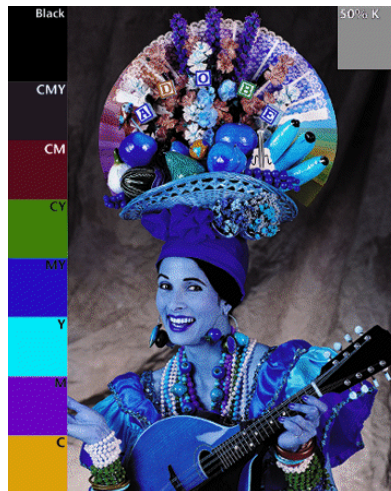


# **CCS-ECL Libraries**

## **Reference Manual - II**

**for**

## **X Panel and Interface Libraries**



## About This Manual

The X Panel and Interface libraries are mainly designed for image generating and controlling. These functions and routines are expected running at real time and full color range handle (display the color as true as possible). Therefore, they are not compatible with XView or Motif GUI. They work only with X internal library

If \*\* symbol appear on any function or sub-routine name line after “—”, this function or sub-routine is not encouraged to be directly used in user’s programming. Most of them are fuzzy layers which are the interface between kernel and user interface. Try to find corresponding interface.

Any function or sub-routine has a \* symbol on its name line after “—” is suggested by using interface call instead of using them directly.

This library is currently not released to public. These functions and sub-routines are available to all HIPS users and LBL users. To be able to use them, contact the responsible people shown in the copyright page in included header files.

**Name:**

BuildColorImage — build a color image in X window

**Synopsis:**

```
BuildColorImage(Image *img,
                 Image *previous_img,
                 char *window_geometry,
                 int icon_factor)
```

**Arguments:**

img                      image structure pointer  
 previous\_img            image pointer to last frame if image is a sequential or  
                          movie.  
 window\_geometry        window geometry description to change window size  
                          different from image size.  
 icon\_factor             icon factor for window icon. Usually, it is generated by  
                          *get\_iconsz*(img, width).

**Description:**

*BuildColorImage*() create color map, dither function, color map function, window, icon window, and X image structure for image displaying. For displaying a single image, the *previous\_img* should pass a NULL pointer.

Note: the *img->name* must be not NULL when calling *BuildColorImage*().

**Program Level:**

User

**Related Functions:**

*create\_windows*(), *choose\_scanline\_converter*(), *eq\_cmap*(),  
*get\_X\_image*(), *get\_dither\_colors*(), *get\_pic*(), *init\_color*()

**Name:**

ButtonPressed — check if a pressbutton is pressed

**Synopsis:**

```
bool  
ButtonPressed( PressButton      *pb,  
               XButtonEvent    *xbutton )
```

**Arguments:**

pb	pressbutton structure pointer
xbutton	X event structure pointer

**Description:****Program Level:**

Panel kernel

**Related Functions:**

**Name:**

ChangeSliderScale — change slider scale range

**Synopsis:**

```
ChangeSliderScale(  Slider      *s,  
                   int         scale,  
                   bool        active      )
```

**Arguments:**

s	slider structure pointer
scale	new scale factor
active	make change visible now

**Description:****Program Level:**

Panel kernel

**Related Functions:**

CreateSlider()

**Name:**

CreateButton — create a set of rectangle buttons on a control panel

**Synopsis:**

```
CreateButton( Panel    *p,
              int      bx, by,
              int      num_buttons,
              char      *name,
              char      **bnames,
              int      botton_color,
              int      presed_color )
```

**Arguments:**

p	panel on which the button will be set
bx, by	button position on panel
num_buttons	number of buttons in this set
name	button title name
bnames	name list for each button
botton_color	button color
pressed_color	pressed button color

**Description:****Program Level:**

Panel kernel

**Related Functions:**

DrawButton()

**Name:**

CreateCLT — create the Color Lookup Table

**Synopsis:**

```

CreateCLT(  XColor    *cp,
            int        totalevel,
            int        cflag,
            bool       DoQuant,
            bool       rev,
            HistoInfo  *hinfo      )

```

**Arguments:**

cp	X color map array pointer (results)
totalevel	number of colors
cflag	DoRed ...
DoQuant	False for doing linear quantization. See Description.
rev	reverse color indices

**Description:**

CreateCLT() create a color lookup table for color mapping. If DoQuant is False, it generates a linear lookup table:

```

cr[0] = cg[0] = cb[0] = 0
cr[1] = cg[1] = cb[1] = 1 * totalevel / 65536
...
cr[n] = cg[n] = cb[n] = n * totalevel / 65536

```

If DoQuant is true, then the value 0 - n on right size will be sorted by image histogram and rearranged by ETA function. This will give a better color mapping result for pseudo-color display

**Program Level:**

X kernel

**Related Functions:**

LinearQuantization()

**Name:**

CreateImage — create image structure with X window

**Synopsis:**

```
CreateImage(  Image          **ip,
              char          *name,
              WinAttribute  *parent,
              int           width, height,
              int           icon_width,
              int           Masks,
              bool          need_buffer  )
```

**Arguments:**

ip	image structure pointer address
name	image name
parent	window attribute structure from parent window
width, height	image dimensions
icon_width	icon width (maximum)
need_buferr	allocate data buffer for Ximage

**Description:****Program Level:**

X kernel

**Related Functions:**

BuildColorImage()



**Name:**

CreatePanel — create a control panel

**Synopsis:**

```
CreatePanel(  int      px, py,
              int      pw, ph,
              char     *name,
              WinAttribute *parent,
              int      mask
              )
```

**Arguments:**

px, py	panel original position. Not important for some window manager.
pw, ph	panel dimensions
name	panel name
parent	parent window attributes structure pointer
mask	X event masks for panel

**Description:****Program Level:**

Panel kernel

**Related Functions:**

**Name:**

CreatePopupMenu — create a popping menu on a control panel

**Synopsis:**

```
CreatePopupMenu(Panel          *pan,
                 WinAttribute *parent,
                 char          *name,
                 char          *menu[],
                 int           num_item )
```

**Arguments:**

pan	panel on which popping menu inherited
parent	parent window attributes
name	popping menu name
menu	menu item list
num_item	number of items on this menu

**Description:****Program Level:**

Panel kernel

**Related Functions:**

**Name:**

CreatePressButton — create a press button on a control panel

**Synopsis:**

```
CreatePressButton(      Panel      *pan,  
                      int          x, y,  
                      char         *name,  
                      int          pressed_color )
```

**Arguments:**

an	panel on which press button inherited
x, y	press button position on the panel
name	name for press button
pressed_color	color after button pressed

**Description:****Program Level:**

Panel kernel

**Related Functions:**

**Name:**

CreateScrollBar — create a scroll bar on any window

**Synopsis:**

```
CreateScrollBar(AnyWindow*awin,
                int      x, y,
                bool     xv, yv,
                int      bar_width,
                int      level_bar_len,
                int      vert_bar_len,
                int      type,
                char     *name,
                int      bar_color,
                int      rail_color )
```

**Arguments:**

x, y	horizontal scroll bar origin
xv, yv	vertical scroll bar origin
bar_width	bar width
level_bar_len	horizontal scroll bar length
vert_bar_len	vertical scroll bar length
type	scroll bar type
name	scroll bar reference name
bar_color	bar color
rail_color	scroll

**Description:****Program Level:**

X kernel

**Related Functions:**

**Name:**

CreateSlider — create a slider on a control panel

**Synopsis:**

```
CreateSlider(  Panel    *pan,
               int      sx, sy,
               int      scale,
               int      v0, v1,
               int      numBars,
               bool     vertical,
               char     *name,
               char     *info,
               int      bar_color,
               int      rail_color )
```

**Arguments:**

pan	panel on which slider is inherited
sx, sy	slider position on the control panel
scale	slider scale factor
v0, v1	sliding range (min - max)
numBars	number of sliding bars
vertical	vertical sliding bar (default is horizontal one)
name	slider title
info	slider description
bar_color	slider bar color
ril_color	slider rail color

**Description:****Program Level:**

Panel kernel

**Related Functions:**

**Name:**

CreateWindow — create a X window for any purpose

**Synopsis:**

```
CreateWindow(AnyWindow      *awin,
              WinAttribute    *parent,
              Cursor           cursor,
              int              mask,
              bool             fixedframe,
              int              wm_flag      )
```

**Arguments:**

awin	any window structure pointer
parent	parent window attributes
cursor	window cursor (No is OK)
mask	X event masks for window
fixedframe	window size is unchangeable
wim_flag	window manager flags

**Description:****Program Level:**

X kernel

**Related Functions:**

**Name:**

Delay\_Clear — \* flushing cursor delay routine

**Synopsis:**

```
Delay_Clear( AnyWindow      *awin,  
             int             (*exp_hd)(),  
             Image          **imgp,  
             int             imgs,  
             int             fdelay )
```

**Arguments:**

awin	any window pointer
exp_hd	exposure handle pointer
imgp	image structure array pointer for exp_hd()
imgs	number of images in image structure array
fdelay	delay factor

**Description:****Program Level:**

X kernel

**Related Functions:**

**Name:**

DestroyImage — destroy image content and free memory space

**Synopsis:**

```
DestroyImage(Image      *img)
```

**Arguments:**

img                      image structure pointer

**Description:****Program Level:**

kernel

**Related Functions:**



**Name:**

DispInfo — \* display information on any panel or window

**Synopsis:**

```
DispInfo(    Panel    *p,  
            int      xoffset,  
            char     *messages,  
            int      color    )
```

**Arguments:**

p	panel structure pointer
xoffset	start displaying position on left side of the panel
messages	message string
color	message color

**Description:****Program Level:**

assemble

**Related Functions:**

**Name:**

DrawButton — show button on its panel

**Synopsis:**

DrawButton(Button\* b)

**Arguments:**

b                      button pointer

**Description:****Program Level:**

Panel kernel

**Related Functions:**

**Name:**

DrawPixWindow — display pixel information on image window

**Synopsis:**

```
DrawPixWindow(      Image      *img,  
                  int          x, y,  
                  bool          rle_form      )
```

**Arguments:**

img	image structure pointer
x, y	pixel coordinate
rle_form	origin is in RLE conversion

**Description:**

DrawPixWindow() display given pixel information in image display window.

**Program Level:**

X kernel

**Related Functions:**

**Name:**

DrawPressButton — draw pressbutton on its panel

**Synopsis:**

```
DrawPressButton(PressButton*          pb)
```

**Arguments:**

pb                                      press button pointer

**Description:****Program Level:**

Panel kernel

**Related Functions:**

**Name:**

DrawScrollBars — draw scrollbar on its parent window

**Synopsis:**

```
DrawScrollBars(ScrollBar *sb,  
               int type      )
```

**Arguments:**

sb	scroll bar pointer
type	horizontal or vertical

**Description:****Program Level:**

X kernel

**Related Functions:**

**Name:**

DrawSlider — draw slider on its panel

**Synopsis:**

```
DrawSlider( Slider *s )
```

**Arguments:**

s slider pointer

**Description:****Program Level:**

Panel kernel

**Related Functions:**

**Name:**

DrawSpeedWindow — display movie speed on image window

**Synopsis:**

```
DrawSpeedWindow(      Image      *img,  
                  int          speed      )
```

**Arguments:**

img	image structure pointer
int	movie speed (frames / sec.) or (1/speed frame / sec. if speed < 0)

**Description:****Program Level:**

assemble

**Related Functions:**

**Name:**

DrawVMark — draw a vertical mark in an image window

**Synopsis:**

```
DrawVMark(  Image      *img,  
            int         nouse,  
            bool        clean      )
```

**Arguments:**

img	image structure pointer
nouse	not used, but for function consistency
clean	clean old before draw new

**Description:****Program Level:**

kernel

**Related Functions:**



**Name:**

Draw\_ImageScrollBars — show scrollbars on an image window

**Synopsis:**

Draw\_ImageScrollBars(Image                   \*img)

**Arguments:**

img                                   image structure pointer

**Description:****Program Level:**

X kernel

**Related Functions:**

**Name:**

Draws — draw patterns in an image window by given type

**Synopsis:**

```
Draws(      Image      *img,
           int          arg,
           bool         revs,
           int          type          )
```

**Arguments:**

img	image structure pointer
arg	type argument:
	DrawString: message string
	Others: minimum pattern size for drawing
revs	draw function
type	pattern types: defined in “panel.h”
	DrawsArc
	DrawsLine
	DrawsRect
	-1 DrawString

**Description:**

**Program Level:**

X kernel

**Related Functions:**

**Name:**

DumpScan\_to\_dpy — dump image content to window display

**Synopsis:**

DumpScan\_to\_dpy(Image \*img)

**Arguments:**

img                                  image structure pointer

**Description:**

DumpScan\_to\_dpy() map img->data buffer content to window display. The img must be either set up bychoose\_scanline\_converter() or created by BuildColorImage() routine.

**Program Level:**

kernel

**Related Functions:**

BuildColorImage(), choose\_scanline\_converter()

**Name:**

EraseSlider — hide a slider from its panel

**Synopsis:**

EraseSlider(Slider \*s)

**Arguments:**

s slider pointer

**Description:****Program Level:**

Panel kernel

**Related Functions:**

**Name:**

FillDGT — \*\* fill Digitizer Table (Quantization Table)

**Synopsis:**

```
FillDGT(      int      n,  
           int      *dgtp      )
```

**Arguments:**

n	number of elements int quantization table
dgtp	quantization table pointer

**Description:****Program Level:**

kernel

**Related Functions:**

**Name:**

Find\_3\_min\_max — find minimum and maximum value in color histogram

**Synopsis:**

```
Find_3_min_max(      U_IMAGE    *img,  
                     int         *histp,  
                     byte        *datap,  
                     bool        nouse      )
```

**Arguments:****Description:****Program Level:**

kernel

**Related Functions:**

**Name:**

Find\_min\_max — find minimum and maximum value in image data

**Synopsis:**

```
Find_min_max(U_IMAGE *img,  
             int      *histp,  
             byte     *dp,  
             bool     histocalc,  
             bool     permanent )
```

**Arguments:****Description:****Program Level:**

kernel

**Related Functions:**

**Name:**

FlushingCursor — flushing cursor generator

**Synopsis:**

```
void
FlushingCursor(AnyWindow      *aw,
               int             (*exp_hd)(),
               Image            **imgp,
               int              imgs,
               int              x0, y0,
               int              cw, ch,
               int              fdelay,
               int              rev
               )
```

**Arguments:**

aw	any window pointer
exp_hd	exposure handle routine pointer
imgp	image array pointer for exposure during Flushing
imgs	number images in image array
x0, y0	flushing cursor origin
cw, ch	cursor size
fdelay	delay factor
rev	reverse cursor color instead clear cursor during flushing

**Description:**

*FlushingCursor()* generates a flushing cursor in a X window for prompt input or noticing.

**Program Level:**

kernel

**Related Functions:**

Delay\_Clear(), TextLine()



**Name:**

GetCloseColor — get close color from image color map

**Synopsis:**

```
PColor
GetCloseColor( Display *dpy,
               Colormap cmap,
               int ncolors,
               XColor *uct,
               int r, g, b )
```

**Arguments:****Description:****Program Level:**

kernel

**Related Functions:**

**Name:**

GetVctEntry — get the 1st available entry in given color map

**Synopsis:**

```
PColor
GetVctEntry( Display *dpy,
             int screen,
             Colormap cmap,
             bool set_gray )
```

**Arguments:****Description:****Program Level:**

kernel

**Related Functions:**

**Name:**

LinearQuantization — generate linear color map table

**Synopsis:**

```
void
LinearQuantization(      XColor      *cp,
                        int           totalevel,
                        int           cflag,
                        bool           rev
                        )
```

**Arguments:**

cp	X color map pointer
totalevel	number of colors
cflag	DoRed, DoGreen...
rev	reverse color indices

**Description:**

```
void
LinearQuantization(cp, totalevel, cflag, rev)
register XColor *cp;
register int totalevel, cflag;
{
    register int i, gray, scale = 65536 / totalevel;

    for (i=0; i<totalevel; i++) {
        if (rev)
            gray = totalevel - i - 1;
        else gray = i;
        cp[i].pixel = gray; /* for new map only */
        cp[i].red = cp[i].green = cp[i].blue = scale * gray;
        cp[i].flags = cflag;
    }
}
```

**Program Level:**

kernel

**Related Functions:**

**Name:**

LoadGXImage — load an image from a file and display it on X window

**Synopsis:**

```
LoadGXImage( int      *num_images,
               Image    *parent, **pic[],
               bool     movie_mode,
               char     *win_geom,
               bool     still_win      )
```

**Arguments:**

num_images	a pointer of an image count
parent	any image created earlier. It should contain visual class, display, gamma, default name, input file stream pointer, and pixmap (pixmap_failed) information for new images.
pic	picture array address pointer points to image array address.
movie_mode	True if need to run imaes in a movie mode.
win_geom	window geometry string to change display window size. NULL is for default.
still_win	when a new image is required, it will be displaied in the same window as the previous image. The window will be resized.

**Description:**

*LoadGXImage()* loads an image or a sequence of images from one file and displays them on a X terminal or monitor. It requires a non-empty parent to pass many information to new images; otherwise, the new image may not be mapped correctly onto the display. For usage, see *getx.c* in program guide.

**Return Value:** Positive value if loaded image is a multi-frame image, and zero for a single fram image. The negtive value indicates nothing is loaded. If fatal error happens, it will exit to OS.

**Program Level:**

kernel

**Related Functions:**

get\_pic(), RLE library

**Name:**

LoadIcon — load image icon X window data buffer

**Synopsis:**

```
LoadIcon(      Image      *ip      )
```

**Arguments:**

ip                      image structure pointer

**Description:**

*LoadIcon()* maps an image data content into its icon data buffer for icon display.

**Program Level:**

X kernel

**Related Functions:**

**Name:**

Maintain\_Flush — \* keep all image dumped to screen to be flushed

**Synopsis:**

```
Maintain_Flush(int      cur_img,
                 Image    *previous,
                 Image    **imgp,
                 int      image_y      )
```

**Arguments:**

cur_img	current image index to image array
previous	previous image pointer for movie mode
imgp	image array pointer
image_y	current image display line position

**Description:****Program Level:**

kernel

**Related Functions:**

**Name:**

MapPixWindow — show pixel information window

**Synopsis:**

```
void
MapPixWindow(Image      *img,
               bool      use_top,
               int        win_bg      )
```

**Arguments:**

img	image structure pointer
use_top	force to use top of the window; otherwise, the window will be opposite the cursor position in the window. e.g. use bottom part if cursor is at top half of the window.
win_bg	pixel window background

**Description:****Program Level:**

X user

**Related Functions:**

**Name:**

MapRGB — map an image line into X window data buffer and maintain the display

**Synopsis:**

```
MapRGB(    int      cur_img,
           Image     *previous,
           Image     **imgp,
           byte      *data_buf[],
           byte      *save_scan[],
           int       y, w,
           int       image_y,
           int       icon_factor    )
```

**Arguments:****Description:****Program Level:**

X interface

**Related Functions:**

Map\_Scanline()



**Name:**

Map\_Scanline — map ILL scan line into X window data buffer

**Synopsis:**

```
Map_Scanline( Image      *img,  
              byte       *data_buf[],  
              byte       *save_scan[],  
              int        x0,  
              int        y,  
              int        w,  
              int        icon_factor    )
```

**Arguments:****Description:****Program Level:**

kernel

**Related Functions:**

**Name:**

OnButton — check if mouse is clicked on a button

**Synopsis:**

```
OnButton(      Button      *b,  
           XButtonEvent *xbutton      )
```

**Arguments:**

b	any button pointer
xbutton	any X event pointer

**Description:****Program Level:**

Panel kernel

**Related Functions:**

**Name:**

OnScrollBar — if mouse is clicked on a scrollbar

**Synopsis:**

```
OnScrollBar( ScrollBar *sb,  
             XButtonEvent *xbutton)
```

**Arguments:**

sb	scrollbar pointer
xbutton	any X event pointer

**Description:****Program Level:**

panel kernel

**Related Functions:**

**Name:**

OnSliderBar — if mouse is clicked on a slider

**Synopsis:**

```
OnSliderBar( Slider      *s,  
             XButtonEvent *xbutton)
```

**Arguments:**

s	slider pointer
xbutton	any X event pointer

**Description:****Program Level:**

panel kernel

**Related Functions:**

**Name:**

PanelMessage — display message onto right area of panel parts or onto given place

**Synopsis:**

```
PanelMessage( AnyParts *pp,  
              char      *pmsg,  
              int       x0, y0,  
              int       len      )
```

**Arguments:**

pp	any panel part pointer
pmsg	message string
x0, y0, len	display origin and area length. If one of them is passed by zero, then, that value will be set to parts->x, parts->y or length of the right area of parts, respectively

**Description:****Program Level:**

panel kernel

**Related Functions:**

**Name:**

ParameterWin — display pixel information in an image window

**Synopsis:**

```
void
ParameterWin( Image      *ip,
               HistoInfo *hinf,
               int        x, y,
               int        y0,
               bool       is_hist      )
```

**Arguments:****Description:****Program Level:**

kernel

**Related Functions:**

SetParameterWin()

**Name:**

PopingMenu — pop a pop menu

**Synopsis:**

```
PopingMenu( PopMenu *pm,  
            int      n_th,  
            void      (*expos)(),  
            Image     **imgp,  
            int        nimg      )
```

**Arguments:****Description:****Program Level:**

kernel

**Related Functions:**

**Name:**

ReadButton — get button name

**Synopsis:**

```
char*  
ReadButton( Button *b )
```

**Arguments:**

b any button pointer

**Description:****Program Level:**

panel kernel

**Related Functions:**



**Name:**

ReadSlider — read slider bar position (value)

**Synopsis:**

```
ReadSlider(  Slider  *s,  
            int      who      )
```

**Arguments:**

s	slider pointer
who	which bar (bar ID)

**Description:****Program Level:**

panel kernel

**Related Functions:**

**Name:**

ResetPressButton — make pressed pressbutton unpressed

**Synopsis:**

```
void  
ResetPressButton(      PressButton    *pb      )
```

**Arguments:**

pb                    press button pointer

**Description:****Program Level:**

panel kernel

**Related Functions:**

**Name:**

ResizeWindow — resize window size

**Synopsis:**

```
ResizeWindow(Image          *img,  
              XConfigureEvent *cevent )
```

**Arguments:**

img	image structure pointer
cevent	any X event structure pointer

**Description:****Program Level:**

kernel

**Related Functions:**

**Name:**

SetFontGetSize — set font in a window, get size into img structure and  
return font ID

**Synopsis:**

```
Font  
SetFontGetSize(AnyWindow*aw,  
               char      *fontname    )
```

**Arguments:**

aw	any window pointer
fontname	font name string

**Description:****Program Level:**

X kernel

**Related Functions:**

**Name:**

SetParameterWin — set pixel information window

**Synopsis:**

```
SetParameterWin(Image *img,  
                 XButtonEvent *xbutton,  
                 int Font_Height,  
                 bool use_top )
```

**Arguments:****Description:****Program Level:**

X user

**Related Functions:**

**Name:**

SetSBarPos — set Slider Bar position by point on panel

**Synopsis:**

```
SetSBarPos(  Slider      *s,  
             int         x, y,  
             int         bar_id      )
```

**Arguments:****Description:****Program Level:**

kernel

**Related Functions:**

**Name:**

SetSBarRPos — set Slider Bar in value (p) position

**Synopsis:**

```
SetSBarRPos( Slider    *s,  
             int       p,  
             int       bar_id      )
```

**Arguments:**

s	slider pointer
p	bar position in value (not x or y)
bar_ib	bar ID 0, 1, 2, ...

**Description:****Program Level:**

kernel

**Related Functions:**

**Name:**

SetScrollBar — set scrollbar position

**Synopsis:**

```
void  
SetScrollBar( ScrollBar *sb,  
              int      x, y,  
              int      type      )
```

**Arguments:**

sb	scroll bar pointer
x, y	position (in pixels from 0) the bar to be set
type	vertical or horizontal bar

**Description:****Program Level:**

kernel

**Related Functions:**



**Name:**

SetScrollBarLength — set scrollbar length

**Synopsis:**

```
void
SetScrollBarLength(      ScrollBar    *sb,
                        int            vert,
                        int            len
                        )
```

**Arguments:**

sb	scrollbar pointer
vert	vertical bar (False for horizontal)
len	the new scroll length

**Description:**

SetScrollBarLength() changes the scrollbar length to fit window changes.

**Program Level:**

kernel

**Related Functions:**

**Name:**

Set\_Panel — set panel part properties

**Synopsis:**

```
void
Set_Panel(    VType    *ip,
             int        item,
             int        op1, op2, op3  )
```

**Arguments:**

ip	any panel item pointer
item	what to be set BUTTON_COLOR PRESS_BUTTON_COLOR SLIDER_COLOR
op1, op2, op3	operands

**Description:**

see set\_button\_color(), set\_pressbutton\_color(), set\_slider\_color()

**Program Level:**

kernel

**Related Functions:**

set\_button\_color(), set\_pressbutton\_color(), set\_slider\_color()

**Name:**

SliderInfo — draw slider information message on the slider

**Synopsis:**

```
SliderInfo(  Slider  *s,  
            int      color      )
```

**Arguments:**

s	slider pointer
color	message color

**Description:****Program Level:**

kernel

**Related Functions:**

**Name:**

TextLine — text line editor for panel input

**Synopsis:**

```
TextLine(      Button    *b,
              char      *buf,
              int        len,
              int        x0,
              int        (*exp_hd)(),
              Image      **imgp,
              int        imgs)
```

**Arguments:**

b	button on this panel
buf	input buffer to hold input string
len	maximum buffer length. Once the input string length exceeding this length, then return.
x0	x offset to panel information area which is at the bottom of the panel. If x0 is zero, then, use the area at right side of the button (b).
exp_hd	exposure handler for waiting input
imgp	image array pointer
imgs	number of images in image array to be handled

**Description:****Program Level:**

kernel

**Related Functions:**

**Name:**

TopWindow — put window on the top of the display stack

**Synopsis:**

```
TopWindow( AnyWindow *aw,  
            bool      use_unmap )
```

**Arguments:**

aw	any image or window pointer
use_unmap	use unmap and map to make window top. The default is to clear window and raise it.

**Description:****Program Level:**

kernel

**Related Functions:**

**Name:**

TrackSubWin — Crop a sub-window in different sharp

**Synopsis:**

```
TrackSubWin( Image      *img,
              HistoInfo *hinf,
              int        ox, oy,
              int        shp,
              int        cropButton )
```

**Arguments:**

img	image structure pointer
hinf	histogram information (NULL is OK)
ox, oy	origin to trace
shp	sub-window sharp; see Draws()
cropButton	which button for crop

**Description:****Program Level:**

kernel

**Related Functions:**

**Name:**

WhichImage — see cursor is in which image window

**Synopsis:**

```
WhichImage( Window win,
             Image **imgp,
             int     imgs      )
```

**Arguments:**

win	X window ID
imgp	image structure pointer array
imgs	number of images in pointer array

**Description:****Program Level:**

kernel

**Related Functions:**

**Name:**

XCopyImage — copy a X image region to another region

**Synopsis:**

```
XCopyImage( XImage    *img,  
            int        src_x, src_y,  
            int        width, height,  
            int        dst_x, dst_y    )
```

**Arguments:****Description:****Program Level:**

kernel

**Related Functions:**



**Name:**

check\_pixmap\_allocation — set error handler

**Synopsis:**

```
void  
check_pixmap_allocation( Image      *img      )
```

**Arguments:****Description:****Program Level:**

kernel

**Related Functions:**

**Name:**

choose\_scanline\_converter — find appropriate scan line routine to use

**Synopsis:**

```
void  
choose_scanline_converter( Image      *img      )
```

**Arguments:**

img                      image structure pointer

**Description:****Program Level:**

X assemble

**Related Functions:**

BuildColorImage(), CreateImage()

**Name:**

create\_windows — create X window for image display

**Synopsis:**

```
void  
create_windows(Image      *img,  
               char       *window_geometry,  
               bool       stingy  
               )
```

**Arguments:****Description:****Program Level:**

kernel

**Related Functions:**

**Name:**

eq\_cmap — compare two color maps

**Synopsis:**

```
eq_cmap(    rle_pixel  **cmap1,
            int         c1_len,
            rle_pixel  **cmap2,
            int         c2_len    )
```

**Arguments:****Description:****Program Level:**

kernel

**Related Functions:**

**Name:**

exposure\_r — exposure event handler

**Synopsis:**

```
exposure_r(  Image    *img,
             int      (*sub_win)(),
             int      x, y,
             int      w, h,
             int      cdp      )
```

**Arguments:**

img	image structure pointer
sub_win	the routine pointer to handle sub-window and superimposed elements and draw patterns
x, y	exposure area origin
w, h	exposure area size
cdp	copy from pixel map if it exists

**Description:****Program Level:**

kernel

**Related Functions:**

**Name:**

find\_appropriate\_visual — find appropriate visual type

**Synopsis:**

```
void  
find_appropriate_visual( Image *img )
```

**Arguments:****Description:****Program Level:**

kernel

**Related Functions:**

**Name:**

find\_min\_max — find minimum and maximum value in a region

**Synopsis:**

```
find_min_max( byte    *bufp,
               int      *hist,
               Mregister *mmm,
               int       r_width, r_height,
               int       width      )
```

**Arguments:**

bufp	data buffer
hist	histogram buffer pointer
mmm	min, max, and max count register
r_width, r_height	region width and height
width	line (image) width

**Description:**

find\_min\_max() computes the min & max value in a region of data buffer.

**Program Level:**

kernel

**Related Functions:**

**Name:**

free\_unique\_colors — \* free system color map space

**Synopsis:**

```
free_unique_colors(      Image      *img,  
                       Pixel      *pixels,  
                       int         npixels      )
```

**Arguments:****Description:**

free\_unique\_colors() frees system color map space allocated by XAllocColorCells(), XAllocColor(), or XAllocColors().

**Program Level:**

kernel

**Related Functions:**



**Name:**

get\_X\_image — create X image for image display

**Synopsis:**

```
XImage*  
get_X_image( Image    *img,  
             int      width, height,  
             bool      buf_need    )
```

**Arguments:****Description:****Program Level:**

kernel

**Related Functions:**

**Name:**

get\_cursors — create cursors for a window

**Synopsis:**

```
void  
get_cursors( Window window )
```

**Arguments:**

window                      X window ID

**Description:****Program Level:**

kernel

**Related Functions:**

**Name:**

get\_dither\_arrays — allocate image dither arrays

**Synopsis:**

```
void  
get_dither_arrays( Image *img )
```

**Arguments:**

img	image structure pointer
-----	-------------------------

**Description:****Program Level:**

kernel

**Related Functions:**

**Name:**

get\_dither\_colors — sets in\_cmap, cmlen, ncmap and mono\_color in an image structure

**Synopsis:**

```
void  
get_dither_colors( Image *img )
```

**Arguments:****Description:****Program Level:**

kernel

**Related Functions:**

**Name:**

get\_iconsize — get appropriate icon size

**Synopsis:**

```
get_iconsize(  Image    *img,  
               int      width    )
```

**Arguments:**

img	image structure pointer
width	icon width

**Description:****Program Level:**

kernel

**Related Functions:**

**Name:**

`get_pic` — build a image and its display window from open files

**Synopsis:**

```
get_pic(      int      cur_img,
              char      *win_geom,
              Image     *prev_img,
              Image     **imgp,
              int      img_win_bg  )
```

**Arguments:**

<code>cur_img</code>	current image index to image structure array
<code>win_geom</code>	window geometry string for changing window size (NULL for no change)
<code>prev_img</code>	movie pointer point to previous frame
<code>imgp</code>	image structure array pointer
<code>img_win_bg</code>	image window background color

**Description:**

`get_pic()` loads different images through CCS interface, converts the loaded image into ILC format, and creates X window to display it. `get_pic()` contains two global variables: *shared\_cmap* and *multi\_hd*. On pseudo color devices, if *shared\_cmap* is set to True, then most images will converted to pseudo color formats and recalibrated to share same color with the image first loaded. The *multi\_hd* variable is used for RLE like images that multi-frame images are constructed by concatenating all single images together.

**Return Value:** It returns 0 when an image is successfully loaded, or negative value on failures.

**Program Level:**

X interface

**Related Functions:**

`BuildColorImage()`, `bool shared_cmap`, `bool multi_hd`

**Name:**

get\_x\_colormap — create X color map

**Synopsis:**

```
void  
get_x_colormap( Image *img )
```

**Arguments:****Description:**

equivalent to XCreateColormap()

**Program Level:**

kernel

**Related Functions:**

**Name:**

handle\_exposure — image exposure handler

**Synopsis:**

```
void  
handle_exposure(Image *img,  
                 int (*sub_win)(),  
                 int x, y,  
                 int width, height,  
                 int img_h,  
                 bool tuner_flag )
```

**Arguments:****Description:****Program Level:**

kernel

**Related Functions:**



**Name:**

init\_color — initial color map

**Synopsis:**

```
void  
init_color(      Image      *img      )
```

**Arguments:**

img                      image structure pointer

**Description:****Program Level:**

X assemble

**Related Functions:**

**Name:**

init\_img\_info — initial image structure content

**Synopsis:**

```
void
init_img_info( Image      *i,
               Display    *dpy,
               int         mid_type,
               bool        color_dpy )
```

**Arguments:****Description:****Program Level:**

kernel

**Related Functions:**

**Name:**

interpolation — interpolate an image by regions

**Synopsis:**

```
interpolation(  byte    *in, *out,
                int     x_regions, y_regions,
                InterpMap *imp,
                Image    *img,
                HistoInfo *hinf          )
```

**Arguments:**

in	original data buffer
out	interpolated data buffer
x_regions	divisor in X dimension
y_regions	divisor in Y dimension
imp	interpolation information structure
<pre>typedef struct {     int min, max, diff; /* union with Mregister */     LKT *lkt; } InterpMap;</pre>	
img	image to be interpolated
hinf	image histogram information

**Description:****Program Level:**

kernel

**Related Functions:**

histogram(), new\_curve()

**Name:**

mag\_pan — zoom an image

**Synopsis:**

```
void
mag_pan(      Image      *img,
             int          job,
             int          bx, by,
             int          mag_factor,
             bool         stingy      )
```

**Arguments:**

img	image structure pointer
job	zooming, shifting, or switching mode
bx, by	position the button press event happened
mag_factor	zooming factor (negative is zoom down)
stingy	slow but use less memory

**Description:****Program Level:**

kernel

**Related Functions:**

**Name:**

map\_1\_to\_3 — map 8-bit color image to a ILL (RLE) image

**Synopsis:**

```
VType*
map_1_to_3( char    *src, *dst,
            cmap_t **cmap,
            int      w, h      )
```

**Arguments:**

src	source data buffer
dst	result data buffer
cmap	color map pointer
w, h	image size

**Description:****Program Level:**

kernel

**Related Functions:**

snf\_to\_rle()

**Name:**

map\_rgb\_to\_bw — map RGB to black-and-white through NTSC transform

**Synopsis:**

```
map_rgb_to_bw(Image      *img,
               rle_pixel **color_row,
               VType      *bw_row,
               int         rowlen )
```

**Arguments:**

img	image structure pointer
color_row	rgb data row buffer
bw_row	black-and-white row buffer
rowlen	scanline width

**Description:****Program Level:**

kernel

**Related Functions:**

map\_rgb\_to\_rgb()

**Name:**

map\_rgb\_to\_rgb — convert RGB to RGB through a colormap

**Synopsis:**

```
void
map_rgb_to_rgb(Image      *img,
                rle_pixel **in_row, **out_row,
                int         rowlen
                )
```

**Arguments:**

img	image structure pointer
in_row	original row buffer
out_row	out going row buffer
rowlen	buffer length (scanline width)

**Description:****Program Level:**

kernel

**Related Functions:**

map\_rgb\_to\_bw()

**Name:**

new\_curve — ETA curve generator for X program

**Synopsis:**

```
new_curve(  LKT      *lkt,
            HistoInfo *hinf,
            Mregister *mmm,
            int       type,
            int       Maxout,
            Image     *img,
            int       hsize
            )
```

**Arguments:**

lkt	lookup table to hold new curve map
hinf	histogram information pointer
mmm	min, max, pixel value & max count register
type	curve type
Maxout	maximum output value for pixel mapping
img	image structure pointer
hsize	histogram buffer size

**Description:****Program Level:**

kernel

**Related Functions:**

find\_min\_max()



**Name:**

on\_superimpose\_elem — if mouse clicked on a superimposed element

**Synopsis:**

```
on_superimpose_elem(    Image    *img,  
                      int        x0, y0    )
```

**Arguments:**

img	image structure pointer
x0, y0	mouse clicked position

**Description:**

If place mouse clicked contains some superimposed elements, on\_superimpose\_elem() returns the top one's ID; otherwise, returns 0.

**Program Level:**

kernel

**Related Functions:**

superimpose\_handle()

**Name:**

set\_button\_color — set button colors

**Synopsis:**

```
set_button_color(      Button      *b,
                      int          button_color,
                      int          pressed_color,
                      int          title_color      )
```

**Arguments:**

b	button pointer
button_color	button color
pressed_color	button pressed color
title_color	button name color

**Description:**

**Program Level:**

kernel

**Related Functions:**

**Name:**

set\_circle\_cursor — set window cursor to circle cursor

**Synopsis:**

```
void  
set_circle_cursor( Window win )
```

**Arguments:**

win                      X Window ID

**Description:**

give window a circle cursor.

**Program Level:**

kernel

**Related Functions:**

set\_left\_ptr\_cursor(), set\_watch\_cursor()

**Name:**

set\_left\_ptr\_cursor — set window cursor to left pointer cursor

**Synopsis:**

```
void  
set_left_ptr_cursor( Window win )
```

**Arguments:**

win                      X Window ID

**Description:**

give window a left pointer cursor

**Program Level:**

kernel

**Related Functions:**

set\_circle\_cursor(), set\_watch\_cursor()

**Name:**

set\_pressbutton\_color — set pressbutton color

**Synopsis:**

set\_pressbutton\_color

**Arguments:****Description:****Program Level:**

kernel

**Related Functions:**

**Name:**

set\_slider\_color — set slider colors

**Synopsis:**

set\_slider\_color

**Arguments:****Description:****Program Level:**

kernel

**Related Functions:**

**Name:**

set\_timer — set timer for wait\_timer()

**Synopsis:**

```
void  
set_timer(    unsigned    microseconds    )
```

**Arguments:**

microseconds                  time to be wake up

**Description:****Program Level:**

kernel

**Related Functions:**

wait\_timer()

**Name:**

set\_watch\_cursor — set window cursor to watch cursor

**Synopsis:**

```
set_watch_cursor( Window win )
```

**Arguments:**

win                                  X window ID

**Description:**

give window a watch cursor.

**Program Level:**

kernel

**Related Functions:**

set\_circle\_cursor(), set\_left\_ptr\_cursor()



**Name:**

set\_window\_cursor — set window cursor

**Synopsis:**

```
void  
set_window_cursor(      Window      window,  
                      Cursor      cursor_type  )
```

**Arguments:**

window	X Window ID
cursor_type	X Cursor type

**Description:**

give window a cursor in X Cursor domain.

**Program Level:**

kernel

**Related Functions:**

set\_circle\_cursor(), set\_left\_ptr\_cursor(), set\_watch\_cursor()

**Name:**

superimpose\_add\_elem — add draw element to an image

**Synopsis:**

```
superimpose_add_elem(  U_IMAGE    *img,
                       int         line_w,
                       int         color,
                       int         shape,
                       int         y, x,
                       int         rows, cols    )
```

**Arguments:**

img	image structure pointer
line_w	pencil line wideness
color	pencil color
sharp	pattern sharp
y, x	pattern origin (center for ARCs)
rows, cols	pattern box size (quart for ARCs)

**Description:****Program Level:**

kernel

**Related Functions:**

**Name:**

superimpose\_handle — superimposed element moving handler

**Synopsis:**

```
superimpose_handle(    Image    *img,
                      int        who,
                      int        x, y    )
```

**Arguments:**

img	image structure pointer
who	which element need to be moved in superimposing stacks. It should be gotten from on_superimpose_elem(), and it must be non-zero. Tips: negative for drawing string, and positive for drawing patterns.
x, y	position the mouse button pressed

**Description:**

superimpose\_handle() used to move a

**Program Level:**

kernel

**Related Functions:**

on\_superimpose\_elem(), superimpose\_images()

**Name:**

superimpose\_images — draws pattern onto an image

**Synopsis:**

```
void
superimpose_images(    U_IMAGE    *img,
                       int          who,
                       int          x0, y0,
                       int          cw, ch          )
```

**Arguments:**

img	image structure pointer
who	pattern type; see Draws()
x0, y0	drawing origin
cw, ch	pattern box width and height

**Description:**

superimpose\_images() does similar pattern as Draws(), but does not draw the patterns into the image (onto).

**Program Level:**

kernel

**Related Functions:**

Draws()

**Name:**

wait\_timer — wait time out set by set\_timer)(

**Synopsis:**

```
void  
wait_timer(    void    )
```

**Arguments:**

None

**Description:**

sleep until time out

**Program Level:**

kernel

**Related Functions:**

set\_timer()

**Name:**

win\_exposure — image window exposure handler

**Synopsis:**

```
win_exposure( XExposeEvent      *expose,
              Image             *img,
              void              (*sub_win)() )
```

**Arguments:**

expose	X exposure event pointer
img	image whose window generates exposure event
sub_win	routine to handle pattern draws on the image

**Description:****Program Level:**

X user

**Related Functions:**

exposure\_r()

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