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COMTAL User's Note No. 3

Running the Color Classification Processor on the COMTAL

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RUNNING THE COLOR CLASSIFICATION PROCESSOR ON THE COMTAL

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The Color Classification program (written by Bill Shelly of the St. Regis Corporation) contains two routines, COLOR and COLKEY. COLOR allows the user to assign a different color to each class in a classification image, up to a maximum of 256 separate classes. The processor is run from the PDP terminal and operates by changing pseudo-color memories of the COMTAL. COLOR can also be used as a level slicer for monochrome images. Each gray level can be considered a separate class and may have a color assignment. COLKEY forms a data file in the PDP which can be transfered to the COMTAL to display a key or legend showing the color choice for each class. COLKEY is limited to 18 classes with a comment about each class.

The Color Classification program is one of the items listed in the menu for the Comtal Utilities Program. To access the menu, log on to the PDP, type RUN COMTAL, and select the processor; you may type either the name (CCLAS) or the corresponding number; the numbers may change from time to time but the names will not.

1. The COLOR Routine

After typing CCLASS and pressing RETURN, you will receive another menu. By entering the name (COLOR) or the number of the function, you will move to the next step of the program. The prompt:

Old Command Statement File Name

will appear. If you have a color file already set up, enter the file name, depress return, and your previously assigned color choices will be processed. In most cases you will not have a file already availble. When that is the case, simply enter a null line (by hitting RETURN) and you will receive the next prompt, which is:

Output Command Statement File Name.

If you wish to save the color assignments you are about to make for future use, type in a file name in the following format: XXXXXXXX.ZZZ . The first name is any character string up to nine characters long followed by a period and a file type up to three characters long. If you do not wish to save your command statements, simply enter a null line in response to the prompt.

Upon depressing the RETURN key, you will receive another prompt:

Enter Command Statement

(You will see three lines of writing concerning the red, green, and blue components of the colors prior to receiving the prompt). The first command statement you should enter is

INITialize(RGB).

RGB is any three-integer digit from 000 (black) to 999 (white) and determines the color of the initial background. This command also initializes the pseudocolor memories of the COMTAL and removes any left over color assignments from prior users. You will receive the Enter Command Statement prompt every time you depress the RETURN key until you stop the program.

The general format for the command statement used to assign the colors is as follows:

OPERation(X,RGB)

where:

OPERation = any of the command statements (only the first four letters are necessary),

X = class number or numbers, separated by a comma, and

RGB = color number.

The color is defined by a three-digit number from 000 (black) to 999 (white). The first digit is a value for the red component, the second for the green component, and the third for the blue component. There is a color chart in the COMTAL room which shows all of the colors available. On that chart the large number below each square is the red value, the number on the side of the square is the green value, and the number on top of the square is blue value (see diagram below).

More than one class may be assigned to the same color. Example:

CLASses(1,2,3,5,7,9,10,11,12,787).

In this example the classes 1,2,3,5,7,9,10,11, and 12 have been assigned color 787. If the classes are sequential, the following convention utilizing the equal sign may be used for the above example,

CLASses(1=3,5,7,9=12,787).

If you know which color you wish to assign to each class, another format may be used:

COLOr(X,RGB1,RGB2,RGB3,....,RGBn).

where X = starting class number (usually 1) followed by the color assignment for each class in sequential order. This format is faster if you know the color assignments in advance and you do not wish to try various color choices.

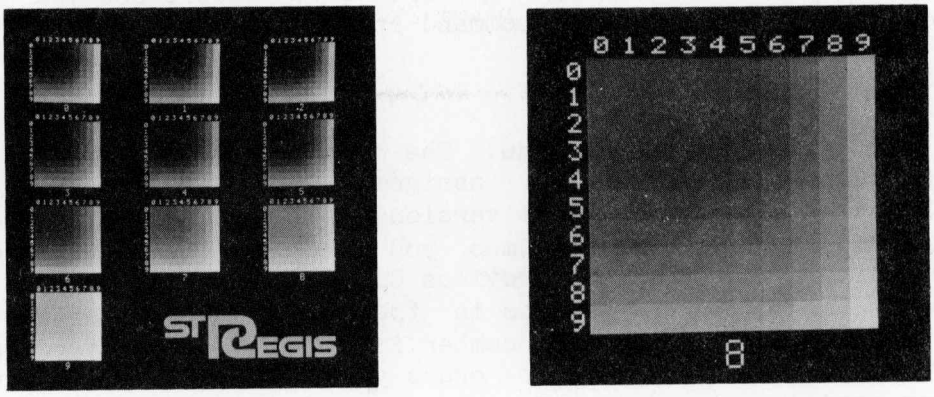

Figure 1. Color chart used to show tones associated with each three-digit number: over-all view and close-up of square 8.

To change all occurrences of one color to another color, use the following statement format:

CHANge(RGB1,RGB2).

This would change all occurrences of color RGB1 to RGB2.

If at any time while you are still in the CCLASS-COLOR program you wish to check and see what colors you have assigned to which classes, you may use the REVIEW command statement. By entering

REVIew

the PDP will give you a listing of all your classes and the colors you have assigned to them. (NOTE: If you did not enter the INIT(RGB) command at the beginning, you will receive a listing of all 256 possible class listings!) If you wish to save a copy of these listings, you may enter the command statement

REPOrt.

This will cause a file called COLOR.PRT to be copied on you DB1 disk. The file contains all color assignments and errors made when using the routine. This file can be sent to the IBM for printing later on.

When you have finished assigning classes to colors and you wish to exit the program, simply enter the command statement

END.

This will exit you to the CCLASS menu. The command also generates a report file of all mistakes and color assignments. The file is called COLOR.PRT;X. The X is a sequential version number and varies according to several factors (e.g., how many times you have used the REPORT request, whether or not you have erased previous COLOR.PRT files, etc.). The information contained is the same as in the file created with the REPORT command. The file with the highest number is the most recent version. To avoid confusion, it is advisable to erase your COLOR.PRT file whenever it is no longer needed.

2. The COLKEY Routine

The other processor in the Color Classification sub-menu is COLKEY, used primarily for preparing a legend for classification images. This process allows the user to set up a data file in the PDP which can be displayed on the COMTAL. When displayed, this file shows a sample of each color assignment with a comment. Eighteen classes may be charted at one time, each with a single-line comment of up to 20 characters (see following example).

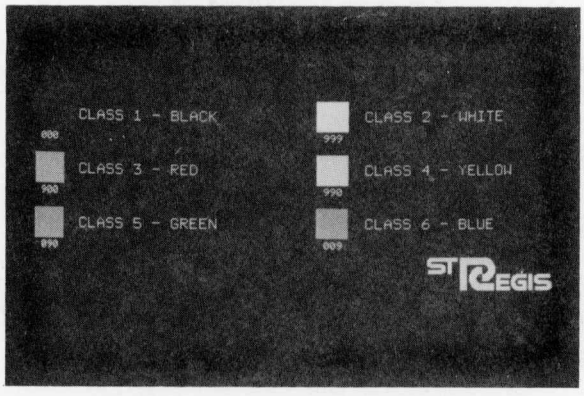

Figure 2. Example of chart shown on the COMTAL (6 classes)

The COLKEY processor is accessed in the same manner as the COLOR processor. The user selects the COLKEY option from the CCLASS sub-menu by entering either the name or the corresponding number. The next three prompts are the same prompts as in the COLOR processor (Old Command

Statement File Name, Output Command Statement File Name, and Enter Command Statement) and for the first two prompts, the user responses are the same. The format of the command statement is different; it takes the form of:

KEY(X,RGB)

where X and RGB have the same definition as in the COLOR processor, that is, X refers to the class number and RGB is a three-digit number representing the desired class.

The next prompt is:

Enter Description for Class X.

At this point you may enter a comment of up to 20 characters. Press RETURN, and repeat for the remaining classes. If one or more of the classes are entered incorrectly, the mistake can be remedied by simply entering the correct information. The file is updated to show the most recent assignment entered for each class; the assignments do not have to be entered sequentially. The REVIEW and REPORT commands can be utilized in the same manner as in the color processor. When all assignments are completed, the command END terminates the proccessor, returns the user to the CCLASS sub-menu and generates a report file of all assignments and errors called COLKEY.PRT. Another file called COLKEY.DAT will be generated; this is the file which may be sent to the COMTAL later for displaying the chart. It takes the PDP approximately five minutes to generate this file, and the PDP terminal should not be used during this time. As with the COLOR files, all files should be erased when they are no longer useful.

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Appendix A

A Sample Run of the COLOR CLASSIFICATION Processor on the COMTAL

The following instructions will lead you through use of the Color Classification processor to display a color classification on the COMTAL screen. The colors that may be assigned are shown on the St. Regis color chart posted in the COMTAL room. Each color is designated by a three-digit number that indicates the red, green, and blue component of the color, respectively.

Underlined characters are entered by the user. The indented lines which are in all capitals show what appears on the PDP screen.

Log on to the PDP as usual.

```
HELLO MADDEN
PASSWORD:
ENTER NAME: JEFF

          RSX-11M BL26  MULTI-USER SYSTEM

GOOD AFTERNOON
17-DEC-81 14:51 LOGGED ON TERMINAL TT3:

WELCOME TO RSX-11M
```

Get the RUN COMTAL menu. A classification image must be in the COMTAL image memory before CCLASS is invoked. Use the DATA/DATATO routine to transfer a classification to image memory, if needed. Then call CCLASS.

```
RUN COMTAL


1) HELP   - GIVES DETAILED DESCRIPTIONS OF OTHER MENU ITEMS
2) END    - TERMINATE THIS COMTAL MENU PROGRAM
3) LOCATE - TAKES TRAINING FIELDS ( LARS12 CARDS )
4) CLUSTE - CREATES A NEW IMAGE ACCORDING TO A CLUSTERED AREA
5) CCLASS - ROUTINES TO COLOR A CLASSIFICATION.
6) DATA   - ROUTINES WHICH HAVE TO DO WITH DATA TRANSFERS
7) GRAPHS - ROUTINES THAT MANIPULATE GRAPHICS PLANES
8) IMAGES - ROUTINES THAT MANIPULATE IMAGES(ADD,SUBTRACT...)
9) PSEUDO - INITIALIZES PSEUDO COLOR MEMORY TO EQUALIZE COLOR.
FUNCTION DESIRED ( NUMBER OR NAME ) : CCLASS
```

After you enter CCLASS, you will receive a menu of choices. To color a classification, enter COLOR.

```
1) HELP   - PRINT AN IN DEPTH EXPLANATION OF THE FUNCTIONS.
2) END    - TERMINATES THIS MENU, AND RETURNS TO LAST MENU.
3) COLOR  - ALLOWS USER TO COLOR PSEUDO COLOR MEMORIES.
4) COLKEY - ALLOWS USER TO CREATE A KEY FOR THE COLORS
FUNCTION DESIRED (NUMBER OR NAME ): COLOR
CONTROL CARD FILE NAME :  RETURN
```

Control Card File Name: If you have a file of previously assigned colors already set up, you may enter the filename. The default will be the existing pseudocolor memory from previous users.

```
OUTPUT CONTROL CARD FILE NAME :  RETURN
```

Output Control Card File Name: If you wish to save the per-class color assignments you are about to define, enter the file name you wish to use to store them.

```
INNNN  READING RED COMPONENT OF COLORS FROM COMTAL        (READPS)
INNNN  READING GREEN COMPONENT OF COLORS FROM COMTAL      (READPS)
INNNN  READING BLUE COMPONENT OF COLORS FROM COMTAL       (READPS)

ENTER CONTROL CARD
INIT(0)
```

The INIT(0) command initializes the pseudocolor memories on the COMTAL and sets the COMTAL background color black. This command is optional, but using it allows you to REVIEW classes more quickly later.

```
INNNN  WRITING RED COMPONENT OF COLORS TO COMTAL          (WRTPS)
INNNN  WRITING GREEN COMPONENT OF COLORS TO COMTAL        (WRTPS)
INNNN  WRITING BLUE COMPONENT OF COLORS TO COMTAL         (WRTPS)

ENTER CONTROL CARD
CLAS(1,000)
INNNN  WRITING RED COMPONENT OF COLORS TO COMTAL          (WRTPS)
INNNN  WRITING GREEN COMPONENT OF COLORS TO COMTAL        (WRTPS)
INNNN  WRITING BLUE COMPONENT OF COLORS TO COMTAL         (WRTPS)
```

Class 1 is now colored 000 (black)

The Classes card assigns the color designated by the three-digit number to a specific class. The format is:

CLAS(X,RGB)

where X is the class number or numbers, separated by commas, and where RGB is a three-digit code, designating the amount of red, green and blue in the color. One thousand different colors may be chosen.

```
ENTER CONTROL CARD
CLAS(2,090)
INNNN  WRITING RED COMPONENT OF COLORS TO COMTAL          (WRTPS)
INNNN  WRITING GREEN COMPONENT OF COLORS TO COMTAL        (WRTPS)
INNNN  WRITING BLUE COMPONENT OF COLORS TO COMTAL         (WRTPS)
```

Class 2 is now colored 090 (Green)

```
ENTER CONTROL CARD
CLAS(3=7,900)
INNNN  WRITING RED COMPONENT OF COLORS TO COMTAL          (WRTPS)
INNNN  WRITING GREEN COMPONENT OF COLORS TO COMTAL        (WRTPS)
INNNN  WRITING BLUE COMPONENT OF COLORS TO COMTAL         (WRTPS)
```

Classes 3, 4, 5, 6 and 7 are now colored 900 (Red)

```
ENTER CONTROL CARD
CLAS(8,10,009)
INNNN  WRITING RED COMPONENT OF COLORS TO COMTAL          (WRTPS)
INNNN  WRITING GREEN COMPONENT OF COLORS TO COMTAL        (WRTPS)
INNNN  WRITING BLUE COMPONENT OF COLORS TO COMTAL         (WRTPS)
```

Classes 8 and 10 are now colored 009 (Blue)

```
ENTER CONTROL CARD
CLAS(9,11,12,999)
INNNN  WRITING RED COMPONENT OF COLORS TO COMTAL          (WRTPS)
INNNN  WRITING GREEN COMPONENT OF COLORS TO COMTAL        (WRTPS)
INNNN  WRITING BLUE COMPONENT OF COLORS TO COMTAL         (WRTPS)
```

Classes 9, 11 and 12 are now colored 999 (White)

This example presumes a 12-class classification is being displayed.

The command REVIEW generated a list of all classes and the colors assigned to each class. Note: if you enter REVIEW without previously initializing pseudocolor memories, INIT(0), the assignments for all possible 256 classes will be printed.

```
ENTER CONTROL CARD
REVIEW
```

CLASS COLOR ASSIGNMENTS

CLASS	COLOR	CLASS	COLOR	CLASS	COLOR	CLASS	COLOR
1	0	2	90	3	900	4	900
5	900	6	900	7	900	8	9
9	999	10	9	11	999	12	999

```
ENTER CONTROL CARD
END
TT3 -- STOP
```

Terminates the program and returns the user to the CCLASS sub-menu. The END command will generate a report file (called COLOR.PRT) containing all mistakes and color assignments. This file should either be sent to the IBM or deleted to avoid filling up the space on the DB1 disk.

Color assignments for the classes can be changed interactively any time the program is running. The change is made simply by entering a new classes card.

Appendix B

Sample COLKEY Job

```
 1) HELP   - PRINT AN IN DEPTH EXPLANATION OF THE FUNCTIONS.
 2) END    - TERMINATES THIS MENU, AND RETURNS TO LAST MENU.
 3) COLOR  - ALLOWS USER TO COLOR PSEUDO COLOR MEMORIES
 4) COLKEY - ALLOWS USER TO CREATE A KEY FOR THE COLORS ASSIGNED
FUNCTION DESIRED ( NUMBER OR NAME ) : COLKEY
ENTER COMMAND STATEMENT
KEY(1,000)
ENTER DESCRIPTION FOR CLASS  1    (20A1)
CLASS 1 BLACK
ENTER COMMAND STATEMENT
KEY(2,999)
ENTER DESCRIPTION FOR CLASS  2    (20A1)
CLASS 2 WHITE
ENTER COMMAND STATEMENT
KEY(3,900)
ENTER DESCRIPTION FOR CLASS  3    (20A1)
CLASS 3 RED
ENTER COMMAND STATEMENT
KEY(4,090)
ENTER DESCRIPTION FOR CLASS  4    (20A1)
CLASS 4 GREEN
ENTER COMMAND STATEMENT
KEY(5,009)
ENTER DESCRIPTION FOR CLASS  5    (20A1)
CLASS 5 BLUE
ENTER COMMAND STATEMENT
KEY(6,990)
ENTER DESCRIPTION FOR CLASS  6    (20A1)
CLASS 6 YELLOW
ENTER COMMAND STATEMENT
KEY(7,099)
ENTER DESCRIPTION FOR CLASS  7    (20A1)
CLASS 7 CYAN
ENTER COMMAND STATEMENT
KEY(8,909)
ENTER DESCRIPTION FOR CLASS  8    (20A1)
CLASS 8 MAGENTA
ENTER COMMAND STATEMENT
KEY(9,600)
ENTER DESCRIPTION FOR CLASS  9    (20A1)
CLASS 9 BROWN
ENTER COMMAND STATEMENT
KEY(10,666)
ENTER DESCRIPTION FOR CLASS 10    (20A1)
CLASS 10-GRAY
ENTER COMMAND STATEMENT
END
TT3  --  STOP
```

```
 1) HELP   - PRINT AN IN DEPTH EXPLANATION OF THE FUNCTIONS.
 2) END    - TERMINATES THIS MENU, AND RETURNS TO LAST MENU.
 3) COLOR  - ALLOWS USER TO COLOR PSEUDO COLOR MEMORIES
 4) COLKEY - ALLOWS USER TO CREATE A KEY FOR THE COLORS ASSIGNED
FUNCTION DESIRED ( NUMBER OR NAME ) : END
```

```
 1) HELP   - GIVES DETAILED DESCRIPTIONS OF OTHER MENU ITEMS
 2) END    - TERMINATE THIS COMTAL MENU PROGRAM
 3) LOCATE - TAKES TRAINING FIELDS ( LARS12 CARDS )
 4) CLUSTE - CREATES A NEW IMAGE ACCORDING TO A CLUSTERED AREA
 5) CCLASS - ROUTINES TO COLOR A CLASSIFICATION.
 6) DATA   - ROUTINES WHICH HAVE TO DO WITH DATA TRANSFERS
 7) GRAPHS - ROUTINES THAT MANIPULATE GRAPHICS PLANES
 8) IMAGES - ROUTINES THAT MANIPULATE IMAGES(ADD,SUBTRACT...)
 9) PSEUDO - INITIALIZES PSEUDO COLOR MEMORY TO EQUALIZE COLOR.
FUNCTION DESIRED ( NUMBER OF NAME ) : END
```

Appendix C

Common Mistakes Made with CCLASS

The following examples show some common mistakes which can happen while running CCLASS on the PDP. While not all possible errors are included, most errors encountered will be of the type shown. Characters underlined were typed in by the user.

```
 1) HELP   - PRINT AN IN DEPTH EXPLANATION OF THE FUNCTIONS.
 2) END    - TERMINATES THIS MENU, AND RETURNS TO LAST MENU.
 3) COLOR  - ALLOWS USER TO COLOR PSEUDO COLOR MEMORIES
 4) COLKEY - ALLOWS USER TO CREATE A KEY FOR THE COLORS ASSIGNED
FUNCTION DESIRED ( NUMBER OR NAME ) : COLOR
CONTROL CARD FILE NAME : wrong.file
TT3  --  ERROR 43
File name specification error
  in   ".MAIN." at or after 15
```

In this example, the wrong file name was given for the command statement file name. The file listed does not exist on the disc. The CCLASS menu will be displayed again and the user will be prompted for the function desired.

```
 1) HELP   - PRINT AN IN DEPTH EXPLANATION OF THE FUNCTIONS.
 2) END    - TERMINATES THIS MENU, AND RETURNS TO LAST MENU.
 3) COLOR  - ALLOWS USER TO COLOR PSEUDO COLOR MEMORIES
 4) COLKEY - ALLOWS USER TO CREATE A KEY FOR THE COLORS ASSIGNED
FUNCTION DESIRED ( NUMBER OR NAME ) : COLOR
CONTROL CARD FILE NAME :
OUTPUT CONTROL CARD FILE NAME : JJSEWFRCDE.CKKDE
TT3  --  ERROR 43
File name specification error
  in   ".MAIN." at or after 29

INNNN  READING RED COMPONENT OF COLORS FROM COMTAL       (READPS)
INNNN  READING GREEN COMPONENT OF COLORS FROM COMTAL     (READPS)
INNNN  READING BLUE COMPONENT OF COLORS FROM COMTAL      (READPS)
```

This error is a result of entering the new file name in the wrong format. The file name can be no more than nine characters in length. The file type must be no more than three characters in length. The new file is not created and the routine continues to the next prompt.

```
ENTER CONTROL CARD
CLAAS(1,111)

CLAAS(1,111)
 E103  INVALID CONTROL PARAMETER - TYPE CORRECT CARD      (CTLPRM)
ENNNN  ERROR ON CONTROL CARD IN COLUMN  0   (COLOR)
```

This is an example of the error issued when there is a simple misspelling of the command statement. The routine will prompt the user for another command statement.

```
ENTER CONTROL CARD
COLOR(1,123,1244,1123,123)
ENNNN  COLOR NUMBER MUST BE FROM 0 TO 999      (COLOR)
```

The color value must be a 3-digit number from 000 to 999. If the value is entered incorrectly, the above error message will result. The routine will prompt the user for a replacement command statement.

```
ENTER CONTROL CARD
KEY(1231,123)
ENNNN  CLASS NUMBER MUST BE FROM 0 TO 255      (COLKEY)
```

If the class number entered is too large (greater than 255), the above error message occurs. The user will be prompted for another command statement.

Appendix D

REVISED 10/08/80

COLOR CLASSIFICATION CONTROL CARDS

REQ	CONTROL PARAMETER(COL,1)	FUNCTION	DEFAULT
	CLASSES (C1,C2,...,CN,X)	ASSIGN COLOR X TO CLASSES C1,C2,...,CN (SEE NOTE BELOW)	CLASS COLORS ARE AS BEFORE
	COLORS (M,X1,X2,...,XN)	COLORS X1,X2,...,XN ARE ASSIGNED TO CLASSES M THRU M+N-1	CLASS COLORS ARE AS BEFORE
	(M,X1,X2,...,XN)	SAME AS ABOVE	
	CHANGE (A,B)	CHANGE ALL OCCURRENCES OF COLOR A TO COLOR B	(NONE)
	INITIALIZE (D)	INITIALIZE ALL CLASSES TO COLOR D	0 -- BLACK
	REVIEW	REVIEW CLASS COLOR ASSIGNMENTS AT TERMINAL	(NONE)
	REPORT	GENERATE A PRINTED REPORT OF CLASS COLOR ASSIGNMENTS	(NONE)
+	END	GENERATE A REPORT AND TERMINATE PROGRAM	(NONE)

*** NOTE: CLASS NUMBERS MAY ALSO BE SPECIFIED IN THE FOLLOWING FORMAT:

C1=C2,C3=C4,...

THIS SELECTS CLASSES C1 THROUGH C2 AND CLASSES C3 THROUGH C4.

THUS, 3=7,9,11=13
HAS THE SAME EFFECT AS 3,4,5,6,7,9,11,12,13

Appendix E

REVISED 10/22/80

COLOR KEY CONTROL CARDS

REQ	CONTROL PARAMETER(COL.1)	FUNCTION	DEFAULT
+	KEY (C,X)	FILL COLOR SQUARE WITH CLASS NUMBER C AND LABEL SQUARE WITH COLOR NUMBER X	(NONE)
	(C,X)	SAME AS ABOVE	
+	AAAAAAAAAAAAAAAAAAA	TWENTY CHARACTER DESCRIPTION OF COLOR REPRESENTATION (MUST FOLLOW KEY CARD IN PAIRS)	(NONE)
	REVIEW	REVIEW CLASS COLOR DESCRIPTIONS AT TERMINAL	(NONE)
	REPORT	GENERATE A PRINTED REPORT OF CLASS COLOR DESCRIPTIONS	(NONE)
+	END	GENERATE A REPORT AND TERMINATE PROGRAM	(NONE)

*** NOTE: THE COLOR KEY BACKGROUND IS ASSOCIATED WITH CLASS 0 AND THE COLOR KEY ANNOTATION CHARACTERS ARE ASSOCIATED WITH CLASS 255 (WHEN THE 'COLOR' PROCESSOR IS RUN THE DEFAULT COLOR ASSIGNMENTS FOR THESE CLASSES ARE BLACK AND CYAN, RESPECTIVELY)

"

COMTAL Notation Conventions

Notation	Connotation
Display Graphic 1 INteger function 1 = Integer (X + Y #) R	Commands you enter by typing only the capital letters, numerals, and operands, each followed by a space. Lower case letters, equal signs, and parentheses are added by the system.
#	Add an extra space. Ex: for INItialize PSeudocolor memory #, user would type INI, space, PS, space, space.
___	(Underline) A single key represented by a group of letters or numbers; e.g., ESC Escape Key fs 1 Function Switch 1 ck A Command Key A
n,g	(Lower case letters) A number that can vary, depending on the size of the system. n refers to an image number or a memory area related to an image; g refers to a graphic number.
*	multiplication sign
/	division sign