render

COLLABORATORS

	TITLE : render	

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1.2 render.library/AddChunkyImageA

```
            NAME
     AddChunkyImageA - add chunky bytes to a histogram.
     AddChunkyImage  - varargs stub for AddChunkyImageA.

SYNOPSIS
     success = AddChunkyImageA(histogram,chunky,width,height,
     d0                        a0        a1     d0    d1
                               palette,taglist)
                               a2      a3

     ULONG AddChunkyImageA(APTR,UBYTE *,UWORD,UWORD,
                           APTR,struct TagItem *)

     ULONG AddChunkyImage(APTR,UBYTE *,UWORD,UWORD,
                          APTR,tag,...,TAG_DONE)

FUNCTION
     This function adds an array of chunky bytes to a histogram. The
     color information contained in the chunky array and its palette
     will be stored in the histogram.

INPUTS
     histogram       - pointer to a histogram
     chunky          - pointer to an array of chunky bytes
     width           - width to be added [pixels]
     height          - lines to be added [rows]
     palette         - pointer to a palette
                       created with
             CreatePaletteA()
                     taglist         - pointer to an array of TagItems

TAGS
     RND_SourceWidth (UWORD) - Total width of the chunky array [pixels].
             Default - equals to the specified width.

     RND_ProgressHook (ULONG) - Pointer to a callback hook
             structure for progress display operations. Refer to
             render/renderhooks.h for further information.
             Default - NULL.

RESULTS
     success - return value to indicate whether the operation succeeded.
               You must at least check for ADDH_SUCCESS. Adding data to
               histograms may fail at any time and the histogram may
               thereof get inaccurate.

NOTES
     - It is not possible with this function to directly add a chunky
       array that represents a HAM color scheme. In this case you have
       to convert it to an RGB array via
             Chunky2RGBA()
             , and then to
       call
             AddRGBImageA()
```

```
              .

      - This function may call the progress callback Hook with
        the PMSGTYPE_LINES_ADDED message.

SEE ALSO

              AddRGBImageA()
              ,
              CreateHistogramA()
              , render/renderhooks.h
```

1.3 render.library/AddHistogramA

```
                NAME
     AddHistogramA - add a histogram to another histogram.
     AddHistogram  - varargs stub for AddHistogramA.

SYNOPSIS
     success = AddHistogramA(desthistogram,sourcehistogram,taglist)
     d0                      a0            a1              a2

     ULONG AddHistogramA(APTR,APTR,struct TagItem *)

     ULONG AddHistogram(APTR,APTR,tag,...,TAG_DONE)

FUNCTION
     This function adds a histogram to another histogram,
     according to the following scheme:

     desthistogram + sourcehistogram -> desthistogram

     The color information contained in the source histogram
     will be added to the destination histogram.

INPUTS
     desthistogram       - pointer to destination histogram
     sourcehistogram     - pointer to source histogram
     taglist             - pointer to an array of TagItems

TAGS
     RND_Weight (UWORD)  - multiplication factor for the
             number of representations in sourcehistogram

RESULTS
     success - return value to indicate whether the operation succeeded.
               You must at least check for ADDH_SUCCESS. Adding data to
               histograms may fail at any time and the histogram may
               thereof get inaccurate.

SEE ALSO

              CreateHistogramA()
```

1.4 render.library/AddRGB

```
                NAME
     AddRGB - add a RGB value to a histogram.

SYNOPSIS
     success = AddRGB(histogram,RGB,count)
     d0               a0        d0  d1

     ULONG AddRGB(APTR,ULONG,ULONG)

FUNCTION
     This function adds a given number of representations for a
     single RGB value to a histogram.

INPUTS
     histogram    - pointer to a histogram
     RGB          - RGB value to be added
     count        - number of representations for that RGB value

RESULTS
     success - return value to indicate whether the operation succeeded.
               You must at least check for ADDH_SUCCESS. Adding data to
               histograms may fail at any time and the histogram may
               thereof get inaccurate.

SEE ALSO

             AddRGBImageA()
             ,
             CreateHistogramA()
```

1.5 render.library/AddRGBImageA

```
                NAME
     AddRGBImageA - add an array of RGB data to a histogram.
     AddRGBImage  - varargs stub for AddRGBImageA.

SYNOPSIS
     success = AddRGBImageA(histogram,rgb,width,height,taglist)
     d0                     a0        a1  d0    d1     a2

     ULONG AddRGBImageA(APTR,ULONG *,UWORD,UWORD,struct TagItem *)

     ULONG AddRGBImage(APTR,ULONG *,UWORD,UWORD,tag,...,TAG_DONE)

FUNCTION
     This function adds an array of RGB pixels to a histogram. The
     color information contained in the RGB array gets stored in the
```

```
     histogram.

INPUTS
     histogram       - pointer to a histogram
     rgb             - pointer to an array of RGB data
     width           - width to be added [pixels]
     height          - lines to be added [rows]
     taglist         - pointer to an array of TagItems

TAGS
     RND_SourceWidth (UWORD) - Total width of the RGB array [pixels].
             Default - equals to the specified width.

     RND_ProgressHook (ULONG) - Pointer to a callback hook
             structure for progress display operations. Refer to
             render/renderhooks.h for further information.
             Default - NULL.

RESULTS
     success - return value to indicate whether the operation succeeded.
               You must at least check for ADDH_SUCCESS. Adding data to
               histograms may fail at any time and the histogram may
               thereof get inaccurate.

NOTES
     - This function may call the progress callback Hook with
       the PMSGTYPE_LINES_ADDED message.

SEE ALSO

             AddRGB()
             ,
             CreateHistogramA()
             , render/renderhooks.h
```

1.6 render.library/AllocRenderMem

```
                NAME
     AllocRenderMem - allocate memory from a render-memhandler.

SYNOPSIS
     mem = AllocRenderMem(rendermemhandler,size)
     d0                   a0               d0

     APTR AllocRenderMem(APTR, ULONG)

FUNCTION
     AllocRenderMem will allocate a memory block from a
     render-memhandler, or from public memory. If there is no memory
     block of the requested size available, NULL will be returned.
     You must check this return value. The request may fail at any
     time. Every call to this function must be followed by a call to
     FreeRenderMem.
```

```
INPUTS
     rendermemhandler - pointer to a render-memhandler, or NULL.
                        If you pass NULL, MEMF_ANY will be used.
     size             - the size of the desired block in bytes

RESULTS
     mem              - pointer to a block of memory, or NULL if the
                        allocation failed.

NOTES
     There is no real need for this function being available to you,
     except for helping you to create a smart, lean and sexy memory
     management - the idea is to enable your application and the
     library to share a particular memory pool.

SEE ALSO

             FreeRenderMem()
             ,
             AllocRenderVec()
             ,
             CreateRMHandlerA()
```

1.7 render.library/AllocRenderVec

```
                NAME
     AllocRenderVec - allocate memory from a render-memhandler,
                      and keep track of the allocated size and
                      the memhandler itself.

SYNOPSIS
     mem = AllocRenderVec(rendermemhandler,size)
     d0                   a0               d0

     APTR AllocRenderVec(APTR, ULONG)

FUNCTION
     AllocRenderVec will allocate a memory block from a
     render-memhandler, or from public memory. If there is no memory
     block of the requested size available, NULL will be returned.
     You must check this return value. The request may fail at any
     time. Any call to this function must be followed by a call to

             FreeRenderVec()
             . AllocRenderVec() keeps track of the allocated
     size and the memhandler itself.

INPUTS
     rendermemhandler - pointer to a render-memhandler, or NULL.
                        If you pass NULL, MEMF_ANY will be used.
     size             - the size of the desired block in bytes

RESULTS
```

```
     mem             - pointer to a block of memory, or NULL
                       if the allocation failed.

SEE ALSO

             FreeRenderVec()
             ,
             AllocRenderVecClear()
             ,
             AllocRenderMem()
             ,

             CreateRMHandlerA()
```

1.8 render.library/AllocRenderVecClear

```
                NAME
     AllocRenderVecClear - allocate a clear block of memory from a
                           render-memhandler

SYNOPSIS
     mem = AllocRenderVecClear(rendermemhandler,size)
     d0                        a0               d0

     APTR AllocRenderVecClear(APTR, ULONG)

FUNCTION
     AllocRenderVecClear will allocate a clear memory block from a
     render-memhandler, or from public memory. If there is no memory
     block of the requested size available, NULL will be returned.
     You must check this return value. The request may fail at any
     time. Any call to this function must be followed by a call to

             FreeRenderVec()
             . AllocRenderVecClear() keeps track of the
     allocated size and the memhandler itself.

INPUTS
     rendermemhandler - pointer to a render-memhandler, or NULL.
                        If you pass NULL, MEMF_ANY will be used.
     size             - the size of the desired block in bytes

RESULTS
     mem              - pointer to a block of memory filled with
                        NULL bytes, or NULL if the allocation failed.

SEE ALSO

             FreeRenderVec()
             ,
             AllocRenderVec()
             ,
             AllocRenderMem()
             ,
```

```
            CreateRMHandlerA()
```

1.9 render.library/ApplyAlphaChannelA

```
                NAME
     ApplyAlphaChannelA - compose RGB array via alpha-channel.
     ApplyAlphaChannel  - varargs stub for ApplyAlphaChannelA.

SYNOPSIS
     ApplyAlphaChannelA(sourcearray,width,height,destarray,tags)
                        a0          d0    d1     a1        a2

     void ApplyAlphaChannelA(ULONG *,UWORD,UWORD,ULONG *,
                             struct TagItem *)

     void ApplyAlphaChannel(ULONG *,UWORD,UWORD,ULONG *,
                            tag,...,TAG_DONE)

FUNCTION
     This function uses the alpha-channel information (by default taken
     from the source array) to perform a composition of the source and
     destination array. The result will be written to the
     destination array.

INPUTS
     sourcearray         - pointer to an ARGB array
     width               - width [pixels]
     height              - height [rows]
     destarray           - pointer to a RGB array
     taglist             - pointer to an array of TagItems

TAGS
     RND_SourceWidth (UWORD) - Total width of the source array [pixels].
             Default - equals to the specified width.

     RND_DestWidth (UWORD) - Total width of the dest array [pixels].
             Default - equals to the specified width.

     RND_AlphaChannel (ULONG) - Pointer to the alpha-channel array.
             Default - equals to the pointer to the source array.

     RND_AlphaModulo (UWORD) - Pixel offset that will be used when
             proceeding from one alpha-channel value to the next [bytes].
             Default - 4.

     RND_AlphaWidth (ULONG) - Total width of the alpha-channel array
             [pixels]. Default - equals to the specified width.

RESULTS
     none

SEE ALSO
```

```
InsertAlphaChannelA()
,
ExtractAlphaChannelA()
,
MixAlphaChannelA()
```

1.10 render.library/BestPen

```
                NAME
     BestPen - find the best matching pen.

SYNOPSIS
     pen = BestPen(palette,RGB)
     d0            a0      d0

     LONG BestPen(APTR,ULONG)

FUNCTION
     Determine a palette's pen number that matches best a given RGB
     value.

INPUTS
     palette   - palette created with
             CreatePaletteA()
                     RGB       - RGB value to find a match for

RESULTS
     pen       - pen number or -1 if no pen could be found.
                 (Usually this occurs when the palette is empty.)
```

1.11 render.library/Chunky2BitMapA

```
                NAME
     Chunky2BitMapA - convert chunky data to bitplanes.
     Chunky2BitMap  - varargs stub for Chunky2BitMapA.

SYNOPSIS
     Chunky2BitMapA(chunky,sx,sy,width,height,bitmap,dx,dy,taglist)
                    a0     d0 d1 d2    d3     a1     d4 d5 a2

     void Chunky2BitMapA(UBYTE *,UWORD,UWORD,UWORD,UWORD,
                         struct BitMap *,UWORD,UWORD,struct TagItem *)

     void Chunky2BitMap(UBYTE *,UWORD,UWORD,UWORD,UWORD,
                        struct BitMap *,UWORD,UWORD,tag,...,TAG_DONE)

FUNCTION
     Converts an array of chunky bytes to the bitplanes associated
     with a BitMap structure. You can specify clip areas both inside
```

```
        the chunky array and the BitMap. This function merges the data
        into the destination BitMap if required. BMF_INTERLEAVED is also
        handled.

        You may only process BMF_STANDARD bitmaps with this function.

    INPUTS
        chunky     - pointer to an array of chunky bytes
        sx         - left edge inside the chunky array [pixels]
        sy         - top edge inside the chunky array [rows]
        width      - width [pixels]
        height     - height [rows]
        bitmap     - pointer to an initialized BitMap structure
        dx         - destination left edge inside BitMap [pixels]
        dy         - destination top edge inside BitMap [rows]
        taglist    - pointer to an array of TagItems

    TAGS
        RND_SourceWidth (UWORD) - Total width of the chunky array [pixels].
                Default - equals to the specified width.

        RND_PenTable (ULONG) - Pointer to a table of 256 UBYTEs
                for a secondary conversion of the pen numbers.
                Default - NULL.

    RESULTS
        none

    IMPORTANT NOTES
        Starting with v39, you are not allowed to assume foreign BitMap
        structures being of a planar type. You may pass a BitMap
        structure to this function only if the BMF_STANDARD flag is set.

        Also remember to set-up your own BitMap structure with the
        BMF_STANDARD flag if you wish to convert it with this function.
        Consider Chunky2BitMapA() being low-level. The BitMap structure
        involved here is intended to hold planar information. Since v39,
        this is different to what graphics.library might associate with
        a BitMap structure.

        Do not use this function with BitMap structures that are
        actually being displayed. If you wish to transfer chunky bytes
        to visible areas, use graphics.library functions, such as
        WriteChunkyPixels(), or WritePixelArray8(). You may also use
        Chunky2BitMapA() followed by BltBitMapRastPort() etc.

        With a graphics card supplied, WriteChunkyPixels() can be
        hundereds times faster than Chunky2BitMapA() followed by
        BltBitMapRastPort(). If you have to provide backward
        compatibility, it is worth the effort to differenciate between
        Kick 2.x and OS 3.x. Use Chunky2BitMapA() in the first case,
        WritePixelArray8() in the second case, and WriteChunkyPixels()
        if the system runs under OS3.1 and is supplied with a graphics
        card.

SEE ALSO
```

```
        Planar2ChunkyA()
        , graphics/gfx.h,
graphics.library/WriteChunkyPixels()
```

1.12 render.library/Chunky2RGBA

```
            NAME
     Chunky2RGBA - convert an array of chunky bytes to RGB data.
     Chunky2RGB  - varargs stub for Chunky2RGBA.

SYNOPSIS
     success = Chunky2RGBA(chunky,width,height,rgb,palette,taglist)
     d0                    a0     d0    d1     a1  a2      a3

     ULONG Chunky2RGBA(UBYTE *,UWORD,UWORD,ULONG *,APTR,struct TagItem *)

     ULONG Chunky2RGB(UBYTE *,UWORD,UWORD,ULONG *,APTR,tag,...,TAG_DONE)

FUNCTION
     This function converts an array of chunky bytes to RGB data.

INPUTS
     chunky      - pointer to an array of chunky bytes
     width       - width to be converted [pixels]
     height      - height to be converted [rows]
     rgb         - pointer to RGB destination buffer
     palette     - pointer to a palette created
                   with
             CreatePaletteA()
                     taglist     - pointer to an array of TagItems

TAGS
     RND_SourceWidth (UWORD) - Total width of the chunky array [pixels].
             Default - equals to the specified width.

     RND_DestWidth (UWORD) - Total width of the RGB array [pixels].
             Default - equals to the specified width.

     RND_ColorMode (ULONG) - Color mode that defines how to determine
             a pixel's actual color. Valid types:

             COLORMODE_CLUT          - normal palette lookup
             COLORMODE_HAM8          - HAM8 mode palette lookup
             COLORMODE_HAM6          - HAM6 mode palette lookup

             Default - COLORMODE_CLUT.

     RND_LeftEdge (UWORD) - Horizontal starting position inside the
             chunky array [pixels]. This is mainly intended to allow
             the conversion of HAM clip areas.
             Default - 0.

     RND_ProgressHook (ULONG) - Pointer to a callback hook
```

```
            structure for progress display operations. Refer to
            render/renderhooks.h for further information.
            Default - NULL.

     RND_PenTable (ULONG) - Pointer to a table of 256 UBYTEs
            for an additional conversion of the pen numbers.
            Default - NULL.
            Note: This is not defined for HAM modes.

     RND_LineHook (ULONG) - Pointer to a callback hook structure
            for line-related operations during conversion. This
            hook is executed once before a line is processed and
            once after it has been completed. Refer to
            render/renderhooks.h for further information.
            Default - NULL.

RESULTS
     success - CONV_SUCCESS to indicate that the operation
               succeeded. Currently, the only reason for this
               function to fail is CONV_CALLBACK_ABORTED.

NOTES
     - This function may call the progress callback Hook
       with the PMSGTYPE_LINES_CONVERTED message type.

SEE ALSO
     render/render.h
```

1.13 render.library/ChunkyArrayDiversityA

```
               NAME
     ChunkyArrayDiversityA - calculate chunky array adaptibility
     ChunkyArrayDiversity  - varargs stub for ChunkyArrayDiversityA.

SYNOPSIS
     diversity = ChunkyArrayDiversityA(chunkyarray,palette,
     d0                                a0          a1
                                       width,height,taglist)
                                       d0    d1     a2

     LONG ChunkyArrayDiversityA(UBYTE *,APTR,UWORD,UWORD,
                                struct TagItem *)

     LONG ChunkyArrayDiversity(UBYTE *,UWORD,UWORD,
                               tag,...,TAG_DONE)

FUNCTION
     Calculate a chunky array's adaptibility to a palette or
     mapping-engine.

INPUTS
     chunkyarray - pointer to an array of chunky bytes
     palette     - the chunky array's palette
```

```
     width       - width to be processed [pixels]
     height      - height to be processed [pixels]
     taglist     - pointer to an array of tagitems

TAGS
     RND_Palette (ULONG) - pointer to a palette. Either this or the
             RND_MapEngine argument is obligatory!

     RND_MapEngine (ULONG) - pointer to a mapping-engine. Either this
             or the RND_Palette argument is obligatory!

     RND_SourceWidth (UWORD) - Total width of the RGB array [pixels].
             Default - equals to the specified width.

     RND_Interleave (ULONG) - number of pixels to skip horizontally.
             Default - 0.

RESULTS
     diversity - an indicator for the chunky array's adaptibility
                 to the given palette or mapping-engine. 0 indicates
                 perfect adaptibility, 195075 indicates the worst case.

IMPLEMENTATION
     Every color in the source array is adapted to the specified
     palette or mapping-engine. Now assume p2 is the RGB of the
     palette entry that matches best with the requested color p1.

         R
         |
         |      * p2
         |     /
         |    /
         |   / d
         |__/_________G
        /  /
       /  * p1
      /
     B

     This function sums up the diversity d$^2$ for every color in the
     source array, and divides it by the number of pixels processed:

                       k=pixels
               1          ___
     D   =   ------   .   \   `   d(k)$^2$
             pixels       /__,

                         k=1

     D is returned, so what you get is the average d$^2$ for all RGB
     values that appear in the array. d$^2$ is summed up instead of d
     because it is a better indicator for most purposes.

     Best case - all pixels match perfectly: D(min) = 0.
     Worst case - all pixels are white, and the only available color
     in the palette is black: D(max) = 255$^2$+255$^2$+255$^2$ = 195075.
```

```
EXAMPLE
     D indicates a palette's applicability for the given chunky
     array. You can e.g. use it to decide whether error diffusion
     should be enabled for
             ConvertChunkyA()
             .

     dithermode = DITHERMODE_NONE;

     D = ChunkyArrayDiversity(sourcearray, palette, width, height,
         RND_Palette, destpalette, RND_Interleave, 4, TAG_DONE);

     if (D > threshold)
     {
         dithermode = DITHERMODE_FS;
     }

     ConvertChunky(sourcearray, palette, width, height, destarray,
         destpalette, RND_DitherMode, dithermode, TAG_DONE);

     The interleave factor increases speed drastically. You gain a
     lot of performance if only dithering can be avoided sometimes.

SEE ALSO

             RGBArrayDiversityA()
```

1.14 render.library/ConvertChunkyA

```
               NAME
     ConvertChunkyA - convert an array of chunky bytes to a new palette.
     ConvertChunky  - varargs stub for ConvertChunkyA.

SYNOPSIS
     success = ConvertChunkyA(source,sourcepalette,width,height,dest,
     d0                       a0     a1            d0    d1     a2
                              destpalette,taglist)
                              a3          a4

     ULONG ConvertChunkyA(UBYTE *,APTR,UWORD,UWORD,UBYTE *,
                          APTR,struct TagItem *)

     ULONG ConvertChunky(UBYTE *,APTR,UWORD,UWORD,UBYTE *,
                         APTR,tag,...,TAG_DONE)

FUNCTION
     This function converts a source array of chunky bytes to another
     chunky array, and adapts it to a new palette.

INPUTS
     source        - pointer to a source array of chunky bytes
     sourcepalette - pointer to the source array's palette
     width         - width to be converted [pixels]
     height        - height to be converted [rows]
```

```
      dest          - pointer to the destination chunky array
      destpalette   - pointer to the destination array's palette
      taglist       - pointer to an array of TagItems

TAGS
      RND_SourceWidth (UWORD) - Total width of source array [pixels].
              Default - equals to the specified width.

      RND_DestWidth (UWORD) - Total width of dest array [pixels].
              Default - equals to the specified width.

      RND_DitherMode (UWORD) - Error diffusion mode. Valid types:

              DITHERMODE_NONE   - no error diffusion

              DITHERMODE_FS     - Floyd-Steinberg
                                  Does not handle a dither amount.

              DITHERMODE_RANDOM - Random dithering
                                  Handles RND_DitherAmount.

              DITHERMODE_EDD    - EDD dithering
                                  Does not handle a dither amount.

              Default - DITHERMODE_NONE.

      RND_DitherAmount (UWORD) - Dither intensity (0-255).
              Only valid with certain dither modes (see above).
              Default - 128.

      RND_LineHook (ULONG) - Pointer to a callback hook structure
              for line-related operations during conversion. This
              hook is executed once before a line is rendered and
              once after a line has been completed. Refer to
              render/renderhooks.h for further information.
              Default - NULL.

      RND_OffsetColorZero (UWORD) - First pen number to appear
              in the rendered chunky image. This offset will be
              added to the palette's indices. Default - 0.
              Note: RND_PenTable overrides RND_OffsetColorZero.

      RND_PenTable (ULONG) - Pointer to a table of 256 UBYTEs
              for a secondary conversion of the pen numbers.
              Default - NULL.
              Note: RND_PenTable overrides RND_OffsetColorZero.

      RND_ProgressHook (ULONG) - Pointer to a callback hook
              structure for progress display operations. Refer to
              render/renderhooks.h for further information.
              Default - NULL.

      RND_ScaleEngine (ULONG) - Pointer to a scaling-engine.
              This scaling-engine will be used to scale the
              source data stream before it is being rendered.
              Default - NULL.
```

```
              Notes:
              - The scaling engine's destination width and
                height specifications override the width and
                height arguments for
              RenderA()
              .
              - The scaling-engine must have been created with
                PIXFMT_CHUNKY_CLUT.

      RND_MapEngine (ULONG) - Pointer to a mapping-engine.
              This can greatly improve performance.
              Default - NULL.

              Notes:
              - The mapping-engine must have been created for
                the destination palette that is specified for
                ConvertChunkyA().
              - With dithering enabled, you better do not
                specify a mapping-engine which was created with
                a link to a histogram. Accurate conversion could
                not be guaranteed in this case.

RESULTS
      success - returncode to indicate whether the operation
                succeeded. You must at least check for
                CONV_SUCCESS.

NOTES
      - This function may call the progress callback Hook with
        the PMSGTYPE_LINES_CONVERTED message type.

SEE ALSO

              MapChunkyArrayA()
              ,
              RenderA()
              ,
              CreatePenTableA()
              ,

              CreatePaletteA()
              , render/render.h, render/renderhooks.h
```

1.15 render.library/CountRGB

```
NAME
      CountRGB      - count a RGB value in a histogram.

SYNOPSIS
      count = CountRGB(histogram,RGB)
      d0               a0        d0

      ULONG CountRGB(APTR,ULONG)
```

```
FUNCTION
     Counts the number of occurances for a given RGB value. The
     result may depend on the histogram's accuracy.

INPUTS
     histogram - pointer to a histogram

RESULTS
     count     - number of representations for the
                 specified RGB value.

NOTE
     You only get the exact result for 24bit histograms. The lower
     the resolution, the more colors are actually put together into
     one 'category' of similar colors. A 24bit histogram
     differenciates 16,7 million colors, a 15bit histogram, for
     instance, only 32768.
```

1.16 render.library/CreateAlphaArrayA

```
NAME
     CreateAlphaArrayA - create an alpha-channel for a RGB array.
     CreateAlphaArray  - varargs stub for CreateAlphaArrayA.

SYNOPSIS
     CreateAlphaArrayA(rgbarray,width,height,tags)
                       a0       d0    d1     a1

     void CreateAlphaArrayA(ULONG *,UWORD,UWORD,struct TagItem *)

     void CreateAlphaArray(ULONG *,UWORD,UWORD,tag,...,TAG_DONE)

FUNCTION
     This function creates an alpha-channel for the given RGB array.
     The alpha-channel will be the difference in brightness towards
     black (0x000000), or optionally towards another RGB value.

INPUTS
     rgbarray            - pointer to a RGB array
     width               - width [pixels]
     height              - height [rows]
     taglist             - pointer to an array of TagItems

TAGS
     RND_SourceWidth (UWORD) - Total width of the RGB array [pixels].
             Default - equals to the specified width.

     RND_AlphaChannel (ULONG) - Alpha-channel destination array.
             Default - equals to rgbarray. the upmost byte in the
             RGB array is a good place for an alpha-channel, usually.

     RND_AlphaWidth (UWORD) - Total width of the alpha-channel array
             [pixels]. Default - equals to the specified width.
```

```
     RND_AlphaModulo (UWORD) - Alpha-channel pixel modulo [bytes].
             Default - 4

     RND_MaskRGB (ULONG) - The RGB value to compute the alpha-channel
             towards. Default - 0x000000

RESULTS
     none
```

1.17 render.library/CreateHistogramA

```
               NAME
     CreateHistogramA - create and set up a histogram.
     CreateHistogram  - varargs stub for CreateHistogramA.

SYNOPSIS
     hst = CreateHistogramA(taglist)
     d0                     a1

     APTR CreateHistogramA(struct TagItem *)

     APTR CreateHistogram(tag,...,TAG_DONE)

FUNCTION
     Allocates and initializes a histogram.

INPUTS
     taglist - pointer to an array of TagItems

TAGS
     RND_RMHandler (ULONG) - pointer to a render-memhandler
             created with
             CreateRMHandlerA()
             .
             Default - NULL.

     RND_HSType (UWORD) - Type of histogram. Valid types:

             HSTYPE_12BIT            - 12bit dynamic histogram
             HSTYPE_15BIT            - 15bit dynamic histogram
             HSTYPE_18BIT            - 18bit dynamic histogram
             HSTYPE_21BIT            - 21bit dynamic histogram
             HSTYPE_24BIT            - 24bit dynamic histogram
             HSTYPE_12BIT_TURBO      - 12bit tabular histogram
             HSTYPE_15BIT_TURBO      - 15bit tabular histogram
             HSTYPE_18BIT_TURBO      - 18bit tabular histogram

             Default - HSTYPE_15BIT_TURBO.

RESULTS
     histogram - pointer to a histogram ready for usage,
                 or NULL if something went wrong.
```

```
SEE ALSO

            DeleteHistogram()
            ,
            QueryHistogram()
            , render/render.h
```

1.18 render.library/CreateMapEngineA

```
                NAME
      CreateMapEngineA - create a mapping-engine.
      CreateMapEngine - varargs stub for CreateMappingEngineA.

SYNOPSIS
      engine = CreateMapEngineA(palette,taglist)
      d0                        a0       a1

      ULONG CreateMapEngineA(APTR,struct TagItem *)

      ULONG CreateMapEngine(APTR,tag,...,TAG_DONE)

FUNCTION
      This function will create and prepare a mapping-engine for
      usage. Mapping-engines are highly optimized low-level conversion
      units for rendering to a specific palette.

      Mapping-engines are immediately dependent from a palette, and
      they may be additionally coupled with a histogram. In the latter
      case, mapping-engines adapt only RGB values that can be found in
      the histogram.

      Mapping-engines do not incorporate the contents of their
      palettes and histograms. They are getting notified, and they
      automagically update themselves when needed. This update takes
      place only on demand, i.e. whenever you pass a mapping-engine to
      a function. The mapping-engine checks if any changes applied to
      the palette or histogram, and it reconstructs itself. The
      palette's pen-adaption buffers are updated as well - palettes
      and mapping-engines are just good friends.

INPUTS
      palette       - pointer to a palette
      taglist       - pointer to an array of TagItems

TAGS
      RND_RMHandler (ULONG) - Pointer to a render-memhandler.
              This will be used for the mapping-engine's
              buffers. Default - The palette's memhandler.

      RND_Histogram (ULONG) - Pointer to a histogram.
              The histogram must be of a HSTYPE_..._TURBO type,
              and have the same resolution as the palette.
              Default - none.
```

```
RESULTS
     engine - pointer to a mapping-engine ready for usage,
              or NULL if something went wrong.

NOTES
     You must free a mapping-engine before you
             DeletePalette()
              the
     palette it is dependent from. The same applies for the
     histogram.

SEE ALSO

             DeleteMapEngine()
             ,
             MapRGBArrayA()
             ,
             CreateRMHandlerA()
```

1.19 render.library/CreatePaletteA

```
                NAME
     CreatePaletteA - create a palette.
     CreatePalette  - vararg stub for CreatePaletteA.

SYNOPSIS
     palette = CreatePaletteA(taglist)
     d0                       a1

     APTR CreatePaletteA(struct TagItem *)

     APTR CreatePalette(tag,...,TAG_DONE)

FUNCTION
     This function creates and initializes a palette that can hold up
     to 256 color entries.

INPUTS
     taglist     - pointer to an array of TagItems

TAGS
     RND_HSType (ULONG) - the palette's resolution. Palette adaption
             accuracy and memory consumption depend on this constant.
             A palette's resolution is specified analogously to a
             histogram's resolution. Valid types:

             HSTYPE_12BIT
             HSTYPE_15BIT
             HSTYPE_18BIT

             Default - HSTYPE_15BIT.

     RND_RMHandler (ULONG) - pointer to a render-memhandler that was
```

```
              created with CreateRMHandler(). Default - NULL.

RESULTS
     palette  - a palette ready for usage,
                or NULL if something went wrong.

SEE ALSO

              DeletePalette()
              ,
              ImportPaletteA()
              ,
              ExportPaletteA()
              ,

              ExtractPaletteA()
              ,
              FlushPalette()
              , render/render.h
```

1.20 render.library/CreatePenTableA

```
                NAME
     CreatePenTableA - create a pen conversion table.
     CreatePenTable  - varargs stub for CreatePenTableA.

SYNOPSIS
     CreatePenTableA(chunky,oldpalette,width,height,newpalette,
                     a0     a1         d0    d1     a2
                     pentab,taglist)
                     a3     a4

     void CreatePenTableA(UBYTE *,APTR,UWORD,UWORD,APTR,
                          UBYTE *,struct TagItem *)

     void CreatePenTable(UBYTE *,APTR,UWORD,UWORD,APTR,
                         UBYTE *,tag,...,TAG_DONE)

FUNCTION
     This function creates a table for the conversion of a particular
     array of chunky bytes. It scans through the chunky array, adapts
     the found palette entries to a new palette, and generates an
     output table of 256 UBYTEs. The resulting table is handled as
     follows:

     new_pen_number = pentab[old_pen_number]

INPUTS
     chunky      - pointer to an array of chunky bytes
     oldpalette  - pointer to the original palette
     width       - width to be processed [pixels]
     height      - height to be processed [rows]
     newpalette  - pointer to a palette to be adapted to
```

```
     pentab      - pointer to the destination table
     taglist     - pointer to an array of TagItems

TAGS
     RND_SourceWidth (UWORD) - Total width of the chunky array [pixels].
             Default - equals to the specified width.

     RND_PenTable (ULONG) - Pointer to a table of 256 UBYTEs
             for a secondary conversion of the pen numbers.
             Default - NULL.

RESULTS
     none

NOTES
     The destination table is assumed to have 256 entries,
     with no respect to what color indices actually occur in
     the chunky array.

SEE ALSO

             ConvertChunkyA()
             ,
             CreatePaletteA()
```

1.21 render.library/CreateRMHandlerA

```
               NAME
     CreateRMHandlerA - Create and set up a memory handler.
     CreateRMHandler  - varargs stub for CreateRMHandlerA.

SYNOPSIS
     rmh = CreateRMHandlerA(taglist)
     d0                     a1

     APTR CreateRMHandlerA(struct TagItem *)

     APTR CreateRMHandler(tag,...,TAG_DONE)

FUNCTION
     This function allocates and initializes a render-memhandler.
     This is a custom memory resource manager for histograms,
     rendering, palettes, and many other render.library
     objects and functions. You may use a render-memhandler for your
     own purposes, too.

     A render-memhandler helps to avoid memory fragmentation as well
     as extreme stressing of the system's public memory lists.
     Private memory management is supported as well as v39 exec pools
     and common public memory. Future versions might provide more
     types of memory management.

INPUTS
     taglist - pointer to an array of TagItems
```

```
TAGS
     RND_MemType (UWORD) - type of memory management. Valid types:

             RMHTYPE_POOL            - v39 exec dynamic pool
             RMHTYPE_PRIVATE         - you supply a private memory pool
             RMHTYPE_PUBLIC          - use common public memory

             Default - RMHTYPE_PUBLIC.

     RND_MemBlock (ULONG) - pointer to a block of memory
             used for private memory management. This tag
             is obligatory if you specify RMHTYPE_PRIVATE
             and is ignored otherwise.
             Default - none.

     RND_MemSize (ULONG) - size of the memory block used
             for private memory management. This tag is
             obligatory if you specify RMHTYPE_PRIVATE
             and is ignored otherwise.
             Default - none.

     RND_MemFlags (ULONG) - memory flags, as defined in
             exec/memory.h. These are ignored for
             RMHTYPE_PRIVATE. Default - MEMF_ANY.

RESULTS
     rmh - a render-memhandler ready for usage, or NULL if
           something went wrong.

NOTES
     You must check for the presence of exec v39 before you create a
     memhandler with RMHTYPE_POOL specified.

SEE ALSO

             AllocRenderMem()
             ,
             AllocRenderVec()
             ,
             DeleteRMHandler()
             ,
     exec.library/CreatePool(), render/render.h, exec/memory.h
```

1.22 render.library/CreateScaleEngineA

```
               NAME
     CreateScaleEngineA - Create a scaling-engine.
     CreateScaleEngine  - varargs stub for CreateScaleEngineA.

SYNOPSIS
     scaleengine = CreateScaleEngineA(sourcewidth,sourceheight,
     d0                               d0          d1
```

```
                                        destwidth,destheight,taglist)
                                        d2        d3         a1

     APTR CreateScaleEngineA(UWORD,UWORD,UWORD,
                             UWORD,struct TagItem *)

     APTR CreateScaleEngine(UWORD,UWORD,UWORD,
                            UWORD,tag,...,TAG_DONE)

FUNCTION
     Allocates and initializes a scaling-engine for a specific set of
     scaling parameters. Once set up, a scaling-engine is highly
     optimized for its particular parameter specifications.

INPUTS
     sourcewidth  - source width [pixels]
     sourceheight - source height [rows]
     destwidth    - destination width [pixels]
     destheight   - destination height [rows]
     taglist      - pointer to an array of tag items

TAGS
     RND_RMHandler (ULONG) - pointer to a render-memhandler,
             such as created with
             CreateRMHandlerA()
             .
             Default - NULL.

     RND_PixelFormat (ULONG) - Type of data to process.
             Currently defined are PIXFMT_CHUNKY_CLUT
             and PIXFMT_0RGB_32. Default - PIXFMT_CHUNKY_CLUT.

     RND_Coordinates (ULONG) - Pointer to an array of coordinates
             for texturemapped scaling. This array consists of
             4 WORD pairs of x/y coordinates each. The array forms
             a trapezoid inside the destination buffer for the source
             array being mapped to. Any parameters are valid, since
             clipping is fully implemented. Default - NULL.

RESULTS
     engine - a scaling-engine ready for usage, or NULL
              if something went wrong.

SEE ALSO

             DeleteScaleEngine()
             ,
             ScaleA()
```

1.23 render.library/DeleteHistogram

```
NAME
     DeleteHistogram - dispose a histogram.
```

```
SYNOPSIS
     DeleteHistogram(histogram)
                     a0

     void DeleteHistogram(APTR)

FUNCTION
     Removes a histogram and frees all associated memory.

INPUTS
     histogram   - pointer to a histogram
                   Passing a NULL pointer is safe.

RESULTS
     none
```

1.24 render.library/DeleteMapEngine

```
NAME
     DeleteMapEngine - dispose a mapping-engine.

SYNOPSIS
     DeleteMapEngine(engine)
                     a0

     void DeleteMapEngine(APTR)

FUNCTION
     Removes a mapping-engine and frees all associated memory.

INPUTS
     engine   - pointer to a mapping-engine

NOTES
     You must free mapping-engines before you delete the
     palettes and histograms they're dependent from.

RESULTS
     none

SEE ALSO
     CreateMapEngine()
```

1.25 render.library/DeleteRMHandler

```
                NAME
     DeleteRMHandler - free a render-memhandler.

SYNOPSIS
     DeleteRMHandler(rendermemhandler)
```

```
                    a0

     void DeleteRMHandler(APTR)

FUNCTION
     DeleteRMHandler() will remove and free a previously created
     render-memhandler. That does not imply that any outstanding
     memory will be returned to the system or to whatever memory
     ressources. You are responsible for freeing each memory block
     that you have allocated from a render-memhandler.

INPUTS
     render-memhandler - a render-memhandler to be deleted.

RESULTS
     none

NOTES
     You are not allowed to call DeleteRMHandler() before every
     single byte has been returned to the memhandler.

SEE ALSO

             CreateRMHandlerA()
```

1.26 render.library/DeletePalette

```
               NAME
     DeletePalette - dispose a palette.

SYNOPSIS
     DeletePalette(palette)
                   a0

     void DeletePalette(APTR)

FUNCTION
     This function deletes a palette and frees all
     associated memory.

INPUTS
     palette   - pointer to a palette created
                 with
             CreatePaletteA()
                RESULTS
     none

SEE ALSO

             CreatePaletteA()
             ,
             FlushPalette()
```

1.27 render.library/DeleteScaleEngine

```
                NAME
     DeleteScaleEngine - dispose a scaling-engine.

SYNOPSIS
     DeleteScaleEngine(engine)
                       a0

     void DeleteScaleEngine(APTR)

FUNCTION
     Deletes a scaling-engine and frees all associated memory.

INPUTS
     engine   - a scaling-engine to be removed

RESULTS
     none

SEE ALSO

             CreateScaleEngineA()
```

1.28 render.library/ExportPaletteA

```
                NAME
     ExportPaletteA - export a palette.
     ExportPalette  - varargs stub for ExportPaletteA.

SYNOPSIS
     ExportPaletteA(palette,buffer,taglist)
                    a0      a1     a2

     ExportPaletteA(APTR,APTR,struct TagItem *)

     ExportPalette(APTR,APTR,tag,...,TAG_DONE)

FUNCTION
     This function exports a palette (or a part of it)
     to a colortable.

INPUTS
     palette   - pointer to a palette created
                 with
             CreatePaletteA()
                     buffer    - pointer to a destination buffer
     taglist   - pointer to an array of tag items

TAGS
     RND_PaletteFormat (ULONG) - format of the color table
             to be exported. Valid types:
```

```
            PALFMT_RGB32    - ULONG red,green,blue
            PALFMT_RGB8     - ULONG 0x00rrggbb
            PALFMT_RGB4     - UWORD 0xrgb

            Default - PALFMT_RGB8.

     RND_FirstColor (ULONG) - first color entry to export.
            Default - 0.

     RND_NumColors (ULONG) - number of colors to export.
            Default - the number of colors inside the palette.

RESULTS
     none

SEE ALSO

            CreatePaletteA()
            ,
            ImportPaletteA()
```

1.29 render.library/ExtractAlphaChannelA

```
               NAME
     ExtractAlphaChannelA - extract alpha-channel from an ARGB array.
     ExtractAlphaChannel  - varargs stub for ExtractAlphaChannelA.

SYNOPSIS
     ExtractAlphaChannelA(argbarray,width,height,chunkyarray,tags)
                          a0       d0    d1     a1          a2

     void ExtractAlphaChannelA(ULONG *,UWORD,UWORD,UBYTE *,
                               struct TagItem *)

     void ExtractAlphaChannel(ULONG *,UWORD,UWORD,UBYTE *,
                              tag,...,TAG_DONE)

FUNCTION
     This function extracts the alpha-channel mask from an ARGB array
     and writes it to an array of chunky bytes.

INPUTS
     argbarray           - pointer to an ARGB array
     width               - width [pixels]
     height              - height [rows]
     chunkyarray         - pointer to an array of chunky bytes
     taglist             - pointer to an array of TagItems

TAGS
     RND_SourceWidth (UWORD) - Total width of the ARGB array [pixels].
            Default - equals to the specified width.

     RND_DestWidth (UWORD) - Total width of the chunky array [pixels].
            Default - equals to the specified width.
```

```
RESULTS
     none

SEE ALSO

             InsertAlphaChannelA()
             ,
             ApplyAlphaChannelA()
```

1.30 render.library/ExtractPaletteA

```
                NAME
     ExtractPaletteA - extract a palette from a histogram.
     ExtractPalette  - varargs stub for ExtractPaletteA.

SYNOPSIS
     success = ExtractPaletteA(histogram,palette,numcolors,taglist)
     d0                        a0        a1      d0        a2

     ULONG ExtractPaletteA(APTR,ULONG *,UWORD,struct TagItem *)

     ULONG ExtractPalettA(APTR,ULONG *,UWORD,tag,...,TAG_DONE)

FUNCTION
     This function extracts a given number of colors from a
     histogram and stores it in a palette.

INPUTS
     histogram - pointer to a histogram
     palette   - pointer to a palette created
                 with
             CreatePaletteA()
                     numcolors - number of entries to extract
     taglist   - pointer to an array of TagItems

TAGS
     RND_RMHandler (ULONG) - Custom memory handler created with

             CreateRMHandlerA()
             . This is used to handle intermediate
             buffers during quantization.
             Default - The histogram's memory handler.

     RND_ProgressHook (ULONG) - Pointer to a callback hook
             structure for progress display operations. Refer to
             render/renderhooks.h for further information.
             Default - NULL.

     RND_RGBWeight (ULONG) - R/G/B quantization factors.
             They form a relative measurement between the R/G/B
             components, defining what color components should be
             preferred when the histogram gets decomposed.
             Default - 0x010101 (all components are treat equally).
```

```
     RND_ColorMode (ULONG) - Color mode that defines how to determine
             a pixel's actual color. Currently this tag should only be
             set to COLORMODE_HAM6 if you extract a palette for the
             use with a HAM6 image.
             Default - COLORMODE_CLUT.

     RND_FirstColor (ULONG) - first color entry inside the palette
             that will be used for the extracted colors. See also

             ImportPaletteA()
              for further details. Default - 0.

     RND_NewPalette (ULONG) - if set to TRUE, this flag indicates
             that you want to dispose the current palette and
             create a new one. If set to FALSE, the new color entries
             are merged to the existing palette. Default - TRUE.

RESULTS
     success - returncode to indicate whether the operation
               succeeded. You must at least check for
               EXTP_SUCCESS.

NOTES
     - This function may call the progress callback Hook
       with the PMSGTYPE_COLORS_CHOSEN message type.

SEE ALSO

             CreateHistogramA()
             ,
             CreatePaletteA()
             ,
             ImportPaletteA()
             ,
     render/render.h, render/renderhooks.h
```

1.31 render.library/FlushPalette

```
                NAME
     FlushPalette - flush all buffers from a palette.

SYNOPSIS
     FlushPalette(palette)
                  a0

     void FlushPalette(APTR)

FUNCTION
     This function flushes all buffers that might be
     associated with a palette.

INPUTS
```

```
     palette   - pointer to a palette that was
                 created with
             CreatePaletteA()
                RESULTS
     none

SEE ALSO

             DeletePalette()
```

1.32 render.library/FreeRenderMem

```
                NAME
     FreeRenderMem - return memory to a render-memhandler.

SYNOPSIS
     FreeRenderMem(rendermemhandler,mem,size)
                   a0               a1  d0

     void FreeRenderMem(APTR,APTR,ULONG)

FUNCTION
     Free a block of memory that was allocated with

             AllocRenderMem()
             .

INPUTS
     rendermemhandler - pointer to the render-memhandler the block
                        has been allocated from
     mem              - pointer to the memory block to be returned
     size             - size of that memory block [bytes]

RESULTS
     NONE

SEE ALSO

             AllocRenderMem()
             ,
             CreateRMHandlerA()
```

1.33 render.library/FreeRenderVec

```
                NAME
     FreeRenderVec - return memory to a render-memhandler.

SYNOPSIS
     FreeRenderVec(mem)
                   a0
```

```
     void FreeRenderVec(APTR)

FUNCTION
     Free a block of memory that was allocated with
             AllocRenderVec()
             .

INPUTS
     mem - pointer to a memory block
           to be returned to its render-memhandler.
           Passing a NULL pointer is safe.

RESULTS
     NONE

SEE ALSO

             AllocRenderVec()
             ,
             DeleteRMHandler()
```

1.34 render.library/ImportPaletteA

```
                NAME
     ImportPaletteA - import a palette.
     ImportPalette  - varargs stub for ImportPaletteA.

SYNOPSIS
     ImportPaletteA(palette,table,entries,taglist)
                    a0      a1    d0      a2

     ImportPaletteA(APTR,APTR,UWORD,struct TagItem *)

     ImportPalette(APTR,APTR,UWORD,tag,...,TAG_DONE)

FUNCTION
     This function imports entries from a color table (or from a
     palette) to a palette. You are allowed to import multiple times.
     When doing so, entries will be overwritten (not inserted). The
     palette automatically grows to the required number of entries.
     Remember to neither import more than 256 entries nor beyond the
     256th entry.

INPUTS
     palette   - pointer to a palette created
                 with
             CreatePaletteA()
                     table     - pointer to a source color table
                    (or a render.library palette)
     entries   - number of color entries to import
     taglist   - pointer to an array of tag items

TAGS
```

```
     RND_PaletteFormat (ULONG) - format of the color table
             to be imported. Valid types:

             PALFMT_RGB32    - ULONG red,green,blue
             PALFMT_RGB8     - ULONG 0x00rrggbb
             PALFMT_RGB4     - UWORD 0xrgb
             PALFMT_PALETTE  - another palette

             Default - PALFMT_RGB8.

     RND_FirstColor (ULONG) - first color entry inside the
             palette to import to. Default - 0.

     RND_EHBPalette (ULONG) - tag to indicate whether the
             imported colors should be interpreted as for an
             Extra-Halfbrite picture. Default - FALSE.

     RND_NewPalette (ULONG) - if set to TRUE, this flag indicates
             that you want to dispose the current palette and
             import a new one. If set to FALSE, the palette is
             merged. Default - TRUE.

RESULTS
     none

SEE ALSO

             CreatePaletteA()
             ,
             ExportPaletteA()
             , render/render.h
```

1.35 render.library/InsertAlphaChannelA

```
                NAME
     InsertAlphaChannelA - insert a alpha-channel mask to a RGB array.
     InsertAlphaChannel  - varargs stub for InsertAlphaChannelA.

SYNOPSIS
     InsertAlphaChannelA(chunkyarray,width,height,rgbarray,tags)
                         a0          d0    d1     a1       a2

     void InsertAlphaChannelA(UBYTE *,UWORD,UWORD,ULONG *,
                              struct TagItem *)

     void InsertAlphaChannel(UBYTE *,UWORD,UWORD,ULONG *,
                             tag,...,TAG_DONE)

FUNCTION
     This function inserts an array of chunky bytes to a RGB array.
     The resulting ARGB array can then be used for alpha-channel
     operations, such as provided with
             ApplyAlphaChannelA()
```

```
            .

INPUTS
     chunkyarray         - pointer to an array of chunky bytes
     width               - width [pixels]
     height              - height [rows]
     rgbarray            - pointer to a RGB array
     taglist             - pointer to an array of TagItems

TAGS
     RND_SourceWidth (UWORD) - Total width of the chunky array [pixels].
             Default - equals to the specified width.

     RND_DestWidth (UWORD) - Total width of the rgb array [pixels].
             Default - equals to the specified width.

RESULTS
     none

SEE ALSO

             ExtractAlphaChannelA()
             ,
             ApplyAlphaChannelA()
```

1.36 render.library/MapChunkyArrayA

```
               NAME
     MapChunkyArrayA - remap a chunky array.
     MapChunkyArray  - varargs stub for MapChunkyArrayA.

SYNOPSIS
     success = MapChunkyArrayA(engine,sourcearray,palette,width,
     d0                        a0     a1          a2      d0
                               height,destarray,taglist)
                               d1     a3        a4

     ULONG MapChunkyArrayA(APTR,UBYTE *,APTR,UWORD,UWORD,UBYTE *,
                           struct TagItem *)

     ULONG MapChunkyArray(APTR,UBYTE *,APTR,UWORD,UWORD,UBYTE *,
                          tag,...,TAG_DONE)

FUNCTION
     MapChunkyArrayA() maps an array of chunky bytes to another
     chunky array.

INPUTS
     engine      - pointer to a mapping-engine created
                   with
             CreateMapEngineA()
                     sourcearray - pointer to source array of chunky pixels
     palette     - pointer to source array's palette
     width       - width to be converted [pixels]
```

```
     height      - height to be converted [rows]
     destarray   - pointer to the destination chunky array
     taglist     - pointer to an array of TagItems

TAGS
     RND_SourceWidth (UWORD) - Total width of the chunky array [pixels].
             Default - equals to the specified width.

     RND_DestWidth (UWORD) - Total width of the chunky array [pixels].
             Default - equals to the specified width.

     RND_PenTable (ULONG) - Pointer to a table of 256 UBYTEs
             for a secondary conversion of the pen numbers.
             Default - NULL.

RESULTS
     success - returncode to indicate whether the operation
               succeeded. You must at least check for
               CONV_SUCCESS.

NOTES
     This function is considered low-level. Much more functionality
     is provided with
             ConvertChunkyA()
             . Mapping-engines may also be
     passed to
             ConvertChunkyA()
             , and MapChunkyArrayA() is only slightly
     faster in this case.
             ConvertChunkyA()
              is preferable under most
     circumstances. If you need to remap lots of tiny images, you
     might prefer MapChunkyArrayA(), since it has got very few overhead.

SEE ALSO

             ConvertChunkyA()
             ,
             MapRGBArrayA()
             ,
             CreateMapEngineA()
```

1.37 render.library/MapRGBArrayA

```
               NAME
     MapRGBArrayA - map an RGB array to chunky bytes.
     MapRGBArray  - varargs stub for MapRGBArrayA.

SYNOPSIS
     success = MapRGBArrayA(engine,rgbarray,width,height,chunky,taglist)
     d0                     a0     a1       d0    d1     a2     a3

     ULONG MapRGBArrayA(APTR,ULONG *,UWORD,UWORD,UBYTE *,struct TagItem *)
```

```
     ULONG MapRGBArray(APTR,ULONG *,UWORD,UWORD,UBYTE *,tag,...,TAG_DONE)

FUNCTION
     MapRGBArrayA() maps an array of RGB data to a chunky array.

INPUTS
     engine      - pointer to a mapping-engine created
                   with
             CreateMapEngineA()
                     rgbarray    - pointer to an array of RGB pixels
     width       - width to be converted [pixels]
     height      - height to be converted [rows]
     chunky      - pointer to the destination array
     taglist     - pointer to an array of TagItems

TAGS
     RND_SourceWidth (UWORD) - Total width of the RGB array [pixels].
             Default - equals to the specified width.

     RND_DestWidth (UWORD) - Total width of the chunky array [pixels].
             Default - equals to the specified width.

     RND_PenTable (ULONG) - Pointer to a table of 256 UBYTEs
             for a secondary conversion of the pen numbers.
             Default - NULL.

RESULTS
     success - returncode to indicate whether the operation
               succeeded. You must at least check for
               CONV_SUCCESS.

NOTES
     - Do not use MapRGBArrayA() with ARGB (A=alpha-channel) data.
       The upper byte must be set to zero!
     - This function is considered low-level. Much more functionality
       is provided with
             RenderA()
             . Mapping-engines may also be passed
       to
             RenderA()
             , and MapRGBArrayA() is only slightly faster in this
       case.
             RenderA()
              is preferable under most circumstances. If you
       need to render lots of tiny images, you might prefer
       MapRGBArrayA(), since it has got few overhead.

SEE ALSO

             RenderA()
             ,
             MapChunkyArrayA()
             ,
             CreateMapEngineA()
```

1.38 render.library/MixAlphaChannelA

```
            NAME
     MixAlphachannelA - mix two arrays via alpha-channels.
     MixAlphachannel  - varargs stub for MixAlphachannelA.

SYNOPSIS
     MixAlphachannelA(sourcearray1,sourcearray2,width,height,destarray,
                      a0           a1           d0    d1     a2
                      tags)
                      a3

     void MixAlphachannelA(ULONG *,ULONG *,UWORD,UWORD,ULONG *,
                           struct TagItem *)

     void MixAlphachannel(ULONG *,ULONG*,UWORD,UWORD,ULONG *,
                          tag,...,TAG_DONE)

FUNCTION
     This function does a 'weighted' alpha-channel composition of
     two RGB arrays and writes the result to a third RGB array.
     You may optionally disable one or both alpha-channel sources,
     in the latter case a 1:1 mix (without alpha-channel) will be
     performed.

INPUTS
     sourcearray1        - pointer to an RGB array, source
     sourcearray2        - pointer to an RGB array, source
     width               - width [pixels]
     height              - height [rows]
     destarray           - pointer to an RGB array, destination
     taglist             - pointer to an array of TagItems

TAGS
     RND_SourceWidth (UWORD) - Total width of sourcearray1 [pixels].
             Default - equals to the specified width.

     RND_SourceWidth2 (UWORD) - Total width of sourcearray2 [pixels].
             Default - equals to the specified width.

     RND_DestWidth (UWORD) - Total width of destarray [pixels].
             Default - equals to the specified width.

     RND_AlphaChannel (ULONG) - Pointer to an alpha-channel array
             for sourcearray1. This may be NULL. Default - equals
             to sourcearray1.

     RND_AlphaWidth (UWORD) - Total width of the first alpha-channel
             array [pixels]. Default - equals to RND_SourceWidth.

     RND_AlphaModulo (UWORD) - Alpha-channel pixel modulo for the
             first alpha-channel array [bytes]. Default - 4

     RND_AlphaChannel2 (ULONG) - Pointer to an alpha-channel array
             for sourcearray2. This may be NULL. Default - equals
             to sourcearray2.
```

```
     RND_AlphaWidth2 (UWORD) - Total width of the second alpha-channel
             array [pixels]. Default - equals to RND_SourceWidth2.

     RND_AlphaModulo2 (UWORD) - Alpha-channel pixel modulo for the
             second alpha-channel array [bytes]. Default - 4

RESULTS
     none

NOTES
     this function is much more generalized than
             ApplyAlphaChannelA()
                     and
             MixRGBArrayA()
             , but it has got more overhead and might be
     noticably slower. read the appropriate autodoc sections to see
     if one of the above mentioned functions suffice for your particular
     purpose.

SEE ALSO

             ApplyAlphaChannelA()
             ,
             MixRGBArrayA()
             ,
             InsertAlphaChannelA()
             ,

             ExtractAlphaChannelA()
```

1.39 render.library/MixRGBArrayA

```
                NAME
     MixRGBArrayA - mix two RGB arrays.
     MixRGBArray  - varargs stub for MixRGBArrayA.

SYNOPSIS
     MixRGBArrayA(sourcearray,width,height,destarray,ratio,tags)
                  a0          d0    d1     a1        d2    a2

     void MixRGBArrayA(ULONG *,UWORD,UWORD,ULONG *,UWORD,
                       struct TagItem *)

     void MixRGBArray(ULONG *,UWORD,UWORD,ULONG *,UWORD,
                      tag,...,TAG_DONE)

FUNCTION
     This function mixes sourcearray and destarray and writes
     the result to destarray. Unlike
             ApplyAlphaChannelA()
             , this
     function does not use any alpha-channel information.
```

```
INPUTS
     sourcearray         - pointer to an ARGB array
     width               - width [pixels]
     height              - height [rows]
     destarray           - pointer to a RGB array
     ratio               - mix ratio (0...255)
     taglist             - pointer to an array of TagItems

TAGS
     RND_SourceWidth (UWORD) - Total width of the source array [pixels].
             Default - equals to the specified width.

     RND_DestWidth (UWORD) - Total width of the dest array [pixels].
             Default - equals to the specified width.

RESULTS
     none

SEE ALSO

             ApplyAlphaChannelA()
```

1.40 render.library/Planar2ChunkyA

```
               NAME
     Planar2ChunkyA - convert bitplane data to chunky bytes.
     Planar2Chunky  - varargs stub for Planar2ChunkyA.

SYNOPSIS
     Planar2ChunkyA(planetab,bytewidth,rows,depth,bytesperrow,
                    a0       d0        d1   d2    d3
                    chunkybuffer,taglist)
                    a1           a2

     void Planar2ChunkyA(PLANEPTR *,UWORD,UWORD,UWORD,UWORD,
                         UBYTE *,struct TagItem *)

     void Planar2Chunky(PLANEPTR *,UWORD,UWORD,UWORD,UWORD
                         UBYTE *,tag,...,TAG_DONE)

FUNCTION
     This function converts raw bitplane-oriented (planar) graphics
     to an array of chunky bytes.

INPUTS
     planetab    - pointer to a table of planepointers
     bytewidth   - width [bytes]. This must be an even number.
     rows        - height [rows]
     depth       - number of bitplanes in planetab
     bytesperrow - total bytes per row in the source bitplanes.
                   This must be an even number. If you convert
                   interleaved bitplanes, multiply by depth.
     chunky      - pointer to the destination chunky buffer
     taglist     - pointer to an array of TagItems
```

```
TAGS
     RND_DestWidth (UWORD) - Total width of chunky array [pixels].
             Default - equals to bytewidth * 8.

             You are explicitely allowed to use a destwidth that is
             smaller than bytewidth * 8 pixels.

             Important note:
             If you specify this tag, you must _still_ supply a
             chunky buffer of at least bytewidth * 8 * rows bytes.

NOTES
     Starting with v39, you are not allowed to assume foreign BitMap
     structures being of a planar type. Before you grab a table of
     planepointers out of an unknown BitMap structure and pass it to
     this function, you have to check for the presence of the
     BMF_STANDARD flag.

RESULTS
     none

SEE ALSO

             Chunky2BitMapA()
             , graphics/gfx.h
```

1.41 render.library/QueryHistogram

```
                NAME
     QueryHistogram - query a histogram parameter.

SYNOPSIS
     value = QueryHistogram(histogram,tag)
     d0                     a0        d0

     ULONG QueryHistogram(APTR,Tag)

FUNCTION
     Query one of a histogram's specifications
     via Tag parameter.

INPUTS
     histogram - pointer to a histogram
     tag       - Tag to be queried

TAGS
     RND_NumColors (ULONG) -
             the number of different colors inside the histogram

     RND_NumPixels (ULONG) -
             the number of pixels that have been added to the
             histogram
```

```
     RND_RMHandler (ULONG) -
             the histogram's render-memhandler

     RND_HSType (UWORD) -
             the histogram's type

RESULTS
     value    - the queried parameter

SEE ALSO

             CreateHistogramA()
```

1.42 render.library/RenderA

```
                NAME
     RenderA - render an array of RGB data to chunky bytes.
     Render  - varargs stub for RenderA.

SYNOPSIS
     success = RenderA(rgb,width,height,chunky,palette,taglist)
     d0                a0  d0    d1     a1     a2      a3

     ULONG RenderA(ULONG *,UWORD,UWORD,UBYTE *,APTR,struct TagItem *)

     ULONG Render(ULONG *,UWORD,UWORD,UBYTE *,APTR,tag,...,TAG_DONE)

FUNCTION
     Render an array of RGB data to an array of chunky bytes.

INPUTS
     rgb         - pointer to an array of RGB pixels
     width       - width to be converted [pixels]
     height      - height to be converted [rows]
     chunky      - pointer to the destination array
     palette     - pointer to a palette to be rendered to
     taglist     - pointer to an array of TagItems

TAGS
     RND_SourceWidth (UWORD) - Total width of the RGB array [pixels].
             Default - equals to the specified width.

     RND_DestWidth (UWORD) - Total width of the chunky array [pixels].
             Default - equals to the specified width.

     RND_ColorMode (ULONG) - Color mode that defines how to determine
             a pixel's actual color. Valid types:

             COLORMODE_CLUT          - normal palette lookup
             COLORMODE_HAM8          - HAM8 mode palette lookup
             COLORMODE_HAM6          - HAM6 mode palette lookup

             Default - COLORMODE_CLUT.
```

```
RND_DitherMode (UWORD) - Error diffusion mode. Valid types:

        DITHERMODE_NONE   - no error diffusion

        DITHERMODE_FS     - Floyd-Steinberg
                            Does not handle a dither amount.

        DITHERMODE_RANDOM - Random dithering
                            Handles RND_DitherAmount.

        DITHERMODE_EDD    - EDD dithering
                            Does not handle a dither amount.

        Default - DITHERMODE_NONE.

RND_ProgressHook (ULONG) - Pointer to a callback hook
        structure for progress display operations. Refer to
        render/renderhooks.h for further information.
        Default - NULL.

RND_OffsetColorZero (UWORD) - First pen number to appear
        in the rendered chunky image. This offset will be
        added to the palette's indices. Default - 0.
        Note: RND_PenTable overrides RND_OffsetColorZero.

RND_PenTable (ULONG) - Pointer to a table of 256 UBYTEs
        for a secondary conversion of the pen numbers.
        Default - NULL.
        Note: RND_PenTable overrides RND_OffsetColorZero.

RND_LineHook (ULONG) - Pointer to a callback hook structure
        for line-related operations during render. This hook
        is executed once before a line is rendered and once
        after it has been completed. Refer to
        render/renderhooks.h for further information.
        Default - NULL.

RND_DitherAmount (UWORD) - Dither intensity (0-255).
        Only valid with certain dither modes (see above).
        Default - 128.

RND_ScaleEngine (ULONG) - Pointer to a scaling-engine.
        This scaling-engine will be used to scale the
        source data stream before it is being rendered.
        Default - NULL.

        Notes:
        - The scaling engine's destination width and
          height specifications override the width and
          height arguments for RenderA().
        - The scaling-engine must have been created with
          PIXFMT_0RGB_32.

RND_MapEngine (ULONG) - Pointer to a mapping-engine.
        This can greatly improve render performance.
        Default - NULL.
```

```
              Notes:
              - Mapping-engines are not applied for rendering
                to HAM modes.
              - With dithering enabled, you better do not
                specify a mapping-engine which was created with
                a link to a histogram. Accurate conversion could
                not be guaranteed in this case.

RESULTS
     success - returncode to indicate whether the operation
               succeeded. You must at least check for
               REND_SUCCESS.

NOTES
     - This function may call the progress callback Hook with
       the PMSGTYPE_LINES_RENDERED message type.

SEE ALSO

              MapRGBArrayA()
              ,
              ConvertChunkyA()
              ,
              CreateMapEngineA()
              ,

              CreateScaleEngineA()
              , render/render.h, render/renderhooks.h
```

1.43 render.library/RGBArrayDiversityA

```
                NAME
     RGBArrayDiversityA - calculate RGB array adaptibility
     RGBArrayDiversity  - varargs stub for RGBArrayDiversityA

SYNOPSIS
     diversity = RGBArrayDiversityA(rgbarray,width,height,taglist)
     d0                             a0       d0    d1     a1

     LONG RGBArrayDiversityA(ULONG *,UWORD,UWORD,struct TagItem *)

     LONG RGBArrayDiversity(ULONG *,UWORD,UWORD,tag,...,TAG_DONE)

FUNCTION
     This function calculates a RGB array's adaptibility to a palette
     or mapping-engine.

INPUTS
     rgbarray - pointer to an array of RGB data
     width    - width of the RGB array [pixels]
     height   - height of the RGB array [pixels]
     taglist  - pointer to an array of tagitems
```

TAGS

RND_Palette (ULONG) - pointer to a palette. Either this or the RND_MapEngine argument is obligatory!

RND_MapEngine (ULONG) - pointer to a mapping-engine. Either this or the RND_Palette argument is obligatory!

RND_SourceWidth (UWORD) - Total width of the RGB array [pixels]. Default - equals to the specified width.

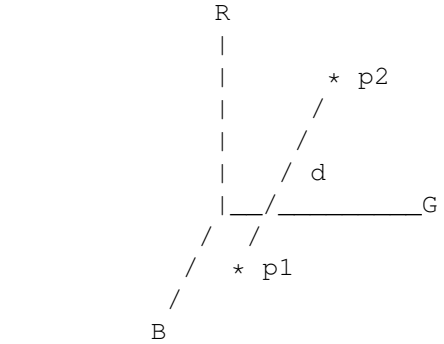
RND_Interleave (ULONG) - number of pixels to skip horizontally. Default - 0.

RESULTS

diversity - an indicator for the RGB array's adaptibility to the given palette or mapping-engine. 0 indicates perfect adaptibility, 195075 indicates the worst case.

IMPLEMENTATION

Every RGB in the source array is adapted to the specified palette or mapping-engine. Now assume p2 is the RGB of the palette entry that matches best with the requested RGB p1.



This function sums up the diversity d^2 for every RGB in the source array, and divides it by the number of pixels processed:

$$D = \frac{1}{\text{pixels}} \cdot \sum_{k=1}^{k=\text{pixels}} d(k)^2$$

D is returned, so what you get is the average d^2 for all RGB values that appear in the array. d^2 is summed up instead of d because it is a better indicator for most purposes.

Best case - all pixels match perfectly: D(min) = 0.
Worst case - all pixels are white, and the only available color in the palette is black: D(max) = 255^2+255^2+255^2 = 195075.

EXAMPLE

D indicates a palette's applicability for the given RGB array.

```
    You can e.g. use it to decide whether error diffusion should be
    enabled or not.

    dithermode = DITHERMODE_NONE;

    D = RGBArrayDiversity(rgbarray, width, height,
        RND_Palette, destpalette, RND_Interleave, 4, TAG_DONE);

    if (D > threshold)
    {
        dithermode = DITHERMODE_FS;
    }

    Render(rgbarray, width, height, chunkyarray, destpalette,
        RND_DitherMode, dithermode, TAG_DONE);

    The interleave factor increases speed drastically. Nonetheless,
    RGBArrayDiversity() is yet very fast. You gain a lot of
    performance if only dithering can be avoided sometimes.

    Applying RGBArrayDiversity() to a mapping-engine is even more
    sophisticated. Use this if a histogram is available for the RGB
    array.

    me = CreateMapEngine(palette,RND_Histogram,histo,TAG_DONE);

    D = RGBArrayDiversity(rgbarray, width, height,
        RND_MapEngine, me, RND_Interleave, 4, TAG_DONE);

    if (D > threshold)
    {
        Render(rgbarray, width, height, chunkyarray, destpalette,
            RND_DitherMode, DITHERMODE_FS, TAG_DONE);
    }
    else
    {
        MapRGBArray(me, rgbarray, width, height, chunkyarray, NULL);
    }

    This example provides even higher performance.
            MapRGBArrayA()
             is
    faster than
            RenderA()
            , especially when the mapping-engine is
    coupled with a histogram. Note: That mapping-engine's histogram
    has to be of a HSTYPE_..._TURBO type with the same resolution as
    the palette.

SEE ALSO

            ChunkyArrayDiversityA()
```

1.44 render.library/ScaleA

```
                NAME
     ScaleA - scale an image.
     Scale  - varargs stub for ScaleA.

SYNOPSIS
     success = ScaleA(engine,source,dest,taglist)
                      a0     a1     a2   a3

     ULONG ScaleA(APTR,APTR,APTR,struct TagItem *)

     ULONG Scale(APTR,APTR,APTR,tag,...,TAG_DONE)

FUNCTION
     This function scales a source array of pixels to another
     array.

INPUTS
     engine  - pointer to a scaling-engine created
               with
             CreateScaleEngineA()
                     source  - pointer to source array of pixels
     dest    - pointer to destination array
     taglist - pointer to an array of TagItems

TAGS
     RND_SourceWidth (UWORD) - Total width of the source array [pixels].
             Default - equals to the source width the scaling-engine
                       was created with.

     RND_DestWidth (UWORD) - Total width of the dest array [pixels].
             Default - equals to the destination width the
                       scaling-engine was created with.

     RND_LineHook (ULONG) - Pointer to a callback hook structure
             for line-related operations during conversion. This
             hook is executed once before a line is processed and
             once after it has been completed. Refer to
             render/renderhooks.h for further information.
             Default - NULL.

RESULTS
     success - CONV_SUCCESS to indicate that the operation
               succeeded. Currently, the only reason for this
               function to fail is CONV_CALLBACK_ABORTED.

NOTES
     - It is possible to downscale (shrink) an array over itself,
       i.e. source and destination buffers may be the same in this
       case.

SEE ALSO

             CreateScaleEngineA()
             ,
```

```
               RenderA()
               ,
               ConvertChunkyA()
```

1.45 render.library/ScaleOrdinate

```
                  NAME
       ScaleOrdinate - scale a single ordinate.

   SYNOPSIS
       scaled_ordinate = ScaleOrdinate(start,dest,ordinate)
       d0                              d0    d1   d2

       UWORD ScaleOrdinate(UWORD,UWORD,UWORD)

   FUNCTION
       This function scales a single ordinate. The algorythm used here
       is identical to what scaling-engines are created with.

   INPUTS
       start    - original value (e.g. width or height)
                  e.g. the original width of an image.
                  This value usually corresponds to a
                  start value with
               CreateScaleEngineA()
               .
                  Must not be 0.
       dest     - destination value (e.g. width or height)
                  e.g. the scaled width of an image.
                  This value usually corresponds to a
                  dest value with
               CreateScaleEngineA()
               .
                  Must not be 0.
       ordinate - a single ordinate (e.g. of a pixel).
                  Must be less than <start>.

   RESULTS
       scaled_ordinate - the new ordinate (after scaling)

   EXAMPLE
       Assume you have a specific pair of coordinates that represent a
       particular pixel inside an image. You can use this function to
       determine the pixel's new coordinates after the image has been
       scaled:

       new_pixel_x = ScaleOrdinate(picwidth,newwidth,pixel_x);
       new_pixel_y = ScaleOrdinate(picheight,newheight,pixel_y);

   SEE ALSO

               CreateScaleEngineA()
```

1.46 render.library/SortPaletteA

```
                NAME
     SortPaletteA - sort a palette.
     SortPalette  - varargs stub for SortPaletteA.

SYNOPSIS
     success = SortPaletteA(palette,mode,taglist)
     d0                     a0      d0   a1

     ULONG SortPaletteA(APTR,ULONG,struct TagItem *)

     ULONG SortPalette(APTR,ULONG,tag,...,TAG_DONE)

FUNCTION
     Sorts a palette according to a sort mode. Some sort modes apply
     to palettes solely, some others additionally require a
     histogram.

INPUTS
     palette - pointer to a palette created
               with
             CreatePaletteA()
             .

     mode    - sort mode. Currently defined are:

               PALMODE_BRIGHTNESS      - sort the palette entries
                             by brightness.

               PALMODE_SATURATION      - sort the palette entries
                             by their color intensity.

               PALMODE_POPULARITY      - sort the palette entries
                             by the number of pixels that they
                             represent. You must specify the
                             RND_Histogram taglist argument.

               PALMODE_REPRESENTATION  - sort the palette entries
                             by the number of histogram entries
                             that they represent. You must specify
                             the RND_Histogram taglist argument.

               PALMODE_SIGNIFICANCE    - sort the palette entries
                             by their optical significance for the
                             human eye. Implementation is unknown
                             to you and may change. You must supply
                             the RND_Histogram taglist argument.

               PALMODE_ASCENDING       - by default, sort direction
                             is descending, i.e. precedence is
                             'more-to-less' of the given effect.
                             Combine with this flag to invert the
                             sort direction.

     taglist - pointer to an array of tagitems.
```

```
TAGS
     RND_Histogram (ULONG) - pointer to a histogram. This taglist
            argument is obligatory for some sort modes. (See above)

RESULTS
     success - return value to indicate whether the operation succeeded.
               You must at least check for SORTP_SUCCESS.

NOTES
     SortPaletteA() can be extremely useful when a palette is to be
     allocated from a ColorMap via ObtainBestPenA(). After sorting
     with PALMODE_SIGNIFICANCE, important colors will be treated
     first. This increases probability for ObtainBestPenA() to
     allocate new pens for the most significant entries in the
     palette.
```

1.47 render.library/TintRGBArrayA

```
NAME
     TintRGBArrayA - tint an RGB array.
     TintRGBArray  - varargs stub for TintRGBArrayA.

SYNOPSIS
     TintRGBArrayA(sourcearray,width,height,RGB,ratio,destarray,tags)
                   a0          d0    d1     d2  d3    a1        a2

     void TintRGBArrayA(ULONG *,UWORD,UWORD,ULONG,UWORD,ULONG *,
                        struct TagItem *)

     void TintRGBArray(ULONG *,UWORD,UWORD,ULONG,UWORD,ULONG *,
                       tag,...,TAG_DONE)

FUNCTION
     This function mixes an RGB array with the specified RGB
     value and a mixing ratio. The result is written to another
     array, which may be the same as the source array.

INPUTS
     sourcearray         - pointer to an ARGB array
     width               - width [pixels]
     height              - height [rows]
     RGB                 - tint RGB
     ratio               - tint ratio (0...255)
     destarray           - pointer to an ARGB array
     taglist             - pointer to an array of TagItems

TAGS
     RND_SourceWidth (UWORD) - Total width of the source array [pixels].
             Default - equals to the specified width.

     RND_DestWidth (UWORD) - Total width of the dest array [pixels].
             Default - equals to the specified width.
```

```
RESULTS
     none
```