

## 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 6, 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 parameters used by different device drivers 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.

```

GDEVICE: DIRECTORY SASHELP.DEVICES (B)
Command ---)

```

Name	Type	Description	Updated
- AGS1000	DEV	AGS1000 terminal	11/23/87
- APLPLUS	DEV	Apple Laserwriter Plus	11/23/87
- APPLELM	DEV	Apple Laserwriter	11/23/87
- CAL81	DEV	CalComp 81 plotter	11/23/87
- CAL84	DEV	CalComp 84 plotter	11/23/87
- CGA	DEV	IBM CGA (palette 0)	11/23/87
- CGA0	DEV	IBM CGA (palette 0)	11/23/87
- CGA1	DEV	IBM CGA (palette 1)	11/23/87
- CGAHD	DEV	IBM CGA (high-intensity palette 0)	11/23/87
- CGAHI	DEV	IBM CGA (high-intensity palette 1)	11/23/87
- CGAM	DEV	IBM CGA (mochrome)	11/23/87
- COLORJET	DEV	IBM Colorjet printer	11/23/87
- COLORPRO	DEV	HP COLORPRO plotter	11/23/87
- COMPAD3	DEV	COMPAD Portable III & IV	11/23/87
- DDL	DEV	DDL clear text format	11/23/87
- DDLBIN	DEV	DDL binary format	11/23/87
- DEBKRC	DEV	Color definable CRT debug driver	11/23/87
- DEBKCM	DEV	Non-definable color CRT debug driver	11/23/87
- DEBKSP	DEV	Plotter debug driver	11/23/87

Screen 1 Device Catalog Entries

Each device entry contains a number of attributes associated with the driver. 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.

```

GDEVICE: DIRECTORY SASHELP.DEVICES (B)
GDEVICE: Detail
Command ---)
NOTE: This entry has been opened for browse mode.
Catalog: SASHELP.DEVICES Entry: HP7550A

```

Orig Driver:	HP7550A	Module:	SASGHWPL	Model:	309
Description:	HP7550 graphics plotter w/A size paper			Type:	PLOTTER
Draws:	40	Xmax:	9.843 IN	Msize:	0.000 IN
Loops:	100	Ymax:	7.087 IN	Vsize:	0.000 IN
Rows:	50	Margin:	0.000 IN	Xpixels:	10000
Cols:	80	Margin:	0.000 IN	Ypixels:	7200
Aspect:	0.500	Relate:	-----	Queued messages:	N
Driver query:	-	Protocol:	-----	Paperfeed:	0.000 IN
Success:	sasgastd.com!	Exitmode:	PDRT	Client:	0
Tranlab:	-----	Devmap:	-----		

- HPLJ5P2	DEV	HP LaserJet Plus (150 dpi)	11/23/87
- HPLJ5P3	DEV	HP LaserJet 500 Plus (300 dpi)	11/23/87
- HPLJ52	DEV	HP LaserJet Series II (300 dpi) IM	11/23/87
- HPPJ100	DEV	HP PaintJet (150 dpi)	11/23/87
- HPPJ90	DEV	HP PaintJet (90 dpi)	11/23/87

Screen 2 DETAIL Screen: Device Entry Parameters

#### 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 QMS 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 QMS 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 looks for a device catalog entry that corresponds to the device name you specified. When it finds the entry in one of the available device catalogs, 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.

```

GDEVICE: DIRECTORY SASHELP.DEVICES (B)
GDEVICE: Detail
GDEVICE: Parameters
Command ---)

Catalog: SASHELP.DEVICES          Entry:  HP7560A

Erase:  -           Autofeed:  -           CharType:  0
Swap:   -           Call:     -           MaxColors:  9
Autocopy: -         Characters: -          Repeat:    3
Handshake: HARDWARE  Circulate: -          Copies:    0
Dash:   -           Speed:   9
Prompt: start up:  X Fill:     -           FillIn:   10
        end of graph: - PlotIn:  -           MaxCopy:  608
        mount pens: X PolyIn:  -           LFactor:  3
        change paper: X Symbol: -           DashIn:   -
PromptChars: -----             Symbols:  -----
RectIn:  -----
Devopts: -----
DIOC:   -----

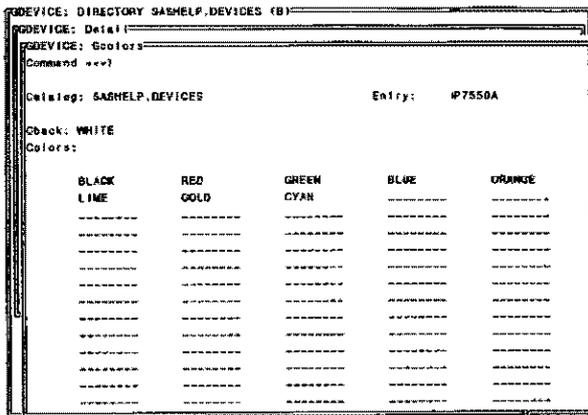
- HP75100 DEV HP PaintJet (180 dpi) 11/25/87
- HP750  DEV HP PaintJet (180 dpi) 11/23/87
  
```

### Screen 3 Parameters Screen

Some of the items on the PARAMETERS screen are

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

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



**Screen 4** GCOLORS Screen

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.

**GPILOG** 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 FRED.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
         MSIZE=6
         VSIZE=5
         COLORS=(RED, GREEN, PINK, MAGENTA, BLUE)
         NOPROMPT
         GSFMODE=REPLACE
         GACCESS=SASGASTD>FRED.GSF;
```

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 libref GDEVICE0 with the directory in which the catalog will be placed. To create the catalog, submit the following statements:

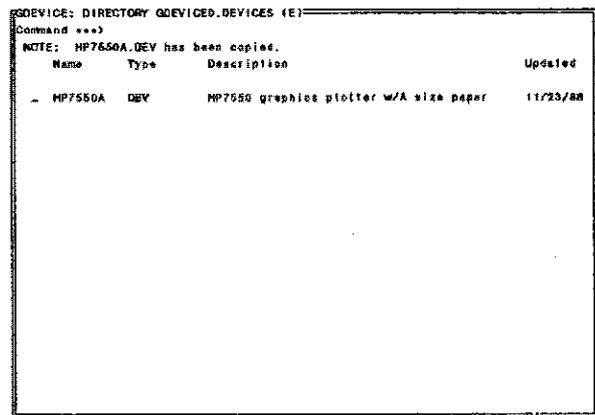
```
LIBNAME GDEVICE0 'directory name';
PROC GDEVICEV C=GDEVICE0.DEVICES;
```

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:

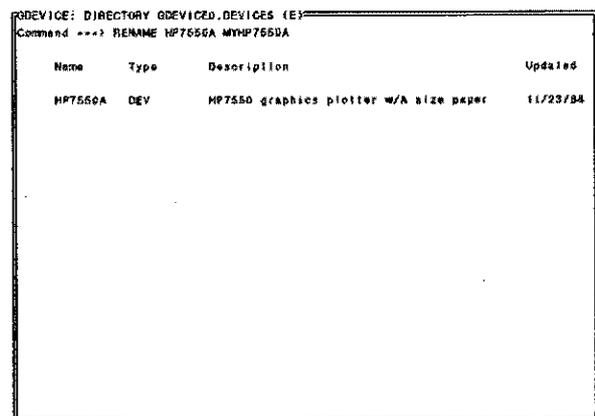
```
COPY SASHELP.DEVICES HP7550A.DEV
```

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



**Screen 5** Catalog Screen for GDEVICE0.DEVICES

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.



**Screen 6** Catalog Screen Before the RENAME Command is Executed

```

GDEVICE: DIRECTORY GDEVICE0.DEVICES (E)
Command ---)
NOTE: Rename complete.
Name      Type      Description                               Updated
- MYP7550 DEV      HP7550 graphics plotter w/A size paper  11/23/88

```

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.

```

GDEVICE: DIRECTORY GDEVICE0.DEVICES (E)
GDEVICE: Detail
Command ---)
Catalog: GDEVICE0.DEVICES                               Entry: MYP7550
Orig Driver: HP7550A      Module: SASGDMPL      Model: 309
Description: HP7550 graphics plotter w/A size paper  Type: PLOTTER
Rows: 40 Xmax:  8.843 IN Hsize:  0.000 IN Xpixels: 10000
Cols: 100 Ymax:  7.087 IN Vsize:  0.000 IN Ypixels:  7200
Rows: 50      Margin:  0.000 IN
Cols: 80      Vorigin:  0.000 IN
Aspect:  0.000      Rotate:  -----
Driver query:  _      Queued messages: N
Protocol:  -----      Paperfeed:  0.000 IN
Success: sasgaid.com:      Device: PORT      Gatten:  0
Tranlab:  -----      Devmap:  -----

```

Screen 8 DETAIL Screen Before Modifications

```

GDEVICE: DIRECTORY GDEVICE0.DEVICES (E)
GDEVICE: Detail
Command ---)
Catalog: GDEVICE0.DEVICES                               Entry: MYP7550
Orig Driver: HP7550A      Module: SASGDMPL      Model: 309
Description: Modified HP7550A plotter                  Type: PLOTTER
Rows: 48 Xmax:  9.843 IN Hsize:  0.500 IN Xpixels: 10000
Cols: 100 Ymax:  7.087 IN Vsize:  5.500 IN Ypixels:  7200
Rows: 50      Margin:  0.000 IN
Cols: 80      Vorigin:  0.000 IN
Aspect:  0.000      Rotate:  -----
Driver query:  _      Queued messages: N
Protocol:  -----      Paperfeed:  0.000 IN
Success: SASGAST0\FRED.GSF
Gatname:  -----      Gsfmode: REPLACE      Gatten:  0
Tranlab:  -----      Devmap:  -----

```

Screen 9 DETAIL Screen After 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.

```

GDEVICE: DIRECTORY GDEVICE0.DEVICES (E)
GDEVICE: Detail
GDEVICE: Parameters
Command ---)
Catalog: GDEVICE0.DEVICES                               Entry: MYP7550
Erase:  _      Autofeed:  _      CharType:  0
Swap:  _      Coll:  _      Maxcolors:  9
Autocopy:  _      Characters:  _      Repaint:  0
Handshake: HARDWARE      Circlearc:  _      Copies:  0
                              Dash:  _      Gsize:  0
Prompt: start up: X Fill:  _      Speed:  0
      end of graph:  _ Piefill:  _      Filling:  10
      mount pens: X Polyfill:  _      Maxpoly:  800
      change paper: X Symbol:  _      Lfactor:  0
Prompchar:  -----      DASHLINE:  -----
Rectfill:  -----      Symbols:  -----
Davgpts:  -----
SUCC:  -----

```

Screen 10 PARAMETERS Screen Before Modifications

