

TECHNOTE: Plotting Small Icons: The 'SICN' Resource

By James Beninghaus & Dennis Hescox
Revised by Michael Marinkovich
marink@applelink.apple.com
Apple Developer Technical Support (DTS)

Apple first introduced the 'SICN' resource so that the Script Manager could represent which country-specific resources are installed in the system by displaying a small icon in the upper right corner of the menu bar. You can pass a 'SICN' resource to the Notification Manager or Menu Manager, and they will draw it for you automatically—you should continue to let them do so.

This Technote addresses the 'SICN' resource format and how to handle 'SICN' Resources with more than one indexed icon. Use `PlotSICNHandle` for 'SICN' Resources with single-indexed icons. With minor modifications, the techniques in this Note can also be used to plot a bitmap of any dimension.

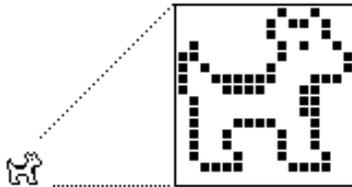
If your application has the need to store more than one icon in a 'SICN' Resource, you will have to load and plot the icons yourself.

We recommend the use of the Icon Utilities package for all your icon needs. This is located in the Icon Utilities chapter of *Inside Macintosh: More Macintosh Toolbox*.

About 'SICN's

What does a 'SICN' look like? The following is a 'SICN' representation of a dogcow to help answer this question:

Figure 1 A 'SICN' Fatbits representation of a dogcow



A 'SICN' resource contains any number of small icon bit images. Each small icon in a 'SICN' list describes a 16 by 16 pixel image and requires 32 bytes of storage. Like an 'ICN#' resource, there is no count of the number of icons stored in a 'SICN'. The following 'SICN' resource, in MPW Rez format, contains two small icons:

```
resource 'SICN' (1984, "clarus") {
    { /* array: 2 elements */

        $"00 48 00 B4 00 84 40 52 C0 41 A0 81 9F 8E 8F 18"
        $"40 18 40 18 47 88 48 48 48 48 44 44 3C 3C 00 00",
        $"00 48 00 FC 00 FC 40 7E C0 7F E0 FF FF FE FF F8"
        $"7F F8 7F F8 7F F8 78 78 78 78 7C 7C 3C 3C 00 00"

    }
};
```

Using 'SICN's

The following examples describe techniques useful when using 'SICN's.

Defining a 'SICN as an Array

The Macintosh Toolbox interfaces do not describe all the necessary data structures needed to work with 'SICN' resources. As shown in the following example, defining the 'SICN' type as an array of 16 short integers and the handles and pointers to this array type make life much easier.

Listing 1 Pascal

```

TYPE
    SICN      = ARRAY[0 .. 15] of INTEGER;
    SICNList  = ARRAY[0 .. 0] of SICN;
    SICNPtr   = ^SICNList;
    SICNHand  = ^SICNPtr;
  
```

Listing 2 C

```

typedef  short      SICN[16];
typedef  SICN      *SICNList;
typedef  SICNList  *SICNHand;
  
```

Counting Included Small Icons

The 'SICN' resource does not provide a count to indicate the number of small icons contained within; however, you can easily determine this number by dividing the total size of the resource by the size of a single small icon.

Listing 3 Pascal

```
CONST
    mySICN      = 1984;
VAR
    theSICN    : SICNHand;
    theSize    : LONGINT;
    theCount   : LONGINT;
    theIndex   : LONGINT;

theSICN := SICNHand(GetResource('SICN', mySICN));
IF (theSICN <> NIL) THEN BEGIN
    theSize := GetHandleSize(Handle(theSICN));
    theCount := theSize DIV sizeof(SICN);
END;
```

Listing 4 C

```
#define mySICN      1984

SICNHand  theSICN;
long      theSize;
long      theCount;
long      theIndex;

theSICN = (SICNHand) GetResource('SICN', mySICN);
if (theSICN) {
    theSize = GetHandleSize((Handle)theSICN);
    theCount = theSize / sizeof(SICN);
}
```

Calling Plot SICN

The example procedure `PlotSICN` draws one small icon of a 'SICN' resource. It takes the handle from `theSICN` and the position in the list from `theIndex` within the rectangle `theRect` of the current `GrafPort`.

The following is an example call to `PlotSICN` which plots all the small icons in a resource into the same rectangle:

Listing 5 Pascal

```
SetRect(theRect, 0, 0, 16, 16);
FOR theIndex := 0 TO theCount-1 DO
    PlotSICN(theRect, theSICN, theIndex);
```

Listing 6 C

```
SetRect(&theRect, 0, 0, 16, 16);
for (theIndex = 0; theIndex < theCount ; ++theIndex)
    PlotSICN(&theRect, theSICN, theIndex);
```

Locking the Handle to 'SICN'

Because `PlotSICN` uses `CopyBits` and `CopyBits` can move memory, you should lock the handle to the 'SICN' once the resource is loaded. Notice that the `PlotSICN` procedure dereferences the 'SICN' handle, adds an offset, and copies the resulting value. If the 'SICN' list moves in memory at this time, the bitmap's `baseAddr` is useless.

To play it safe, `PlotSICN` saves a copy of the master pointer flags associated with the relocatable block, locks the block with a call to `HLock`, and restores the flags after calling `CopyBits`.

▲ **WARNING**

You should *never* examine, set, or clear these flags directly; you should always use the routines which are provided by the Memory Manager and Resource Manager. It is not necessary to check the value of the flag after getting it. ▲

Listing 7 Pascal

```
PROCEDURE PlotSICN(theRect: Rect; theSICN: SICNHand; theIndex : INTEGER);
VAR
    state      : SignedByte; { we want a chance to restore original
                              state }
    srcBits    : BitMap; { built up around 'SICN' data so we can
                          CopyBits }
```

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```
BEGIN
    { check the index for a valid value }
    IF (GetHandleSize(Handle(theSICN)) DIV sizeof(SICN)) > theIndex THEN
    BEGIN

        { store the resource's current locked/unlocked condition }
        state := HGetState(Handle(theSICN));

        { lock the resource so it won't move during the CopyBits call }
        HLock(Handle(theSICN));

        { set up the small icon's bitmap }
        {$PUSH}
        {$R-}          { turn off range checking }
        srcBits.baseAddr := Ptr(@theSICN^[theIndex]);
        {$POP}
        srcBits.rowBytes := 2;
        SetRect(srcBits.bounds, 0, 0, 16, 16);

        { draw the small icon in the current grafport }
        CopyBits(srcBits,thePort^.portBits,srcBits.bounds,
                theRect,srcCopy,NIL);

        { restore the resource's locked/unlocked condition }
        HSetState(Handle(theSICN), state);
    END;
END;
```

Listing 8 C

```
void PlotSICN(Rect *theRect, SICNHandle theSICN, long theIndex) {
    char    state;          /* saves original flags of 'SICN' handle */
    BitMap  srcBits;       /* built up around 'SICN' data so we can
                           CopyBits */

    /* check the index for a valid value */
    if ((GetHandleSize(Handle(theSICN)) / sizeof(SICN)) > theIndex) {

        /* store the resource's current locked/unlocked condition */
```

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```
state = HGetState((Handle)theSICN);

/* lock the resource so it won't move during the CopyBits call */
HLock((Handle)theSICN);

/* set up the small icon's bitmap */
srcBits.baseAddr = (Ptr) (*theSICN)[theIndex];
srcBits.rowBytes = 2;
SetRect(&srcBits.bounds, 0, 0, 16, 16);

/* draw the small icon in the current grafport */
CopyBits(&srcBits, &(*qd.thePort).portBits,
        &srcBits.bounds, theRect, srcCopy, nil);

/* restore the resource's locked/unlocked condition */
HSetState((Handle) theSICN, state);
}
}
```

Further Reference

- Inside Macintosh: Macintosh ToolBox Essentials
- Inside Macintosh: Imaging With QuickDraw
- Inside Macintosh: Memory
- Technical Note QD 17 — Drawing Icons

Change History

This Technote was originally written in August, 1989.

Since August 1989: Errors in the Pascal code were corrected.

