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Technical Note DV09

High-Level Control and Status Calls: When a Good Call Goes Bad

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This Technical Note discusses situations under which high-level `Status` calls do not work correctly and `PBStatus` calls should be made instead.

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`_Control` and `_Status` traps

When Apple designed the `_Control` and `_Status` traps, it was assumed that `_Control` would be used to send the driver a command or information and `_Status` would be used to request information from the driver. The `csParam` parameter was meant to pass information in only one direction for each call; **to** a driver on control calls and **from** a driver on status calls. Most drivers follow this convention, and so there is no problem using the high-level `Control` and `Status` calls with them. However, some drivers depend on the bidirectional transfer of information on `_Control` and `_Status` calls through the `csParam` variable. For drivers of this type it behooves you to always use the `PBControl` and `PBStatus` calls. It's not hard. Honest!

Glue code is used to build the parameter block that gets passed to the `_Control` and `_Status` traps. The glue uses the `refNum` and `csCode` parameters to fill out the corresponding fields in the parameter block.

On control calls it copies the data pointed to by `csParamPtr` into the `csParam` field of the parameter block before it calls `_Control`, but it does **not** copy the information back **after** the call.

On status calls it only copies the `csParam` field to the location pointed to by `csParamPtr` after the `_Status` call. It does **not** copy the data pointed to by `csParamPtr` into the parameter block **before** calling `_Status`.

The low-level `PBControl` and `PBStatus` calls have no such problem because you are working directly with the parameter block and have direct access to the `csParam` field. The high-level `Control` and `Status` calls in some cases either work incorrectly, or worse, cause problems for the device driver.

An example of `_Control` calls that return data in `csParam` field are disk drivers that return a pointer to their icon on `_Control` calls with a `csCode` of 21. Here is an example of how you can use `PBControl` to get the icon of a drive and add it to the current resource file.

```
#define      kGimmeIconDataPtr 21
#define      kSizeOfIconAndMask 256
#define      kCustomAliasIconID 128

AddVolumeIconRes (short  vRefNum)
{
    HVolumeParam    vInfoPB;
    CntrlParam      cntlPB;
    Handle          serverIcon;
    OSErr           err;

    vInfoPB.ioNamePtr = nil;
    vInfoPB.ioVRefNum = vRefNum; // can be working // directory
    vInfoPB.ioVolIndex = 0; // use vRefNum - // don't index

    err = PBHGetVInfoSync ((HParamBlockRec *) &vInfoPB);

    if (err == noErr)
    {
        cntlPB.ioVRefNum      = vInfoPB.ioVDrvInfo; // logical drive // number
        cntlPB.ioCRefNum      = vInfoPB.ioVRefNum; // disk driver // reference number
        cntlPB.csCode          = kGimmeIconDataPtr;

        err = PBControl ((ParamBlockRec *) &cntlPB, false); // false = // synchronous

        if (err == noErr) // copy ICN# and add to resource fork
        {
            serverIcon = NewHandle (kSizeOfIconAndMask);
            if (serverIcon != nil)
            {
                BlockMove (* (Ptr *) (cntlPB.csParam), *serverIcon,
                    kSizeOfIconAndMask);
                AddResource (serverIcon, 'ICN#', kCustomAliasIconID, nil);
                if (ResError () != noErr)
                    DisposHandle (serverIcon);
            }
        }
    }
}
```

The most obvious example of a device driver that expects `csParam` as input on a `_Status` call is the video device driver(s) for Macintosh II Video Cards. Almost all of the documented status calls require `csParam` to point to some kind of table. In this case, most of the device driver's status routines do not function properly if using the high-level `Status` call.

Therefore, if you are interfacing to a device driver that you either know or suspect requires `csParam` for its status calls, use the low-level `PBStatus` call instead of the high-level `Status` call. Likewise, if the driver returns information via the `csParam` field on control calls, you will need to use `PBControl` rather than the high-level `Control` call.

If you are writing a device driver, alert the users of your driver to these limitations. Alternatively, you could design your driver so that control calls only receive data and status calls only return data in the `csParam` field.

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References

Inside Macintosh , Volume II, The Device Manager

Inside Macintosh , Volume IV, The Disk Driver

Inside Macintosh , Volume V, The Disk Driver

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