Using the GDEVICE Procedure to Customize Device Driver Output
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ABSTRACT
In Version 6 of SAS/GRAPH® software, many graphics options and parameters used by device drivers are stored in device catalog entries. By modifying existing device catalog entries or creating new entries, you can tailor driver output to your needs without specifying a long set of GOPTIONS for each driver. This paper describes how to use the GDEVICE procedure to manage device catalogs, create new entries, and change parameters to obtain desired output.

INTRODUCTION
Prior to Version 5, if you needed to produce SAS/GRAPH output in a non-standard format (for example, rotated or with a non-default size), it was necessary to specify one or more GOPTIONS. If you had more than one device at your site, each of which required different specifications, you had to supply a different set of GOPTIONS for each device. Specifying a long string of graphics options can be confusing, especially if there is a large number of users at your site who are not familiar with the equipment and options required to produce the appropriate output.

Beginning with Version 6 SAS/GRAPH software, you can set the default size of your PC screen with the EGA driver, you can tailor your output to specific devices, and you can specify any device parameters without specifying a series of options in a GOPTIONS statement. This capability is available through the use of a device catalog and the GDEVICE procedure.

What is a Device Catalog?
A device catalog is a SAS® catalog that contains device entries. There is an entry for each supported graphics device in the device catalog supplied by SAS Institute. Screen 1 illustrates a partial listing of the entries in a device catalog.

Screen 1 Device Catalog Entries
Each device entry contains a number of attributes associated with the device. These include:

- size of the graphics area
- resolution of the device
- default colors list
- output destination and format
- hardware capabilities
- rows and columns
- promptcharacters
- orientation of the graph.

Many of these are parameters that can also be specified on a GOPTIONS statement. Screen 2 illustrates some of the parameters contained in a device entry.

Why Use Device Catalogs?
Device catalogs allow you to tailor your output to specific devices you use. For example, if you want the output sent to the OMS printer to be 3 X 5 inches, but you want to preview the output first on the full size of your PC screen with the EGA driver, you can modify the catalog entry for the OMS printer to produce a 3 X 5 inch picture. If you specify the HSIZE and VSIZE in the device catalog, you do not have to specify them in a GOPTIONS statement. In addition, all output to the OMS printer will be 3 X 5 inches, while output going to other devices will use the default size for those devices.

How SAS/GRAPH Software Uses Device Catalogs
When you run a SAS/GRAPH procedure and specify a driver name (with the DEVICE= option), SAS/GRAPH software uses the parameters specified in the device entry, along with any additional options specified on the GOPTIONS statement. If a parameter or option is specified in both the device catalog entry and GOPTIONS statement, the value on the GOPTIONS statement is used.
THE DEFAULT DEVICE CATALOG AND YOUR CATALOG

The device catalog supplied by the Institute, SASHELP.DEVICES, contains an entry for each device supported by the SAS/GRAPH product. If you use the SAS System for Personal Computers and you did a custom install, SASHELP.DEVICES will contain only entries for the devices that you selected.

To modify catalog entries, copy the device entries to your own catalog and modify them there, rather than modifying the catalog supplied by the Institute. There are some advantages to creating your own device catalog. First, you will always have a copy (in the catalog supplied by the Institute) of the unmodified entries. Also, creating a personal catalog that contains only the drivers you are using reduces the time required for the SAS System to access the device entry. Name your personal catalog GDEVICE0.DEVICES. If you have multiple catalogs, name them GDEVICE1.DEVICES, GDEVICE2.DEVICES, and so on. If you create your own device catalog, include a LIBNAME statement in your AUTOEXEC.SAS file to associate the libref GDEVICE0 with your primary personal catalog. If you add catalogs, supply a libref for each one.

When a graphics procedure is executed, SAS/GRAPH software searches for the entry in GDEVICE0.DEVICES. If the entry is not found in GDEVICE0.DEVICES, SAS/GRAPH searches GDEVICE1.DEVICES through GDEVICE9.DEVICES (if they exist). If the entry is not found in any of these catalogs, the SAS/GRAPH software searches SASHELP.DEVICES. If the entry does not exist there, an error message is issued.

PROC GDEVICE

PROC GDEVICE is a SAS/GRAPH procedure used to manage device catalogs. PROC GDEVICE can do the following:

- list entries
- examine parameters in individual entries
- copy and modify entries
- delete entries
- rename entries
- add entries.

Using PROC GDEVICE to List Entries in a Device Catalog

To examine the entries in a device catalog, submit the following SAS/GRAPH statements:

PROC GDEVICE C:LIBREF.DEVICES;

To examine the entries in the catalog supplied by the Institute, use 'C=SASHELP.DEVICES'. The above statement brings up the catalog screen shown in Screen 1. Use the SCR UP and SCR DOWN keys to scroll through the list of device entries.

Examining a Device Entry

You can select a device entry to edit or browse from the catalog screen by scrolling down and placing an E (edit), B (browse), or S (select) in the space next to the name. Alternatively, you can enter EDIT entryname, BROWSE entryname, or SELECT entryname on the command line. Each catalog entry contains several screens. Each screen contains different sets of parameters used by the driver. When you select an entry from the catalog screen, the first screen displayed for that entry is the DETAIL screen. The DETAIL screen is illustrated in Screen 2.

Some of the characteristics on the DETAIL screen are

- number of rows and columns
- size of the display area
- position of the output
- destination of the output
- orientation of the output.

Press the NEXTSCR key to go from screen to screen within an entry. Press the NEXTSCR key from the DETAIL screen to take you to the PARAMETERS screen, which is illustrated in Screen 3.

PROC GDEVICE: Directman SASHELP.DEVICES (in)

PROC GDEVICE: Parameters (out)

Catalog: SASHELP.DEVICES Entry: HP7UOA

Press the NEXTSCR key again displays the GCOLORS screen, as illustrated in Screen 4.

Screen 3 Parameters Screen

Some of the items on the PARAMETERS screen are

- hardware capabilities
- maximum number of colors
- hardware shaking
- prompt characters
- number of copies of each graph to be printed.

Pressing the NEXTSCR key again displays the GCOLORS screen, as illustrated in Screen 4.
The GCOLORS screen displays the default background and foreground colors. Pressing the NEXTSCR key advances you through the remaining screens. They are:

- **CHARTYPE** which specifies hardware character sets.
- **METAGRAPHICS** which contains information used by metagraphics drivers.
- **GPROLOG** which can be used to specify a string sent by the driver at the beginning of each graph.
- **GEPILOG** which can be used to specify a string sent by the driver at the end of each graph.
- **GSTART** which can be used to specify a string sent by the driver at the beginning of each record.
- **GEND** which can be used to specify a string sent by the driver at the end of each record.

### How to Copy and Modify a Device Entry

Suppose you are asked to create some graphs for a project. You need 100 graphs drawn on a Hewlett-Packard 7550A plotter, using a graphics area of 5 X 6 inches. The plotter has pens in the following order: red, green, pink, magenta, and blue. The output is to be placed in a file called FREO.GSF that will later be copied to the plotter.

Without using a device catalog entry, the following GOPTIONS are required in every program:

```
GOPTIONS DEV=HP7550A
NOTE=6
TITLE=5
COLORS=(RED,GREEN,PINK,MAGENTA,BLUE)
ACCESS=READONLY
```

By using a device catalog, you can create a catalog entry called **MYHP7550** that contains the characteristics specified in the above GOPTIONS statement. In order to use that entry (and all of its associated parameters), specify DEVICE = MYHP7550 in a GOPTIONS statement. Before creating the MYHP7550 entry, first create your personal device catalog, **GDEVICE0.DEVICES**. To do this, submit a LIBNAME statement associating the library **GDEVICE0.DEVICES** with the directory in which the catalog will be placed.

To create the catalog, submit the following statements:

```
LIBNAME GDEVICE0 'directory name';
PROC CATALOG C=GDEVICE0.DEVICES;
```

This displays an entry catalog screen like the one illustrated in Screen 4.

Rather than creating an entry from scratch, you may find it useful to copy an existing entry from SASHELP.DEVICES. To copy the HP7550A entry from SASHELP.DEVICES to your own catalog, enter the following on the command line:

```
COPY SASHELP.DEVICES.MYHP7550.DEV
```

The catalog screen will now look like the one in Screen 5.

### Rename the Device Entry

Rename the device entry so that it can be easily identified as a modified device driver. This is done using the RENAME command. See Screen 6 and Screen 7.

```
RENAME MYHP7550 HP7550A
```

The catalog screen before the RENAME command is executed looks like Screen 6.

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Screen 7  Catalog Screen After the RENAME Command in Executed

To edit the entry and make modifications, place an E next to the entry name and press ENTER. This takes you to the DETAIL screen where you can make modifications. Screen 8 illustrates the DETAIL screen before modifications. Screen 9 illustrates the DETAIL screen after changes have been made to the HSIZE, VSIZE, GACCESS, and GSFMODE fields.

Screen 8  DETAIL Screen Before Modifications

Press the NEXTSCR key to display the PARAMETERS screen. Here you can make modifications to the PROMPT fields. Screen 10 illustrates the PARAMETERS screen before modifications. Screen 11 illustrates the PARAMETERS screen after the PROMPT field has been changed.

Screen 9  DETAIL Screen After Modifications

Screen 10  PARAMETERS Screen Before Modifications
Screen 11  PARAMETERS Screen After Modifications

Press the NEXTSCR key once again to take you to the GCOLOR screen, where you can change the order of the pen colors. The original and modified screens are displayed in Screen 12 and Screen 13.

Screen 13  GCOLOR Screen After Modifications

Press END until you exit PROC GDEVICE and return to the program editor. Now that the changes you made have been saved, enter the following option when you run your SAS program:

```
GOPTIONS DEV=HP7550A;
```

Note: To use the default characters of the HP7550A device driver, specify DEVICE=HP7550A in your GOPTIONS statement. SAS/GRAPH software will find the HP7550A entry in SASHELP.DEVICES and use the parameters in that entry.

SUMMARY


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