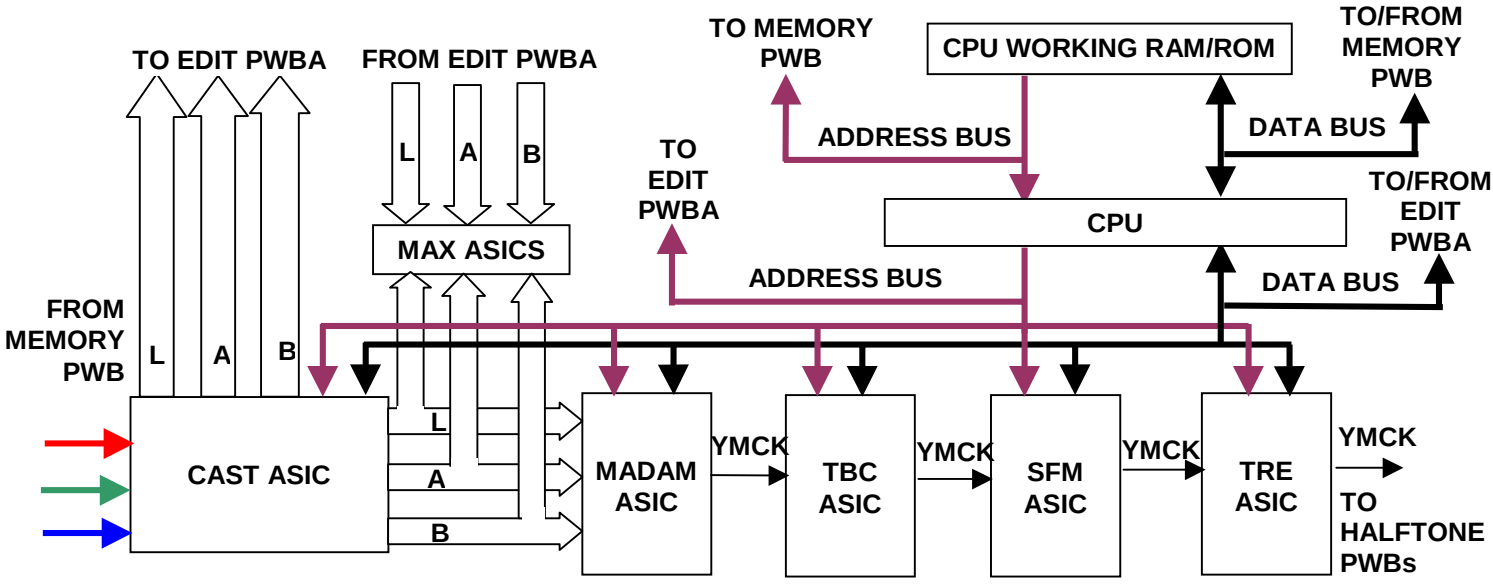
Image Processing and IIT PWB Functions (continued)

Each color memory is controlled by a unique CMM, located on the Memory PWB. The three CMMs are themselves controlled by common address and data buses from the IPS Yahoo and IPS Mickey PWB.



IPS Yahoo and IPS Mickey PWB Block Diagram

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Image Processing and IIT PWB Functions (continued)

IPS Yahoo and IPS Mickey PWB

The IPS Yahoo and IPS Mickey PWB processes 8-bit RGB image pixels retrieved from the Memory PWB and provides them in YMCK (yellow, magenta, cyan, black) format to the two Video Select PWB. The IPS Yahoo and IPS Mickey PWB first converts the RGB data to a L*a*b* format.

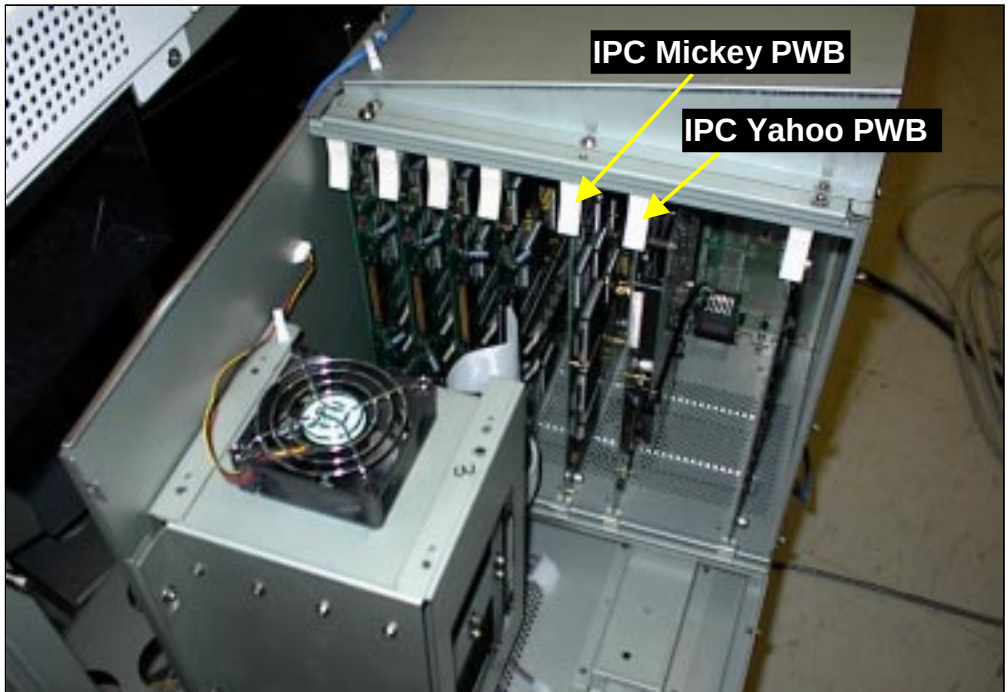

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Image Processing and IIT PWB Functions (continued)

The intermediate data can be passed to and from the Edit PWB located on top of the IPS Yahoo PWB.

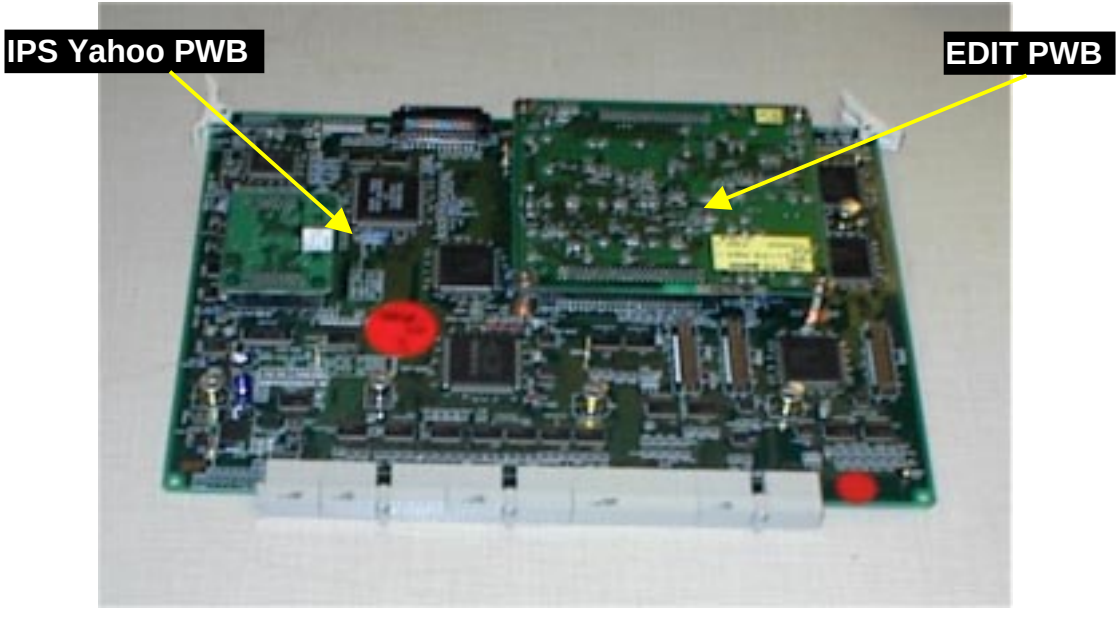

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Image Processing and IIT PWB Functions (continued)

All the functions of the IPS Yahoo and IPS Mickey are contained in the ASICs described in Table 2. below.

Table 2. IPS Yahoo and IPS Mickey PWB ASlCs and their Functions

ASlC Name	Functions
CST	Converts image from RGB format to L*a*b* format
MAX (3 total)	Differentiates between text and image areas of document original
TRE	Enlarges/Reduces in one dimension; Creates mirror image; Shifts Image
TBC	Converts 400 DPI to 600 DPI; generates timing signals
CPI	Generates chip selects; Contains priority interrupt controller; Generates delay signals

The IPS Yahoo and IPS Mickey PWB retrieves the RGB information from the Memory PWB four times on a pixel by pixel basis. This is because all three input values are required to construct all four output values. The image's pixel color information is provided to the YM VSEL PWB and the CK VSEL PWB. The IPS Yahoo and IPS Mickey PWB circuitry provide the information in the following order:

1. All yellow (Y) information
2. All magenta (M) information
3. All cyan (C) information
4. All black (K) information

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Image Processing and IIT PWB Functions (continued)

Likewise, all of a pixel's RGB data must be extracted from memory before it can be translated to L*a*b* format and provided to the Edit PWB.

This process is modified if the document originals are 8-1/2" X 11"/A4 or smaller. In this case, the two images are loaded sequentially into the Memory PWB in the following order:

1. R1, Gl, B1 simultaneously
2. R2, G2, B2 simultaneously

However, the images are extracted from the Memory PWB in a different order.

1. R1, Gl, B1 simultaneously to construct Y1 and L1 *al *bl *
2. R2, G2, B1 simultaneously to construct Y2 or L2*a2*b2*
3. R1, Gl, B1 simultaneously to construct M1
4. R2, G2, B2 simultaneously to construct M245.
5. R1, Gl, B1 simultaneously to construct C1
6. R2, G2, B2 simultaneously to construct Y2
7. R1, Gl, B1 simultaneously to construct K1
8. R2, G2, B2 simultaneously to construct Y2

This enables the IPS Yahoo and IPS Mickey PWB to present the color information in the following order: Y1, Y2, M1, M2, C1, C2, K1, K2, to the four Halftone PWBs in the Xerographic subsystem for simultaneous processing of two 8-1/2" X 11"/A4 images.

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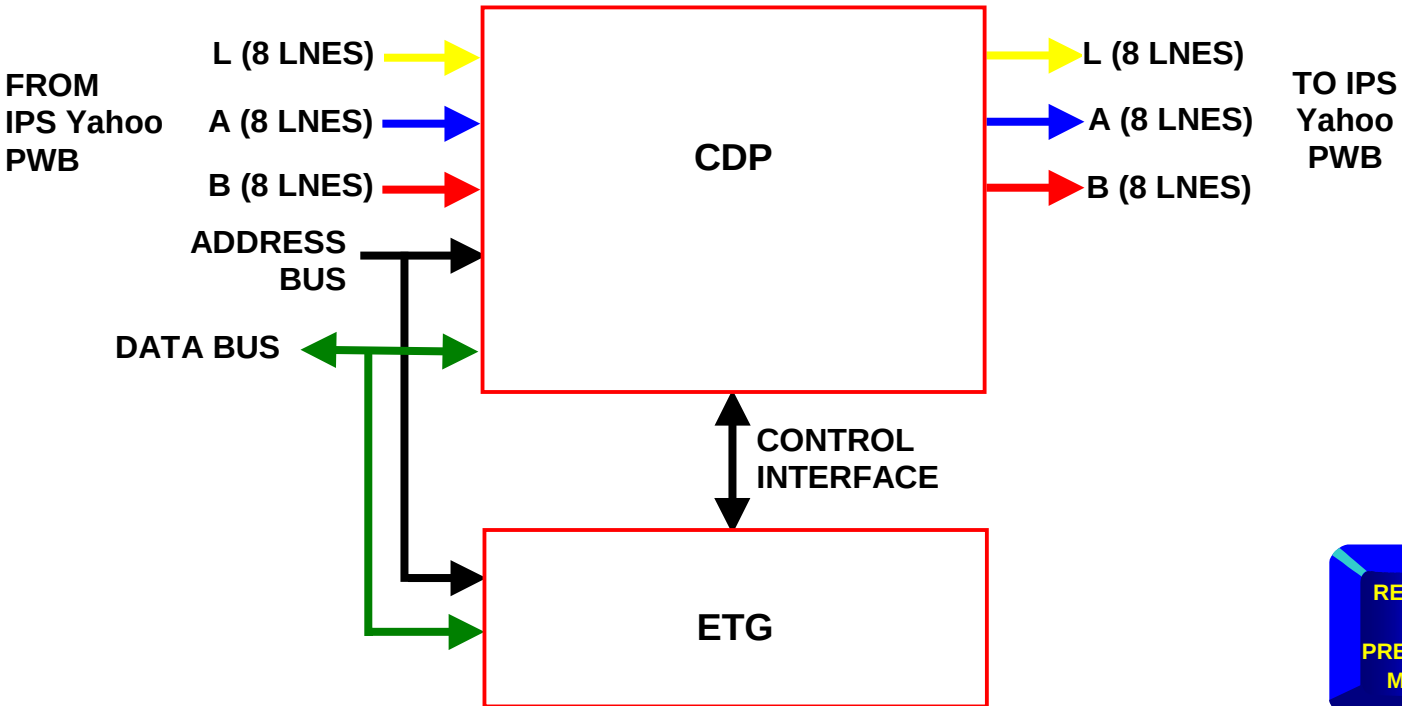
Image Processing and IIT PWB Functions (continued)

Edit PWB

The Edit PWB permits portions of the scanned image to be removed. The Edit PWB is a daughterboard of the IPS Yahoo PWB. The image is accepted from the IPS Yahoo PWB format in L*a*b* format and processed in two ASICs.



RETURN TO PREVIOUS MENU