SetGold

For the Harlequin® Host Renderer SDK and Harlequin® MultiRIP™

GLOBAL GRAPHICS® software

v5.3—February 2016

Contents

Chapter 1–Introducing SetGold 4
1.1 What is SetGold 4
1.2 The difference between SetGold and SetGoldPro 4
1.3 SetGold requirements 5
1.3.1 Hardware 5
1.3.2 Software 5
1.4 What's new in SetGold 5
1.5 Using SetGold with the Harlequin Host Renderer 6
1.6 The SetGold window 7

Chapter 2–Getting Started 8
2.1 Preparing to use SetGold 8
2.2 Preparing the printer 8
2.3 Preparing the reader 8
2.4 Preparing the Harlequin MultiRIP 9
2.5 Installing SetGold 9
2.6 Starting SetGold 9
2.6.1 Evaluating SetGoldPro (demo mode) 9
2.7 Enabling SetGold 9

Chapter 3–Creating a Profile 11
3.1 Choosing input options 11
3.2 Entering profile details 11
3.2.1 Method 1—Using an X-Rite reader 14
3.2.2 Method 2—Importing data from an IT8 file 14
3.2.3 Skipping the gray balancing process 17
3.2.4 Method 1—Using an X-Rite reader connected to the computer 18
3.2.5 Method 2—Using the GretagMacbeth Spectrolino device to create an IT8 file 18

Chapter 4– Using the profile 23
4.1 Using the golden state profile 23
4.1.1 In the Harlequin MultiRIP 23
4.1.2 In the Harlequin Host Renderer 24
4.2 Creating an ICC profile 24

Chapter 5–Troubleshooting 26
5.1 Error messages 26
5.2 Symptoms 27

Appendix A – Inking limits 29
A.1 Introduction 29

Appendix B – Editing default values for targets 33
B.1 Introduction 33

B.2 Editing the Gray Balance target 33
B.2.1 Percentage values. 33
B.2.2 Filenames 34
B.3 Editing the dividing lines on all targets 35
B.3.1 Initial target 36
B.3.2 Golden State target 36
B.3.3 Gray Balance targets 36

Appendix C – Supported devices 38

Chapter 1–Introducing SetGold

1.1 What is SetGold

SetGold™ is a development tool used to place a printing device into an optimum calibrated state prior to building color profiles. The application uses both colorimetry and densitometry to arrive at the final profile table data. It has be shown that most printers do not print optimized or even usable color characterization targets from a linear curve. SetGold also provides a proven technique for achieving gray balance which results in neutral patches being printed within a color characterization target which insures absolute color accuracy around the neutral axis and more robust accuracy elsewhere is the color gamut of the printer.

The golden state profile is a good basis for two activities:

- Use of the printer without any further color management in the RIP. The initial results will be much better than with a truly raw device and the calibration required to compensate for differences between units and day to day variation should be much simpler. It is also possible for multiple users to calibrate their printers to match the golden state.
- Full color characterization for profiling and color management. This procedure has been optimized for print profiling and Global Graphics Software has achieved very good results with this profile as the starting point for color management work.

Note: A gray balance profile is what SetGold and SetGoldPro can create for a given printer setup—screening, resolution, media, ink and the device combination. A golden state is what is achieved (and can be maintained through calibration) for the given printer when the gray balance profile is used to print, typically, a color characterization target for full color profiling.

1.2 The difference between SetGold and SetGoldPro

Both SetGold and SetGoldPro are contained within the same executable and are delivered as a single compressed ZIP file.

The Sentinel LDK key you have or the password you enter determines whether SetGold or SetGoldPro is enabled. If you have enabled SetGold you can upgrade to SetGoldPro by entering a SetGoldPro password or obtaining a new Sentinel LDK key.

SetGold can produce Harlequin format gray balance profiles which, when used via the calibration manager in the Harlequin MultiRIP and via PushCalibration in the Harlequin Host Renderer, put a printer into an optimum state, sometime called the “golden state”, before actually printing color characterization targets which are used for making color profiles.

For the Harlequin Host Renderer, an option is to perform the calibration procedure in the Harlequin MultiRIP driving the intended device and then use Push Calibration to add the gray balance profile to the Harlequin Host Renderer for future use. This method would semi-automate most the of required steps limiting the chance for errors.

SetGoldPro can make Harlequin format gray balance profiles but also Harlequin format input, emulation and output profiles for use in ColorPro setups.

1.3 SetGold requirements

Generally, SetGold will run on the same specification Windows machine as the Harlequin MultiRIP.

To use SetGold you must have the following items of hardware and software:

1.3.1 Hardware

- A representative printer or digital press of the type requiring a golden state profile, with sufficient ink and media supplies to make several prints at A4 or US Letter size (or larger).
- A spectrophotometer capable of producing Lab, Status T and spectral measurements, together with its calibration plaques. That is, any supported spectrophotometer or color meter that can produce IT8 files which are compatible with SetGold. For full details see Appendix C, "Supported devices". The term IT8 is used to refer to a file format that is compliant with ANSI and ISO standards for measurement data. The `misc` folder in your SetGold application folder contains examples of valid IT8 files for targets generated by SetGold. An IT8 formatted data file is required if the device is not supported directly from within SetGold.
- Suitable cables to connect your measuring instrument to the computer. For example, Keyspan HS-19 USB Serial Adapter, X-Rite/PC Interface Cable (Part No. SE108-92-01 and DB9 Adapter to PC computer).

1.3.2 Software

- The SetGold application, as well as data and supplementary files. All files required by SetGold are supplied in the SetGold folder. Also, you may find it convenient to have some standard color test files such as IT8 target files.

Note: SetGold must be enabled using the Sentinel LDK with a new product key or a password with a hardware dongle.

- Harlequin MultiRIP v11.0r1 (HMR) or later, Harlequin Host Renderer v11.0r1 (HHR) or later.
- A Harlequin RIP plugin capable of driving the printer for which you are developing a golden state profile. The plugin should be directory-structured with a place for the profiles. If the plugin—called, for example, *new_device*—supports only one device type and colorant family, it is sufficient to have a folder called:

  ```
  RIP_folder/SW/Devices/new_device/Profiles/
  ```

  If the plugin supports multiple device types or color spaces, there may need to be sub-folders. For details, see the Harlequin RIP *Extensions* manual.
- HqnPushCalibration is available with both the Harlequin MultiRIP v10.0 (or later) and Harlequin Host Renderer v4.0r0 (or later). It provides a route to storing and updating calibration sets in the HHR, and is intended to provide users of the HMR with an alternative which does not require any manual interaction with the Calibration Manager dialog. For more information see *Technical Note 081 "Push Calibration"*.

1.4 What's new in SetGold

From v5.3:

- The golden state target now uses 100 patches and has four pages. See ""Print the golden state target" on page 20.

From v5.2:

- An Inkjet or Toner option is provided on the Printer menu for selection according to your printer type when creating a gray balance profile. See "Choosing input options" on page 11.

1.5 Using SetGold with the Harlequin Host Renderer

From SetGold/SetGoldPro v5.0r0, Harlequin Host Renderer (HHR) v4.0r0 (or later) users can use PushCalibration in conjunction with gray balance profiles to calibrate the printer. A gray balance profile is also the best starting point for making an ICC output profile. The recommended procedure to make an ICC profile for HHR is:

1. Use SetGold (or SetGoldPro) to make a gray balance profile.

Note: If you only want to perform a calibration (that is, no color management), perform step 1 and then install it as a calibration using PushCalibration.

2. Print a target with that profile selected via PushCalibration. The choice of target may be constrained by the package you use to make an ICC profile. It may be a target provided by the package or it could be a target supplied with SetGold/SetGoldPro.
3. Use a proprietary package to make an ICC profile.
4. Use that ICC profile in HHR with the gray balance calibration in place.

Refer to the *Technote 081 "Push Calibration"* to see how to make use of gray balance profiles in the Harlequin Host Renderer.

Testing on the Epson Stylus Pro 7890 found that the best color using ICC profiles in the RIP (in terms of meeting Fogra compliance) was achieved using a SetGold gray balance profile and then using X-Rite's latest ICC profiling package i1 Profiler to make an ICC output profile. This ensures that HHR users can attain a similar workflow quality to that which MultiRIP users can obtain with ColorPro.

1.6 The SetGold window

The SetGold window provides all the details you need to complete each step: an image provides a snapshot of the step; *Overview* provides a brief description; and *Procedure* provides instructions for completing each step. Figure 1.1 shows the main areas of the SetGold window.

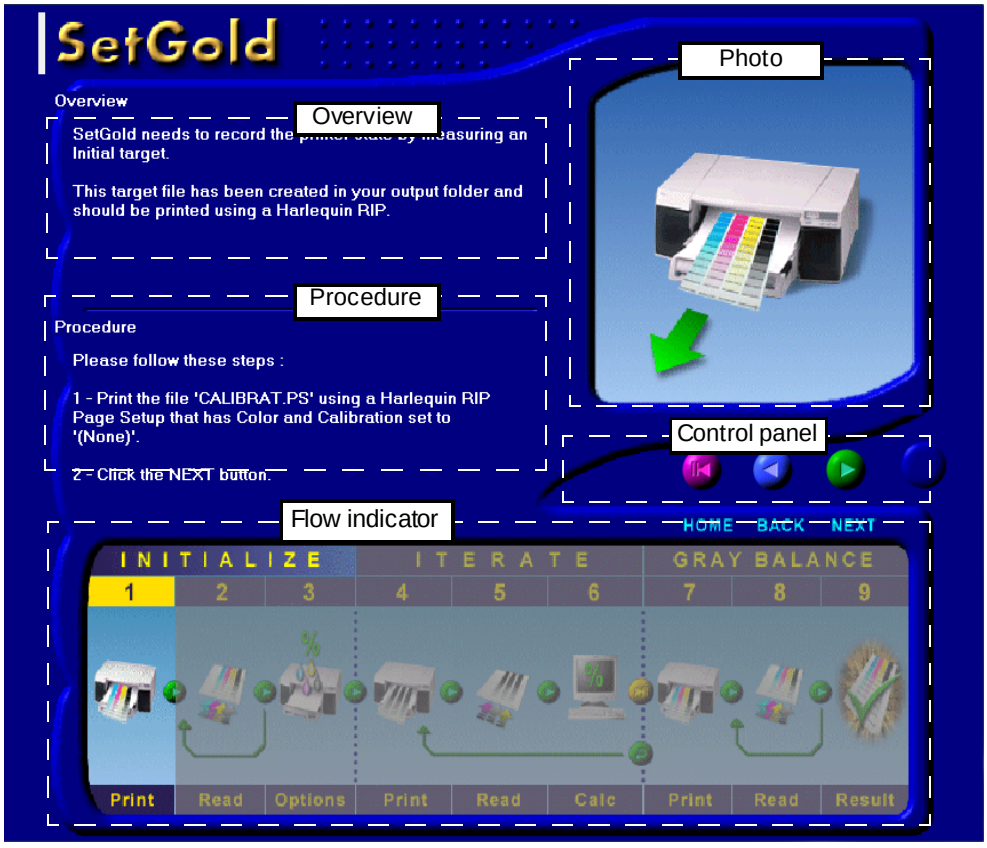

Figure 1.1 SetGold user interface window

Use the buttons in the control panel to move between the steps and to access the options dialog, where you enter details about the input methods you will be using.

Chapter 2–Getting Started

2.1 Preparing to use SetGold

Before creating profiles you should ensure your printer, calibration target reader, and Harlequin MultiRIP are configured and working correctly. Also, and equally important, allow yourself plenty of time to create your device profiles as it is often a time-consuming process.

2.2 Preparing the printer

The condition and current operational status of the printer are important considerations when creating a calibration profile. A poorly maintained printer or press may not be operating at its optimum performance and could produce poor quality output. Any profile created for such a device may not be representative of the true characteristics of that printer. We therefore recommend that before starting, and when resuming after a long interruption, you follow the manufacturer's maintenance advise for the printer. In general you should always:

- Install and operate the printer in a clean and stable environment.
- Allow time for the machine to reach operating temperature.
- Perform any cleaning or self-calibration procedures before making test prints for measurement.

If there is a significant delay between making prints and taking measurements, ensure that the storage conditions of the prints are consistent. In particular, avoid bright light, humidity and high temperatures while storing or transporting prints.

To test the printer's ability to deliver color consistently you should print test files that includes areas of solid blocks of color, as well as fine lines and patterns. Inspect the print to confirm that all the colorants appear correctly and check that all jets (or the equivalent in non-inkjet devices) are delivering colorants evenly. Also, check for banding effects in areas of solid color.

2.3 Preparing the reader

Calibrate the spectrophotometer reader before taking measurements with it. This reduces any possible error due to drift from the calibrated state before taking actual measurements. It also allows return to a known state should the procedure require more than one working session. Use the correct calibration plaque supplied for each device, carefully following the recommended procedures described in the device's documentation.

Choose the background you selected in the SetGold calibration profiles setup window. This reduces the effect of any translucency in the media. On strip-reading devices, there is often a choice of backgrounds provided for this reason. For density, black is preferred for SetGold golden state profiles. Note that white is generally used for full color profiles

Allow about ten minutes of drying and stabilization time for each test print before attempting to measure color values from it. There are several cases where the color continues to change significantly after the print is dry enough to handle and pass through a strip-reading instrument. Make your own repeated measurements on a single print if you wish to see when the change becomes insignificant.

2.4 Preparing the Harlequin MultiRIP

To ensure consistency and accuracy when producing your profiles, it is recommend that you start with a clean installation of the Harlequin MultiRIP and the plugin you are working with. Create a page setup for the output device that includes details of the resolution, output quality and separation style you are calibrating. Save the page setup with an appropriate name for example, `Epson7890_plainpaper_1440`, which will remind you of the setup used.

As previously mentioned, for the Harlequin Host Renderer, in many cases, it would make sense to perform the calibration procedure in the Harlequin MultiRIP driving the intended device then use Push Calibration to add the gray balance profile to the Harlequin Host Renderer for future use. This method would semi-automate most the of required steps limiting the chance for errors.

2.5 Installing SetGold

SetGold is delivered as a compressed ZIP folder. To install SetGoldPro unpack the ZIP on your disk.

2.6 Starting SetGold

To start SetGold go to the folder where you extracted the supplied ZIP file and double click **SetGold.exe**.

Unless you want to run SetGold in demonstration mode, it is essential to enable SetGold using the Sentinel LDK with a new product key or by entering a password when prompted *and* to have your Harlequin MultiRIP dongle attached. See Evaluating SetGoldPro (demo mode) below.

2.6.1 Evaluating SetGoldPro (demo mode)

You may evaluate SetGoldPro by running the application in demonstration mode (demo mode). Demo mode allows you to step through all the procedures for creating profiles without requiring any input data. Of course, without input data the application is unable to produce any profiles, but it will give you a good idea of the application's capabilities.

To enter demo mode, enter an invalid SetGoldPro serial number (such as 0) when prompted for a serial number to enable the application. If you decide to go ahead and purchase a password for SetGoldPro, you may enter it by choosing Options > Upgrade in SetGoldPro.

2.7 Enabling SetGold

You must either have an Sentinel LDK installation along with a new product key or a Harlequin MultiRIP security dongle and a valid SetGold password to run SetGold. When not using the LDK the first time you run SetGold you will be prompted to enter a password to enable the program. The password is unique to the dongle and entering a valid password lets you create profiles for your output devices. However, entering an invalid password, or clicking Cancel, runs the program in demonstration (demo) mode.

Note: Demo mode is for SetGoldPro and not SetGold. This allows you to see the features available in that application.

When not using LDK security you can activate SetGold or upgrade to SetGoldPro by selecting Options and clicking the Upgrade button followed by entering your password.

Demo mode does *not* let you generate target files or process calibration data, but is a useful training tool since it allows you to view each procedure in SetGold. You can enter demo mode at any time by clicking the **Demonstration mode active** in the Options screen.

Figure 2.1 Startup screen

Chapter 3–Creating a Profile

This chapter describes the procedures involved in creating a Harlequin “golden state” profile with SetGold. As you work through the procedures, refer to this manual for a detailed description of each step.

3.1 Choosing input options

When creating a Harlequin RIP profile SetGold needs to know how you intend to input data. On the opening screen (Figure 3.1, page 11) click **Options** to access the options screen, as shown in Figure 3.1.

Figure 3.1 Input options screen

SetGold is able to read profile data from various readers, and/or it can import data from an IT8 calibration file. If you are using a reader, select the model and connection port from the menus, or choose `None` if you are not using a reader. If you are importing data from an IT8 file select **Import data from IT8 file** check box.

From the **Printer** drop-down menu select either **Inkjet** or **Toner** depending on your printer type.

Click **Home** to exit the dialog and return to the first screen. Click **Next** to advance to the next screen, described next.

3.2 Entering profile details

Details such as media type, output resolution, screening method, and ink type used should all be included in the calibration profile. If any of these parameters change, the calibration profile should

not be used as its accuracy cannot be guaranteed. Instead, a new profile should be created that includes the new parameters.

Figure 3.2 Calibration profile details

Select the profile details in the dialog box as follows:

Device	Enter the name of the output device. You may use up to 31 characters, including spaces, for the name.
Serial No	Enter the device's serial number, as found on the output device.
Media	Enter the media used in the output device, for example, paper or film type.
Resolution	Select the print resolution used in the output device. All the standard resolutions are available in the menu.
Screening	For most current inkjet and digital presses screening is done by the device. For this reason select other.
Backing Color	Enter the backing color of the paper that is used for the profile. The backing color can affect the profile, and must therefore be accounted for in the calibration profile.
Ink Set	Enter details for the ink set used in the output device.
Comments	Enter any additional comments for the profile, for example, an operators name, or some extra information which may be relevant to the profile.
Output folder	Select a folder for the output created by SetGold. Do *not* choose the SetGold program folder. Choose a *different* folder for each profile that you create.

Click **Next** to save the details and proceed to Step 1.

Step 1: Print initial target

Figure 3.3 Step 1 – Print initial target

Using the correct page setup, see Section 2.4, "Preparing the Harlequin MultiRIP", print the calibration target **CALIBRAT.PS**, located in your SetGold output folder (see page 12) (or the equivalent in HHR—see *Technote 081 "Push Calibration"* for more information). The target includes the maximum ink density that the printer can deliver, and closely resembles the standard Harlequin RIP calibration target.

To allow the reading device to work correctly, the calibration target includes two dashed lines to indicate how much margin you should leave when trimming the strip.

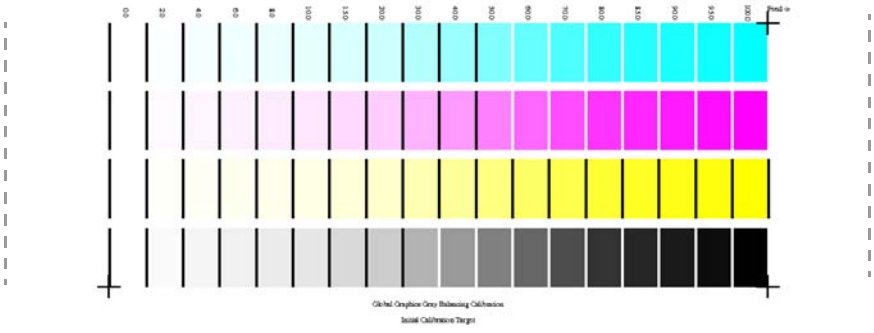

Figure 3.4 SetGold initial calibration target

Step 2: Read initial target

Figure 3.5 Step 2 – Read Initial target

Ensure the ink is *completely* dry before attempting to take readings from the target. Depending on the paper type and the ambient conditions it can take up to 10 minutes or more for the ink to dry. If you use a roll-fed or very large paper size trim the target to include the dashed lines from the target.

When the ink is dry click **Next** and, depending on the method you are using, you will be prompted to read the target, as described next.

3.2.1 Method 1—Using an X-Rite reader

1. Insert the Cyan strip into the spectrophotometer so that 100% Cyan is the first patch to be read.
2. Click **Next** to read the Cyan strip. If the unit encounters a problem while reading a strip SetGold issues an error message. Click **Next** to try reading the strip again. If the problem persists see Chapter 5, "Troubleshooting".
3. When the Cyan strip has been read, click **Next** to read the other strips in turn.

   If you need to re-read a strip, for instance, you may have read the *same* strip twice, click **Back**.
4. When you have finished, SetGold confirms that all strips have been successfully measured. Click **Next** to continue to the next step.

3.2.2 Method 2—Importing data from an IT8 file

The following instructions describe the procedure for importing IT8 files created by the GretagMacbeth Spectrolino reader into SetGold. The IT8 import method is limited to the older Spectrolino/Spectroscan and is included for legacy purposes. What is recommended is to use the i1 Pro 2 for this process because it completely automates the workflow.

1. Copy the files `InitialCalibrationTarget.csv`, `ChromticityTarget.csv`, `GreyBal.csv` and `GoldenStateTarget.csv` from the `data` folder into the `Charts` folder created by SpectroChart Lite. The SpectroChart Lite software can now access these `.csv` files when measuring targets.
2. Start SpectroChart Lite, click **Measure** and select `# Initial Calibration Target` from the **Charts** list.

3. Click **OK** and save the resulting IT8 file as `CALIBRAT.IT8`.
4. Save `CALIBRAT.IT8` into your output folder and click **Next** to import the data from this file into SetGold.
5. Click **Next** to continue to the next step in SetGold, or click **Back** to import density data again.

Step 3: Inking limits and tolerance levels

Figure 3.6 Step 3 – Determining inking limits

For some printing setups the total amount of ink printed at a given point needs to be limited to prevent over-saturation. For example, uncoated papers tend to over ink more than coated papers since they are more absorbent to the ink. Over-inking is also more likely when higher resolutions are used. Although most color profiling packages include a TAC (Total Area Coverage) control, there are some cases where you may need to use SetGold's ink limiting functionality—a few such cases are described in Appendix A.

3.2.2.1 Manually entering your printer's inking limits

If you know your printers inking limits you can enter them directly into SetGold—click the **Skip** button and enter inking limits for cyan, magenta yellow and black into the text boxes, as shown in Figure 3.7.

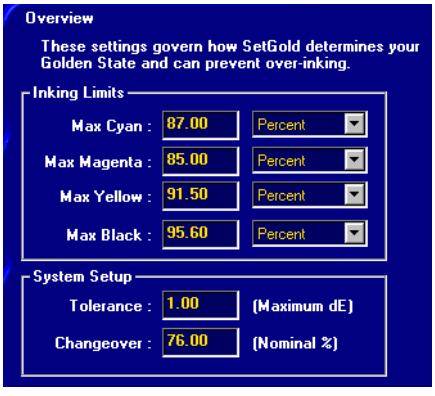

Figure 3.7 Inking limits and system setup fields

3.2.2.2 Using SetGold to automatically enter inking limits

SetGold can automatically determine your printer's inking limits by measuring *chromaticity* values in a target. If you want SetGold to do this, click **Next** in Step 3 and follow the on-screen instructions. After reading the target, inking limit values for cyan, magenta, yellow and black will be automatically entered into the Inking Limits fields, as shown in Figure 3.7.

Note: These recommendations are currently biased towards inkjet devices and may not give optimum starting points for other printer device classes such as toner based. Testing is the best solution, but you can also analyze the log file after reading the Chroma target for additional information.

Enter values for **Tolerance** and **Changeover** in the System Setup fields, as described next.

Tolerance	This is the acceptable tolerance between an ideal grayscale and the values measured by SetGold. A tolerance of 1.0 dE is just visible to most observers, while most measuring instruments show a variation of 0.2 or 0.3 dE when repeating a measurement of the same color patch. (In general, the smaller the tolerance the more measurements you will need to make later in this procedure.) A higher tolerance setting (2.0 dE or more) may be required for some combinations of media, ink and printer or where print to print variation is an issue. This tolerance setting is a guideline and you can choose at a later stage to create a golden state profile that attains a larger or smaller tolerance. A value of about 1.00 dE is usually a good choice.
Changeover	Defines a percentage point on the Gray Balance target at which SetGold will switch from producing as perfect a neutral color as possible to progressively approaching the color of a solid CMY overprint. A high value means the highlight and midtones remain neutral for longer. A lower value results in smoother midtones and shadow tones, at the expense of neutrality.

3.2.2.3 What is chromaticity?

Chromaticity allows one to find the minimum amount of ink needed of each colorant to achieve the maximum gamut for a inkset, paper, screening and resolution combination. In some combinations of variables over inking can still occur. Reducing the inking further reduces the gamut on the output device and may in rare cases reduces portions of the gamut inside of the press gamut. This results in unprintable colors on the subsequent proof and therefore a potentially poor color match on some colors. One must decide through additional testing whether a different paper or ink is required to meet the gamut requirements of the press condition one is proofing to.

Step 4: Print the gray-balance target

Figure 3.8 Step 4 – Print target

Step 4 starts the iteration process. The iteration process is the most time-consuming part of the process when creating a profile since it involves repeated printing and reading of targets. However, you may quit SetGold during the iteration phase and carry on later. SetGold prompts you to complete the iteration process if it finds an incomplete profile in the output folder.

To start the iteration, print the gray balance target `GREYBALx.PS` (where `x` is the sequence number for the file, starting at `0`) located in the output folder. The target mixes cyan, magenta and yellow inks to produce a neutral color tonal range. To start with it is unlikely the target will reproduce the full tonal range correctly. However, on subsequent passes the profile is refined and the tones reproduce more accurately. In some rare circumstances a patch on a target may look *worse* after an iteration. This will not affect performance as SetGold uses the patch with the lowest error from all the iterations.

The Gray Balance target holds three strips, where the two outside strips vary slightly from the central strip, which is the best approximation that SetGold can currently produce. The differences between each strip helps SetGold to assess the best correction. The strips are labeled `Magenta Change`, `No Change`, and `Yellow Change`. The percentage values along each strip reflect a percentage of the inking limit that you chose in Step 3, "Inking limits and tolerance levels". The inking limits for CMY are indicated on the bottom right of the target.

For example, if you set an inking limit of 40% for C, M and Y the target would read `Max CMY (40, 40, 40)`.

After printing the target click **Next** to read the target.

3.2.3 Skipping the gray balancing process

In exceptional cases your Gray Balance target may display severe over-inking, where the ink has run across the target into other patches. If this occurs you should skip SetGold's gray balancing process since there is little to be gained by gray balancing. In this case, click the **Skip** button and proceed directly to Step 7, "Print the golden state target" and create a golden state profile without gray balancing.

A non-gray balanced golden state profile still applies the ink limits that you have set. It also applies a tone curve adjustment to optimize the tonal scale of all colorants.

If your Gray Balance target is not subject to severe over-inking click **Next** to continue.

Step 5: Read the gray balance target

Figure 3.9 Step 5 – Read the gray balance target

As always, wait until the ink is completely dry before attempting to take readings from the target. If you use a roll-fed printer or a very large paper size trim the target to just include the dashed lines. Click **Next** to read the target strips using your chosen method.

3.2.4 Method 1—Using an X-Rite reader connected to the computer

1. Insert the *MAGENTA CHANGE* strip into the spectrophotometer so that the maximum value patch is the first to be read and click **Next**.

   SetGold issues an error message if the unit encounters a problem while reading a strip. Click **Next** to try re-reading the strip. If the problem persists see Chapter 5, "Troubleshooting".

2. When the first has been read, click **Next** to read the other strips in turn.

   If you wish to re-read a strip, for instance, you may have read the *same* strip twice, click **Back**.

3. When you have finished SetGold confirms that all strips have been successfully read and measured. Click **Next** to continue to the next step in SetGold.

3.2.5 Method 2—Using the GretagMacbeth Spectrolino device to create an IT8 file

1. Start SpectroChart Lite and click **Measure** then select `# GreyBal file` from the **Charts** menu.
2. Click **OK** and save the resulting IT8 file as `GreybalN.IT8`, where *N* matches the number of the target you are measuring. Following the example given in Section 4, "Print the gray-balance target", the choice would be `Greybal0.IT8`.
3. Save the IT8 file into your chosen output folder and click **Next** to import the data from this file into SetGold.
4. Click to continue to the next part of the procedure.

Step 6: Calculate a revised target

Figure 3.10 Step 6 – Accuracies recalculated

The new target, called `GREYBALx.PS` (where x is the sequence number), is sent to the output folder for you to print. This version of the target should create a more accurate representation of the gray scale than previous versions, since it has been produced from the calibration readings made from each iteration.

SetGold presents a summary of the accuracy so far achieved in the target, for example:

```
SetGold has successfully calculated a new Gray Balance target.

Achieved accuracies:
Maximum Error : 23.3 dE
Average Error : 8.8 dE

Accuracy IS NOT within specified tolerance.
```

Notice, in this example SetGold reports that the accuracies are *not* within your specified limits. In this case you may want to repeat the process in an attempt to improve the accuracy of the target. Click **Iterate** to go back to step 4 and repeat the procedure.

If the target is within your accuracy parameters, or accuracy cannot be improved any further due to the inherent limitations in your paper or printer, click **Gold**.to advance to the Finish phase.

You have now created a final calibration target that is the culmination of all the iteration passes. The target accurately reproduces the full tonal range in your printer and can be used to produce a golden state profile for the target device. The golden state profile may also contain profile data from up to three IT8 data files, as described in the following steps.

Step 7: Print the golden state target

Figure 3.11 Step 7 – Print the golden state target

Using the correct page setup in the RIP, with **Color** and **Calibration** set to `None`, print the target file `GOLDEN.ps`. When the target is ready click **Next** and input the final set of readings.

To create a gray balance profile, do the following:

Using a Harlequin MultiRIP page setup with **Color** and **Calibration** set to `None`, print the target file `GOLDEN.PS` found in your SetGold output folder. Ensure the target is fully dry before attempting to measure it.

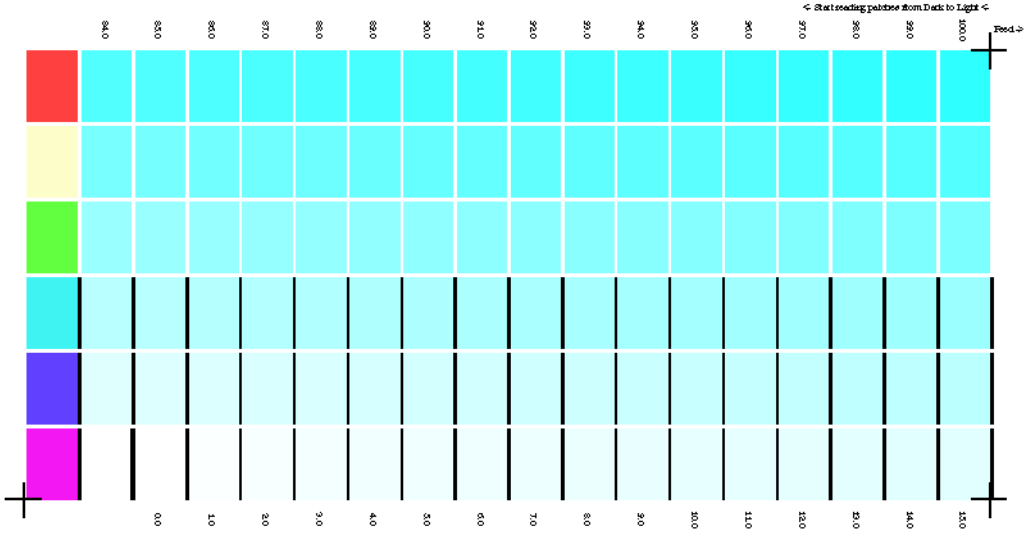

Figure 3.12 GOLDEN.PS—Cyan plate example (partial)

The golden state target has four pages which you can either measure as a strip target (you will be prompted for each strip), or you can use it to create IT8 files.

If you have opted to use a spectrophotometer device that is connected to the computer, you can use the supplied `.csv` files to read the targets and create four IT8 files named (by default) **Golden State Spectral Target_p1.IT8**, **..._p2.IT8** and so on.

SetGold will prompt you to read the each of the four pages in turn.

Step 8: Read the golden state target

Figure 3.13 Step 8 – Read the golden state target

When prompted, you select all four of these files to import at once into SetGold.

If you are importing via IT8, there must be exactly four IT8 targets, one per colorant, with readings ordered from 100% down to 0%. These are added into the final golden state profile. In Step 8, shown in Figure 3.13, select the appropriate check boxes then click **Next** to continue.

After incorporating the final sets of data, SetGold prompts you to save the profile. When choosing a name, devise one that defines the calibration profile so that it is easily identifiable. For example:

```
Glossy Photo Hvy 1440 (Stylus7000)
D-E Com Matte 720 (Stylus5000)
Archival Matte 720 (SP5500 VSDbi)
Dye Glossy Photo 360 (SP10000 VSDbi Roll)
```

Step 9: Completed golden state profile

Figure 3.14 Step 9 – Gray-balanced profile completed

You have now produced a Harlequin RIP profile for your printer that can be used in your Harlequin RIP page setups, as described in Section 4.1, page 23.

Chapter 4– Using the profile

4.1 Using the golden state profile

This section describes how to use the golden state profile in both the Harlequin MultiRIP and the Harlequin Host Renderer.

4.1.1 In the Harlequin MultiRIP

Now that you have created a golden state profile and you intend to use your profile with an Harlequin MultiRIP, you copy the profile to the correct location (as described in step 1 below). The profile does not, however, become available in the calibration profile list until you have created a new calibration setup. This is the setup you would use to print a color characterization target from an ICC profiling package.

To create a new calibration set, open the Calibration Manager and click New. In the Name field enter the name of the profile (you can use the same name if you wish). Also, ensure the Force Solid Colors option is *not* selected.

The following procedure describes how to use your profile with a v5.5 RIP (or earlier):

1. Copy the golden state profile from the output folder to the following location (substituting the correct folder names in place of the text shown in *italics*):

   RIP_folder/SW/devices/*plugin*/Profiles/*device*/

2. In the Harlequin RIP open the Page Setup Manager by choosing it from the Harlequin RIP menu.
3. In the Page Setup Manager dialog box select the page setup that you created for the SetGold procedure and click Edit. The Edit Page Setup dialog box appears.
4. In the Calibration menu select the golden state profile, as named in Step 8, "Read the golden state target". Click OK twice to close the dialog boxes.
5. From the Output menu choose Print Calibration. The Print Calibration dialog box opens.
6. In Print for select the page setup you have just edited and click Print calibrated target. The target is printed on the output device.

The calibrated target and the golden state target have a different number of patches, but they should have equivalent values and the same tone response. If this is the case, you have a working golden state profile for the printer conditions.

The profile provides over-inking control and a tone curve optimization for the printer using one combination of media, resolution, and screening. This profile also ensures gray balancing (unless the gray balancing process was skipped).

You may wish to proceed further to produce an ICC profile and import it into the RIP. See *Creating an ICC profile*, below for details.

4.1.2 In the Harlequin Host Renderer

The golden state profile includes a default curve optimized for the device, ink set, media, screening and resolution settings as well as calibration tables for use in future calibration sessions. After installing this profile into an HHR RIP via push calibration it must be referenced in any configuration file that uses a ICC color output profile based on this golden state profile. For more information see *Technical Note 081 "Push Calibration"*.

4.2 Creating an ICC profile

The details of creating an ICC profile vary from application to application. This is a summary of things to do in the Harlequin RIP, suitable for use with most applications.

Before you create an ICC profile and import it into the RIP you should check whether the TAC that you intend to implement in your profiling package is sufficient to limit the ink. The TAC that you should use may have changed because the SetGold profile that you use to print has changed the response of the printer.

1. Print the file `ProfileInkLimits.ps`, located in the `misc` folder within the SetGold application folder, using the page setup in which you have chosen your copied profile.
2. Inspect the Superblack patch on this target (C+M+Y+K) and choose the highest patch that produces acceptable output. The TAC of this patch should be your new profiling package TAC, unless you discover the need for a lower TAC when examining the double overprints in the next step.
3. Examine the double overprints (C+M, C+Y, M+Y) on this target for signs of overinking below the TAC that you intend to set in your profiling package.

   For example, if your intended profiling package TAC is 160% and you see overinking in the M+Y strip at 75% (a TAC of 150%) you need to change your intended profiling package TAC to 140%.
4. If necessary, make a note of your new profiling package TAC.

Note: If you cannot reduce your profiling package TAC to this new limit, you need to create a new golden state profile with lower ink limits. See Method C in the Inking limits appendix on page 31 for details.

Once you have checked your intended profiling package TAC, print the color profiling target using the page setup in which you have chosen the copied SetGold profile.

If the color profiling target is still subject to overinking, you may be able to use the special page feature `CMYKInkLimit`.

This page feature limits the TAC of patches so that they do not exceed the TAC that you intend to use in your profiling system. This means that patches that would have been ignored by your profiling system are prevented from overinking and ruining neighboring patches.

Note: This page feature can only be used when printing targets that use the `setcmykcolor` PostScript operator. It cannot be used when printing color profiling targets that contain images.

If necessary, follow these steps to edit your page setup so that it uses the `CMYKInkLimit` page feature:

1. Move the `CMYKInkLimit` file from the `misc` folder within the SetGold application folder into the `Page Features` folder within the Harlequin RIP application folder.
2. Open this file and edit the value for the key `/InkLimit` so that it matches your intended profiling package TAC.

   For example, if you intend to implement a TAC of 140%, change the value to `1.4`.
3. Open the Page Setup Manager dialog box (Harlequin RIP > Page Setup Manager), choose the page setup that you wish to edit and click Edit.

4. Select the Enable Feature checkbox in the Processing section and choose `CMYKInkLimit` from the accompanying menu.
5. Click OK twice to close the dialog boxes.
6. Use this edited page setup to print a target that can be successfully measured.

Once you have generated the ICC profile, using an appropriate TAC control, install it using the RIP menu option, Color > Install ICC Profile. In the Linear Calibration From list in the Install ICC Profile dialog box, you must select the golden state profile that you have created with SetGold. All the important data from the golden state profile is now associated with the installed ICC profile.

Chapter 5–Troubleshooting

5.1 Error messages

The following is a list of possible error messages and symptoms that you may encounter when using SetGold. Suggestions are also made for how you can overcome these errors.

You can inspect the SetGold `.log` file, created in the SetGold application folder or your chosen output folder, for details of error messages, such as those relayed from the reading device.

`"Error creating setup data"`

`"Error writing setup data"`

`"Failed to save setup data"`

SetGold creates a `Setup` file in the `data` sub folder of your application folder. This file records your choice of reading device and output folder. These messages appear if there is insufficient disk space to write to this file or if the disk or file is read-only. To prevent this error, ensure that enough disk space is available or change the disk and file properties.

`"Error creating Print-State data file"`

`"Error writing Print-State data"`

`"Error saving Print-State data file"`

SetGold creates a `data` file in your chosen output folder. This file records printer setup information as well as your print options, such as inking limits. These messages appear when there is insufficient disk space to write to this file or if the disk or file is read-only. To prevent this error, ensure that enough disk space is available or change the disk and file properties.

`"Warning - Some default Print-State values used."`

This message occurs when default values are used in place of missing information for the `data` file in your output folder. Inspect the file to see if the default values are applicable. If necessary, edit the values.

`Error creating file 'C:\...\...\...\`*ANYFILE*`.ps'.`

This message appears when the named file is read-only. To prevent this error change the properties of the file so that it is no longer read-only.

`"Status T Read error 'Bad reading'."`

`"Status T Read error 'LAB read error'."`

These messages occur if the reader is unable to correctly read the strip that it is measuring. To prevent this error, ensure that you feed the target into the reader at the correct angle. If necessary, re-align the target so that the middle of the strip that you are reading is in line with the alignment markings on your reader.

You may need to change the dividing lines on the target so that the reader can distinguish between neighboring patches. See "Editing the dividing lines on all targets" on page 35 for details.

"Status T Read error 'Device needs calibrating'."

This message occurs if your device needs re-calibrating. When re-calibrating, ensure that you use the correct calibration plaque for the reader.

"N point(s) corrected to make output curve monotonic"

This message occurs if SetGold has modified the curve to ensure that ink saturation values increase rather than decrease for increasing percentage levels. N is the number of points on the curve that SetGold has modified.

"Invalid min/max points in adjustment curve"
"End points of adjustment curve are invalid"

These messages appear when the curve for any of the channels is non-monotonic. If this message appears, SetGold has been unable to correct the tone curve. This means that you will get an error if you try to use this profile in the Harlequin RIP. In the rare event that you see this message, you will need to create another profile.

5.2 Symptoms

Difficulty in reading calibration strips

You may have trimmed the target too much. The dashed lines used as trim marks must remain on the strip. Try adding a backing piece of the same type of paper and re-read the strip, or print another target.

You may have selected the wrong model of DTP41. When you click  it is important to select the exact model that you are using.

You may have loaded the strip wrongly. Offer the strip up to the alignment mark on the spectrophotometer, inserting the target as far as it will go before you meet firm resistance. Then click  to start the reading.

There may be insufficient contrast between the patches and the dividing lines. This is most likely to happen in the black strip of the Initial target, but is possible elsewhere. To cure the problem, you must edit the defaults.lg file to make the dividing lines turn from black to white. See "Editing the dividing lines on all targets" on page 35 for details.

Your reader may need re-calibrating if you repeatedly get read error messages. Ensure that you use the correct calibration plaque for the reader.

SetGold may not be able to communicate with the reader due to the re-configuration of the communications port by another application. Use the Task Manager to close SetGold and then close the application that you suspect is causing the conflict. If necessary reboot your computer. You can then restart SetGold and configure the communications port by clicking  .

Difficulty in achieving the required error tolerance

You may have specified too small a tolerance. Try a larger value. For example, you may not be able to achieve a tolerance of 1.0 dE for the combination of media, ink and printer that you are using.

You may have read the same strip twice or you may have read the strips in the wrong order. If you think this is the case, try re-reading the strips.

You may be allowing inadequate drying and stabilization time before measuring targets.

Difficulty seeing the created profile in the RIP

A small number of names seem to cause the name to be unlisted in the **Profile** list in the Edit Calibration dialog box. You may also see problems with names similar to the plugin device, but differing only in the use of uppercase or lowercase letters.

If you see this problem, try renaming the profile to a dissimilar name then close and re-open the Edit Calibration dialog box. Please report any such problems to Global Graphics.

Edit Calibration reports a problem with the profile

This may happen when you exit the repeated printing and measuring of `greybal`*`N`*`.ps` files with a large error. The error may have led to invalid curves in the profile file, such as non-monotonic values.

Check that you intended to end the iterative measurements in SetGold at the point that you did. It is possible to resume measurements from a previous session and it may be worth trying one iteration or more to reduce the reported error values.

Appendix A – Inking limits

A.1 Introduction

This appendix contains details on why you may wish to set ink limits in SetGold and some guidelines on how to decide on these limits. Before examining the individual cases where you may need to use SetGold's ink limiting functionality, it may be helpful to consider the following questions and answers.

Why are inking limits necessary?

It is sometimes necessary to limit the TAC (Total Area Coverage) to prevent paper from becoming oversaturated. Oversaturated paper may tear and signifies wastage of ink. In some extreme cases the ink may run and ruin an image or patches on a target.

Why not limit the TAC in your color profiling package?

Two main methods exist for creating a color profile. One method uses a RGB color profiling target as its starting point. The user then specifies the TAC as part of the conversion process from a RGB to a CMYK color profiling target. If using a suitable TAC, this method should result in a target that does not over-ink. However, if your profiling package cannot provide a low enough TAC limit, you may need to use SetGold to help limit inking.

The second and more common method of creating a color profile uses a CMYK color profiling target as its starting point. This color profiling target may exhibit over-inking. In most cases, patches on an over-inked target that are above the specified TAC are ignored. However, severe over-inking may mean that it is not possible to measure some neighboring, acceptable patches of the color profiling target. You can resolve this problem by using a special page feature that is supplied with SetGold, as detailed in Section 4.2, “Creating an ICC profile”.

Why not limit the TAC in SetGold?

If you used just SetGold to limit the TAC, you would prevent your color profiling package from producing saturated colors. For example, if you wanted to implement a TAC of 240% in SetGold, each color component would be limited to approximately 60%. Your color profiling package cannot then use 80% Cyan and 90% Yellow to produce a bright green, even though this would require only 170% ink coverage. Instead your color profiling package must use the absolute limits set in SetGold of 60% which would produce a much paler green.

Having considered the limitations of using just SetGold or just your color profiling package to limit inking, let us look at some methods for determining ink limits in SetGold.

A.2 Methods for determining SetGold ink limits

The list below offers an overview of some possible methods for deciding on SetGold ink limits. Choose the method that suits your needs and refer to the relevant section for further details.

- “Method A” on page 30

  Use this method to ensure that the ink limits are not reduced below those of the eventual press, when using the printer as a proofing device.

  This method involves setting the ink limits to just above those of the eventual press.

- "Method B" on page 30

  Use this method if you have already created a profile for one resolution with suitable ink limits and you wish to create a matching profile for another resolution.

  This method involves copying the maximum Status T value for each color component from the first profile for use in the other profile.

- "Method C" on page 31

  Use this method to facilitate any of the following needs:

  - Establish what your profiling package TAC should be
  - Limit inking beyond the ability of your profiling package

  This method consists of two main stages.

  The first stage involves following a procedure to establish a desired profiling package TAC.

  If necessary, the second stage involves deciding on SetGold ink limits to account for the difference between your desired profiling package TAC and the actual TAC control offered by your profiling package.

Note: You may still see over-inking when using a golden state profile that includes ink limits to print a color profiling target. In most cases this over-inking can be ignored, as ink is limited by the TAC control of your profiling package. In some severe cases the ink may run and prevent acceptable patches from being read. You can use a special page feature when printing color profiling targets that prevents this over-inking, as detailed in Section 4.2, "Creating an ICC profile".

Once you have determined suitable ink limits using one of these methods you can return to *Inking limits and tolerance levels* on page 15.

A.3 Method A

Use this method in a proofing situation where you know the solid ink densities for the printing system you wish to proof and where the primary objective is to ensure that the color gamut of your proofing device is not reduced below that of your eventual press.

This method involves setting ink limits in SetGold to values just above those of the eventual press.

For example, you could take the maximum Status T values for each color component on a SWOP press and use slightly higher values in SetGold. The amount by which you should increase the ink limits is a matter of experimentation and analysis.

Color	Cyan	Magenta	Yellow	Black
Status T	1.22-1.36	1.33-1.47	0.94-1.08	1.52-1.66

Table 1 SWOP Press - CGATS Type 1

The table shows some Status T values for a SWOP press.

A.4 Method B

If you have already created a golden state profile for one resolution you can use the same inking limits when creating a matching profile for another resolution.

For a proofing environment this method ensures the color gamuts will match for a given ink, paper and screening combination, regardless of resolution setting.

To access the Status T values used in the first profile, follow these steps:

1. Open the Calibration Manager using the Output>Calibration Manager menu option.
2. Choose the Device for which the profile was created and click New.
3. Choose the Profile that you wish to copy values from.
4. Choose `Status T (X Rite)` from the Measurements as menu.
5. Choose `Cyan` from the Channel menu and note the Status T value within the C100 field.
6. Repeat step 5 for the other channels.
7. Use these values in SetGold.

A.5 Method C

This method can be used in two instances and involves following various stages of a procedure.

Stage 1	Complete stage 1 to establish what your profiling package TAC should be. This stage involves printing a file that shows output for different levels of Cyan (C), Magenta (M), Yellow (Y), Black (K) and Superblack (C+M+Y+K). You decide on acceptable maximum ink limits for each of these strips and calculate your desired profiling package TAC on the basis of these limits. Stage 1 includes steps 1-4 of the procedure.
Stage 2	Continue to stage 2 if your desired profiling package TAC is below the level of control offered by your color profiling package. This stage involves following guidelines to decide on SetGold ink limits that account for the difference between your desired and actual profiling package TAC. Stage 2 includes steps 5-8 of the procedure.

Note: As discussed in the introduction, unnecessarily low ink limits in SetGold prevent a color profiling package from producing saturated colors. Where possible, limit inking using your profiling package rather than SetGold.

Follow steps 1-4 of the procedure to establish your desired profiling package TAC. Complete the whole procedure if your desired profiling package TAC is below the level of control offered by your color profiling package.

1. Print the file `SetGoldLimits.ps` located in the `misc` folder within the SetGold application folder, using a page setup in the RIP where Color and Calibration are set to `(None)`.

   The target contains strips for Cyan (C), Magenta (M), Yellow (Y), Black (K) and Superblack (C+M+Y+K). The percentage levels for the patches of the C, M, Y and K strips are indicated by the numbers to the left of the Cyan strip. Numbers to the right of the Superblack strip indicate the TAC levels for the Superblack patches.

2. Inspect the C, M, Y and K strips and record acceptable ink limits for each strip.

   You should select the highest ink limits possible and use the printing of reversed text at a specific point size as a means of determining acceptable output.

3. Inspect the Superblack strip and choose the highest patch that produces acceptable output. Note the TAC of this patch. This is your aim TAC.

4. If the C, M, Y and K inking limits that you chose in step 2 are all 100% then the aim TAC that you decided on in step 3 is equal to your desired profiling package TAC. Otherwise, determine your desired profiling package TAC using the formula:

$$\text{Desired Profiling Package TAC} = \left(\frac{\text{Aim TAC}}{\text{Sum of C, M, Y, K Limits}} \right) ? \quad 400$$

Figure A.1 Desired profiling package TAC formula

For example, if the sum of the C, M, Y, and K inking limits is 370% and your aim TAC is 160% then your desired profiling package TAC is approximately 170% ((160/370) x 400 = 173%).

5. If your profiling package offers your desired TAC there is no need to set ink limits in SetGold. Otherwise, calculate the difference between your desired profiling package TAC and the actual TAC control offered by your profiling package. In total, you need to reduce the C, M, Y and K inking limits by this amount.

   For example, if your desired profiling package TAC is 170% and your profiling package only offers a TAC control of 220%, then the difference is 50%.

   Note: If your desired profiling package TAC is close to the lowest TAC offered by your profiling package, then you should limit inking in SetGold. This means that you can further limit your profiling package TAC, if necessary, at a later stage. The amount by which you should limit inking is a matter of judgement.

6. Try to account for this difference, for example 50%, by firstly reducing the inking limit that you decided on for Black (K) in step 2.

   Often, a range of similar patches can be seen in the Black strip. You can account for some if not all of this difference by choosing the lowest patch in the range. However, you should not limit any colorant more than necessary. For example, if the difference is only 10% do not limit Black by more than a further 10%.

7. If necessary, account for the remaining difference by reducing the C, M, Y inking limits that you chose in step 2.

   You can either reduce these colorants equally or account for the remaining difference by choosing new CMY levels that attain a gray balance. For example, if the difference you calculated in step 5 is 50% and you reduce the Black inking limit by a further 20% in step 6 then you can account for the remaining 30% difference by reducing each of the other colorants by 10%.

8. Record the revised ink limits that you decided on in steps 6 and 7.

Once you have determined suitable ink limits using this method, you can return to *Inking limits and tolerance levels* on page 15.

Appendix B – Editing default values for targets

B.1 Introduction

This appendix describes how to edit some default values used for generating targets in SetGold. The default values that you can edit are mainly associated with Gray Balance targets, although you can edit the color of dividing lines on all targets.

The default values used for generating targets are defined in a PostScript dictionary in the `defaults.lg` file, located in the `data` folder within your SetGold application folder. Values within this dictionary are expressed as key-value pairs, which include a key that begins with a forward slash, such as `/IterationPrefix` and a value such as `"Greybal"`.

Note: If you edit the `defaults.lg` file and wish to return to the default values, delete the `defaults.lg` file and restart SetGold. SetGold will create a new `defaults.lg` file with default values if no existing file is found.

B.2 Editing the Gray Balance target

There are two main aspects of the Gray Balance target that you may edit:

Percentages — You can change the percentage values of the patches for all the strips. See "Percentage values" on page 33 for details.

Filenames — You can change the format of filenames for both the Gray Balance target file and the IT8 import file. See "Filenames" on page 34 for details.

Refer to the individual sections for details on how and why to edit specific defaults.

B.2.1 Percentage values

You can change the percentage values of the patches for the *No Change* strip, as well as the percentage values that are used in the *Magenta Change* and *Yellow Change* strips when creating the first Gray Balance target. Also, you can specify the percentages to use on the chromaticity target.

No Change strip

The percentage values used for the patches of the No Change strip on the Gray Balance target are defined in an array with the key `/Percentage`.

```
/Percentage [  100.0   95.0   90.0   85.0 80.0   70.0   60.0   50.0   40.0   30.0
20.0   15.0   10.0 8.0 6.0 4.0 2.0 0.0  ]
```

The default values range from 100-0%, with 5% and 10% increments. You can choose other values, but there must be 18 patches and the percentage values must range from `100.0` to `0.0`.

Note: The percentage values reflect a percentage of the maximum amount of Cyan, Magenta and Yellow that you allow (see Step 3, "Inking limits and tolerance levels"). The maximum limits for CMY are indicated on the bottom right of the target. For example, if you set an inking limit of 40% for C, M and Y the target would read `Max CMY (40, 40, 40)`.

Do not change the maximum percentage value `100.0` to a lower value. SetGold already provides a mechanism for limiting inking, as described in Step 3, "Inking limits and tolerance levels".

You may wish to change other values to place more patches in the highlights, midtones or shadow tones sections of the strip.

Magenta Change / Yellow Change strip

You can change the amount by which the percentage values for the Magenta Change and Yellow Change strips differ from those for the No Change strip during the first iteration.The amount by which the percentage values differ for the first iteration is known as the *range*.

The default values for the Magenta Change strip are:

```
/M_Range    [    0.0  -14.0  -10.0  -12.0  -14.0  -18.0   12.0   12.0   12.0   10.0
6.0    6.0    4.0    0.0  ]
```

The default values for the Yellow Change strip are:

```
/Y_Range    [    0.0  -12.0  -16.0  -18.0  -16.0  -16.0   12.0   12.0    8.0    8.0
4.0    4.0    4.0    0.0  ]
```

The arrays of values for the Magenta Change and Yellow Change strips directly correspond to the array of values for the No Change strip. In this case the range for both strips at 100% is 0.0. The range for the Magenta Change strip at 95% is -14.0 which produces a value of 81% for Magenta. Similarly, the range for the Yellow Change strip at 95% is -12.0 which produces a value of 83% for Yellow.

You can edit these values in order to optimize SetGold and reduce the number of iterations that you need to perform to make a Golden State profile. For example, you can experiment with these values and analyze the number of iterations that are necessary for varying ranges.

If you change the percentage values for the patches of the No Change strip, you may wish to change the range for these strips. Determining suitable ranges for particular percentage levels is a matter of experimentation.

Chromaticity values

Default percentages that are used in the Chromaticity stage. Values do NOT typically range from 0%, and there should be 18 in total.

```
/ChromaticityPercentage [  100.0   97.5   95.0   92.5   90.0   87.5   85.0   82.5
80.0   77.5   75.0   72.5   70.0   67.5   65.0   62.5   60.0   57.5  ]
```

B.2.2 Filenames

You can change the filename prefix of the Gray Balance target from its default value of *Greybal*. You can also change the format of the filename of the IT8 file that is searched for when importing data.

Note to OEMs: If you change the stem of the filename for Gray Balance targets you need to edit the screen prompts detailed in this document to reflect this change.

B.2.2.1 Gray Balance target filename

You can change the filename prefix used to create the filename of the Gray Balance target file. The default value is:

```
/IterationPrefix "Greybal"
```

SetGold appends the number of the iteration as well as the file extension `.ps` to this filename prefix to create the filename of the Gray Balance target file. For example, using the default settings, SetGold produces the file `Greybal0.ps` the first time it generates a Gray Balance target. Successive iterations are then numbered accordingly, for example `Greybal1.ps` for the first iteration and so on.

You can edit the filename prefix to contain any text:

```
/IterationPrefix "AnyPrefix"
```

Note: SetGold displays the filename in uppercase when it prompts you to print the Gray Balance target file. The file generated in your output folder uses the same case as the file prefix that you specify.

B.2.2.2 IT8 import filename

You can change the format of the filename of the IT8 file that is searched for when importing data. You can change the filename prefix of the IT8 file from its default value of:

```
/ImportPrefix "Greybal"
```

SetGold expects the filename of the IT8 file to consist of the file prefix and the file extension `.it8`.

You can also choose whether the filename should use the same numbering convention as that used for the filenames of Gray Balance target files. This choice is indicated by the value of `TRUE` or `FALSE` for the key `/ImportAppendNum`. The default value is:

```
/ImportAppendNum "TRUE"
```

When this value is `TRUE` you must include the number of the iteration for which the measurements apply in the filename of the IT8 file. For example, if the IT8 file contained data from measuring the target `Greybal1.ps` then you should save the file as `Greybal1.it8`.

If the value is `FALSE`, you can use the same filename each time you save IT8 files, for example `Greybal.it8`.

Note: When you import data from an IT8 file this data is stored in the corresponding Gray Balance target file. This means that you can use a single filename for IT8 files and overwrite previously imported IT8 files, whilst still keeping track of iteration data.

B.3 Editing the dividing lines on all targets

On all targets, black or white lines separate the patches. The lines must have enough contrast for the reading device to detect the patch boundaries. You can change the point at which the dividing lines

on a strip change from black to white for all of the targets used in SetGold. Two main types of target are used in SetGold:

Initial targets
Contain four strips Cyan (C), Magenta (M), Yellow (Y) and Black (K).

Golden State targets
Contains six strips per colorant, but these are regarded as one long strip per colorant for the purposes of editing the dividing lines.

Gray Balance targets
Contain three strips Magenta Change (M), No Change (N) and Yellow Change (Y).

B.3.1 Initial target

For the Initial target the default values are:

```
/BlackStripsCMYK [  8  8  15  6  ]
```

The values in the array correspond to the CMYK strips and specify how many black dividing lines should appear in each strip, counting upwards from the dividing line below the lowest percentage patch. There are a total of 15 dividing lines in each strip. The default values specify that all of the dividing lines in the Yellow strip (Y) are black, whereas only the first 6 dividing lines in the black strip are black.

You may need to modify the changeover point from black to white strips for targets that display relatively dark colors in the highlights section of the strip. For example, your reading device may not be able to use the dividing line to distinguish between neighboring patches. If this is the case reduce the number of black dividing lines.

B.3.2 Golden State target

For the Golden State target the default values are:

```
/BlackStripsGoldenCMYK [  50  50  101  30  ]
```

The values in the array correspond to the CMYK strips and specify how many black dividing lines should appear in each strip, counting upwards from the dividing line below the lowest percentage patch. There are a total of 101 dividing lines in each strip. The default values specify that all of the dividing lines in the Yellow strip (Y) are black, whereas only the first 30 dividing lines in the black strip are black.

You may need to modify the changeover point from black to white strips for targets that display relatively dark colors in the highlights section of the strip. For example, your reading device may not be able to use the dividing line to distinguish between neighboring patches. If this is the case reduce the number of black dividing lines.

B.3.3 Gray Balance targets

For the Gray Balance targets the default values are:

```
/BlackStripsMNY [5 5 5]
```

The default values specify that the first 5 dividing lines on all of the strips are black. The dividing lines are counted from below the lowest percentage patch, (as for the Initial target). This should restrict the

black dividing lines to the highlights section of the target. However, if the target is relatively dark in the highlights section, you can use white dividing lines to distinguish between neighboring patches by reducing the numbers in this array.

Appendix C – Supported devices

This appendix lists the devices supported in SetGold.

X-Rite - DTP-41 series

ADB using Keyspan HS-19 USB Serial Adapter—Windows XP, Windows 7 32-bit and 64-bit.

The DTP41/B can be setup via USB on Windows 7 32-bit.

X-Rite/Gretag - Spectrolino/SpectroScan/SpectroChart Lite 1.42

ADB using Keyspan HS-19 USB Serial Adapter—Windows XP, Windows 7 32-bit via .it8 import feature.

X-Rite/Gretag - i1 Pro

USB—Windows XP, Windows 7 32-bit.

X-Rite/Gretag - i1 Pro 2

USB—Windows XP, Windows 7 32-bit and 64-bit.

X-Rite/Gretag - i1iO

USB—Windows XP, Windows 7 32-bit (64-bit if using i1 Pro 2) via .it8 import feature.

GLOBAL GRAPHICS® software

Copyright and Trademarks

SetGold v5.3 User Manual

February 2016

Part number: GG.SETGOLD.5.3

Document issue: 115

Global Graphics Software Ltd. Confidential Information.

Certificate of Computer Registration of Computer Software.

Registration No. 2006SR05517

The information in this publication is provided for information only and is subject to change without notice. This publication could contain technical inaccuracies, typographical errors and out-of –date information. Use of the information is therefore at your own risk. Global Graphics Software Ltd and its affiliates shall not be responsible or liable for any loss or damage that may arise from the use of any information in this publication.

The software described in this publication is furnished under license and may only be used or copied in accordance with the terms of that license. Global Graphics Software Ltd accepts no responsibility or liability for any special, punitive, incidental, indirect or consequential damages of any kind, or any damages whatsoever, including, without limitation, those resulting from loss of use, data or profits, whether or not Global Graphics Software has been advised of the possibility of such damages, and on any theory of liability, arising out of or in connection with the use of this software.

Protected by U.S Patents 5,862,253; 6,343,145; 6,330,072; 6,483,524; 6,380,951; 6,755,498; 6,624,908; 6,809,839; 6,755,498; 6,624,908; 6,809,839; 6,996,284; 7,298,526; 7,359,530; 8,749,813; 8,823,982.

Other U.S. Patents Pending

Portions Type 1 font renderer contains licensed third party software

Portions copyright 1991 International Business Machines, Corp.,

Portions copyright 1991 Lexmark International, Inc.

Portions Adobe Glyph List. Copyright 1990-2007 Adobe Systems Incorporated.

Portions Adobe Cmaps. Copyright 1990-2009 Adobe Systems Incorporated

Portions TrueType ® font renderer copyright 1997 Bitstream, Inc.

Portions developed using the Kakadu software. Copyright 2001 David Taubman, The University of New South Wales (Unisearch Ltd)

The ECI and FOGRA ICC color profiles supplied with this Harlequin RIP are distributed with the kind permission of the ECI (European Color Initiative) and FOGRA respectively, and of Heidelberger Druckmaschinen AG (HEIDELBERG).

The IFRA ICC profiles supplied with this Harlequin RIP are distributed with the kind permission of IFRA and of GretagMacbeth.

TrueType is a registered trademark of Apple Computer, Inc.

Microsoft, Win32, Windows, Windows NT, Windows Server, Windows Vista, Windows 7, Windows 8 and WinFX are either registered trademarks or trademarks of the Microsoft Corporation in the United States and/or other countries.

PANTONE® Colors displayed herein may not match PANTONE-identified standards. Consult current PANTONE Color Publications for accurate color.

PANTONE® and other Pantone trademarks are the property of Pantone LLC. © Pantone LLC, 2014.

Font data copyright 1991 -1995 Linotype Hell Corp.

Fonts copyright © 2000-2004 Timo Lehtinen. All Rights Reserved. http://www.timolehtinen.com/type/.

Adobe, Adobe Photoshop, Adobe Type Manager, Acrobat, Display PostScript, Adobe Illustrator, PostScript, Distiller and PostScript 3 are either registered trademarks or trademarks of Adobe Systems Incorporated in the United States and/or other countries which may be registered in certain jurisdictions.

Portions include software licensed under the following terms:

OpenSSL - general purpose cryptography library

Copyright © 1998-2011 The OpenSSL Project. All rights reserved.

Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met:

1. Redistributions of source code must retain the above copyright notice, this list of conditions and the following disclaimer.

2. Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution.

3. All advertising materials mentioning features or use of this software must display the following acknowledgment: “This product includes software developed by the OpenSSL Project for use in the OpenSSL Toolkit. (http://www.openssl.org/)”

4. The names “OpenSSL Toolkit” and “OpenSSL Project” must not be used to endorse or promote products derived from this software without prior written permission. For written permission, please contact openssl-core@openssl.org.

5. Products derived from this software may not be called “OpenSSL” nor may “OpenSSL” appear in their names without prior written permission of the OpenSSL Project.

6. Redistributions of any form whatsoever must retain the following acknowledgment: “This product includes software developed by the OpenSSL Project for use in the OpenSSL Toolkit (http://www.openssl.org/)”.

THIS SOFTWARE IS PROVIDED BY THE OpenSSL PROJECT ``AS IS'' AND ANY EXPRESSED OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE OpenSSL PROJECT OR ITS CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

This product includes cryptographic software written by Eric Young (eay@cryptsoft.com). This product includes software written by Tim Hudson (tjh@cryptsoft.com).

Copyright © 1995-1998 Eric Young (eay@cryptsoft.com)

All rights reserved.

This package is an SSL implementation written by Eric Young (eay@cryptsoft.com). The implementation was written so as to conform with Netscapes SSL.

This library is free for commercial and non-commercial use as long as the following conditions are adhered to. The following conditions apply to all code found in this distribution, be it the RC4, RSA, lhash, DES, etc., code; not just the SSL code. The SSL documentation included with this distribution is covered by the same copyright terms except that the holder is Tim Hudson (tjh@cryptsoft.com).

Copyright remains Eric Young's, and as such any Copyright notices in the code are not to be removed. If this package is used in a product, Eric Young should be given attribution as the author of the parts of the library used. This can be in the form of a textual message at program startup or in documentation (online or textual) provided with the package.

Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met:

1. Redistributions of source code must retain the copyright notice, this list of conditions and the following disclaimer.

2. Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution.

3. All advertising materials mentioning features or use of this software must display the following acknowledgement: “This product includes cryptographic software written by Eric Young (eay@cryptsoft.com)”. The word 'cryptographic' can be left out if the routines from the library being used are not cryptographic related:-).

4. If you include any Windows specific code (or a derivative thereof) from the apps directory (application code) you must include an acknowledgement: “This product includes software written by Tim Hudson (tjh@cryptsoft.com)”.

THIS SOFTWARE IS PROVIDED BY ERIC YOUNG ``AS IS'' AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE AUTHOR OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

The licence and distribution terms for any publicly available version or derivative of this code cannot be changed. i.e. this code cannot simply be copied and put under another distribution licence [including the GNU Public Licence.

ICU - IBM library providing Unicode and Globalization support

Copyright © 1995-2003 International Business Machines Corporation and others All rights reserved.

Permission is hereby granted, free of charge, to any person obtaining a copy of this software and associated documentation files (the “Software”), to deal in the Software without restriction, including without limitation the rights to use, copy, modify, merge, publish, distribute, and/or sell copies of the Software, and to permit persons to whom the Software is furnished to do so, provided that the above copyright notice(s) and this permission notice appear in all copies of the Software and that both the above copyright notice(s) and this permission notice appear in supporting documentation.

THE SOFTWARE IS PROVIDED “AS IS”, WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT OF THIRD PARTY RIGHTS. IN NO EVENT SHALL THE COPYRIGHT HOLDER OR HOLDERS INCLUDED IN THIS NOTICE BE LIABLE FOR ANY CLAIM, OR ANY SPECIAL INDIRECT OR CONSEQUENTIAL DAMAGES, OR ANY DAMAGES WHATSOEVER RESULTING FROM LOSS OF USE, DATA OR PROFITS, WHETHER IN AN ACTION OF CONTRACT, NEGLIGENCE OR OTHER TORTIOUS ACTION, ARISING OUT OF OR IN CONNECTION WITH THE USE OR PERFORMANCE OF THIS SOFTWARE.

Except as contained in this notice, the name of a copyright holder shall not be used in advertising or otherwise to promote the sale, use or other dealings in this Software without prior written authorization of the copyright holder.

Expat - XML parser library

Copyright © 1998, 1999, 2000 Thai Open Source Software Center Ltd and Clark Cooper

Copyright © 2001, 2002 Expat maintainers.

Permission is hereby granted, free of charge, to any person obtaining a copy of this software and associated documentation files (the "Software"), to deal in the Software without restriction, including without limitation the rights to use, copy, modify, merge, publish, distribute, sublicense, and/or sell copies of the Software, and to permit persons to whom the Software is furnished to do so, subject to the following conditions:

The above copyright notice and this permission notice shall be included in all copies or substantial portions of the Software.

THE SOFTWARE IS PROVIDED "AS IS", WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT. IN NO EVENT SHALL THE AUTHORS OR COPYRIGHT HOLDERS BE LIABLE FOR ANY CLAIM, DAMAGES OR OTHER LIABILITY, WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING FROM, OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE SOFTWARE.

---

pthreads-win32 - a POSIX threads library for Microsoft Windows

This file is Copyrighted

This file is covered under the following Copyright:

Copyright © 2001,2006 Ross P. Johnson All rights reserved.

Everyone is permitted to copy and distribute verbatim copies of this license document, but changing it is not allowed.

Pthreads-win32 is covered by the GNU Lesser General Public License

Pthreads-win32 is open software; you can redistribute it and/or modify it under the terms of the GNU Lesser General Public License as published by the Free Software Foundation version 2.1 of the License.

Pthreads-win32 is several binary link libraries, several modules, associated interface definition files and scripts used to control its compilation and installation.

Pthreads-win32 is distributed in the hope that it will be useful, but WITHOUT ANY WARRANTY; without even the implied warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU Lesser General Public License for more details.

A copy of the GNU Lesser General Public License is distributed with pthreads-win32 under the filename: COPYING.LIB

You should have received a copy of the version 2.1 GNU Lesser General public License with pthreads-win32; if not, write to:

Free Software Foundation, Inc.

59 Temple Place

Suite 330

Boston, MA02111-1307

USA

The contact addresses for pthreads-win32 is as follows:

Web:http://sources.redhat.com/pthreads-win32

Email: Ross Johnson

Please use: Firstname.Lastname@homemail.com.au

Pthreads-win32 copyrights and exception files

With the exception of the files listed below, Pthreads-win32 is covered under the following GNU Lesser General Public License copyrights: threads-win32 - POSIX Threads Library for Win32:

Copyright© 1998 John E. Bossom

Copyright© 1999,2006 Pthreads-win32 contributors

The current list of contributors is contained n the file CONTRIBUTORS included with the source code distribution. The current list of CONTRIBUTORS can also be seen at the following WWW location:

http://sources.redhat.com/pthreads-win32/contributors.html

Contact Email: Ross Johnson

Please use: Firstname.Lastname@homemail.com.au

These files are not covered under one of the Copyrights listed above:

COPYING

COPYING.LIB

tests/rwlock7.c

This file, COPYING, is distributed under the Copyright found at the top of this file. It is important to note that you may distribute verbatim copies of this file but you may not modify this file.

The file COPYING.LIB, which contains a copy of the version 2.1 GNU Lesser General Public License, is itself copyrighted by the Free Software Foundation, Inc. Please note that the Free Software Foundation, Inc. does NOT have a copyright over Pthreads-win32, only the COPYING.LIB that is supplied with pthreads-win32.

The file tests/rwlock7.c is derived from code written by Dave Butenhof for his book 'Programming

With POSIX® Threads'. The original code was obtained by free download from his website http://home.earthlink.net/~anneart/family/Threads/source.html and did not contain a copyright or author notice. It is assumed to be freely distributable.

In all cases one may use and distribute these exception files freely. And because one may freely distribute the LGPL covered files, the entire pthreads-win32 source may be freely used and distributed.

General Copyleft and License info

For general information on Copylefts, see: http://www.gnu.org/copyleft/

For information on GNU Lesser General Public Licenses, see: http://www.gnu.org/copyleft/lesser.html http://www.gnu.org/copyleft/lesser.txt

---

zlib - general purpose compression library

Copyright © 1995-2013 Jean-loup Gailly and Mark Adler

This software is provided 'as-is', without any express or implied warranty. In no event will the authors be held liable for any damages arising from the use of this software.

Permission is granted to anyone to use this software for any purpose, including commercial applications, and to alter it and redistribute it freely, subject to the following restrictions:

1. The origin of this software must not be misrepresented; you must not claim that you wrote the original software. If you use this software in a product, an acknowledgment in the product documentation would be appreciated but is not required.

2. Altered source versions must be plainly marked as such, and must not be misrepresented as being the original software.

3. This notice may not be removed or altered from any source distribution.

Copyright © 2005-2008, The Android Open Source Project

Licensed under the Apache License, Version 2.0 (the “License”); you may not use this file except in compliance with the License.

Unless required by applicable law or agreed to in writing, software distributed under the License is distributed on an “AS IS” BASIS, WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied. See the License for the specific language governing permissions and limitations under the License.

Apache License

Version 2.0, January 2004

http://www.apache.org/licenses/

TERMS AND CONDITIONS FOR USE, REPRODUCTION, AND DISTRIBUTION

1. Definitions.

“License” shall mean the terms and conditions for use, reproduction, and distribution as defined by Sections 1 through 9 of this document.

“Licensor” shall mean the copyright owner or entity authorized by the copyright owner that is granting the License.

“Legal Entity” shall mean the union of the acting entity and all other entities that control, are controlled by, or are under common control with that entity. For the purposes of this definition, “control” means (i) the power, direct

or indirect, to cause the direction or management of such entity, whether by contract or otherwise, or (ii) ownership of fifty percent (50%) or more of the outstanding shares, or (iii) beneficial ownership of such entity.

"You" (or "Your") shall mean an individual or Legal Entity exercising permissions granted by this License.

"Source" form shall mean the preferred form for making modifications, including but not limited to software source code, documentation source, and configuration files.

"Object" form shall mean any form resulting from mechanical transformation or translation of a Source form, including but not limited to compiled object code, generated documentation, and conversions to other media types.

"Work" shall mean the work of authorship, whether in Source or Object form, made available under the License, as indicated by a copyright notice that is included in or attached to the work (an example is provided in the Appendix below).

"Derivative Works" shall mean any work, whether in Source or Object form, that is based on (or derived from) the Work and for which the editorial revisions, annotations, elaborations, or other modifications represent, as a whole, an original work of authorship. For the purposes of this License, Derivative Works shall not include works that remain separable from, or merely link (or bind by name) to the interfaces of, the Work and Derivative Works thereof.

"Contribution" shall mean any work of authorship, including the original version of the Work and any modifications or additions to that Work or Derivative Works thereof, that is intentionally submitted to Licensor for inclusion in the Work by the copyright owner or by an individual or Legal Entity authorized to submit on behalf of the copyright owner. For the purposes of this definition, "submitted" means any form of electronic, verbal, or written communication sent to the Licensor or its representatives, including but not limited to communication on electronic mailing lists, source code control systems, and issue tracking systems that are managed by, or on behalf of, the Licensor for the purpose of discussing and improving the Work, but excluding communication that is conspicuously marked or otherwise designated in writing by the copyright owner as "Not a Contribution."

"Contributor" shall mean Licensor and any individual or Legal Entity on behalf of whom a Contribution has been received by Licensor and subsequently incorporated within the Work.

2. Grant of Copyright License. Subject to the terms and conditions of this License, each Contributor hereby grants to You a perpetual, worldwide, non-exclusive, no-charge, royalty-free, irrevocable copyright license to reproduce, prepare Derivative Works of, publicly display, publicly perform, sublicense, and distribute the Work and such Derivative Works in Source or Object form.

3. Grant of Patent License. Subject to the terms and conditions of this License, each Contributor hereby grants to You a perpetual, worldwide, non-exclusive, no-charge, royalty-free, irrevocable (except as stated in this section) patent license to make, have made, use, offer to sell, sell, import, and otherwise transfer the Work, where such license applies only to those patent claims licensable by such Contributor that are necessarily infringed by their Contribution(s) alone or by combination of their Contribution(s) with the Work to which such Contribution(s) was submitted. If You institute patent litigation against any entity (including a cross-claim or counterclaim in a lawsuit) alleging that the Work or a Contribution incorporated within the Work constitutes direct or contributory patent infringement, then any patent licenses granted to You under this License for that Work shall terminate as of the date such litigation is filed.

4. Redistribution. You may reproduce and distribute copies of the Work or Derivative Works thereof in any medium, with or without modifications, and in Source or Object form, provided that You meet the following conditions:

(a) You must give any other recipients of the Work or Derivative Works a copy of this License; and

(b) You must cause any modified files to carry prominent notices stating that You changed the files; and

(c) You must retain, in the Source form of any Derivative Works that You distribute, all copyright, patent, trademark, and attribution notices from the Source form of the Work, excluding those notices that do not pertain to any part of the Derivative Works; and

(d) If the Work includes a "NOTICE" text file as part of its distribution, then any Derivative Works that You distribute must include a readable copy of the attribution notices contained within such NOTICE file, excluding those notices that do not pertain to any part of the Derivative Works, in at least one of the following places: within a NOTICE text file distributed as part of the Derivative Works; within the Source form or documentation, if provided along with the Derivative Works; or, within a display generated by the Derivative Works, if and wherever such third-party notices normally appear. The contents of the NOTICE file are for informational purposes only and do not modify the License. You may add Your own attribution notices within Derivative Works that You distribute, alongside or as an addendum to the NOTICE text from the Work, provided that such additional attribution notices cannot be construed as modifying the License.

You may add Your own copyright statement to Your modifications and may provide additional or different license terms and conditions for use, reproduction, or distribution of Your modifications, or for any such Deriva-

tive Works as a whole, provided Your use, reproduction, and distribution of the Work otherwise complies with the conditions stated in this License.

5. Submission of Contributions. Unless You explicitly state otherwise, any Contribution intentionally submitted for inclusion in the Work by You to the Licensor shall be under the terms and conditions of this License, without any additional terms or conditions. Notwithstanding the above, nothing herein shall supersede or modify the terms of any separate license agreement you may have executed with Licensor regarding such Contributions.

6. Trademarks. This License does not grant permission to use the trade names, trademarks, service marks, or product names of the Licensor, except as required for reasonable and customary use in describing the origin of the Work and reproducing the content of the NOTICE file.

7. Disclaimer of Warranty. Unless required by applicable law or agreed to in writing, Licensor provides the Work (and each Contributor provides its Contributions) on an "AS IS" BASIS, WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied, including, without limitation, any warranties or conditions of TITLE, NON-INFRINGEMENT, MERCHANTABILITY, or FITNESS FOR A PARTICULAR PURPOSE. You are solely responsible for determining the appropriateness of using or redistributing the Work and assume any risks associated with Your exercise of permissions under this License.

8. Limitation of Liability. In no event and under no legal theory, whether in tort (including negligence), contract, or otherwise, unless required by applicable law (such as deliberate and grossly negligent acts) or agreed to in writing, shall any Contributor be liable to You for damages, including any direct, indirect, special, incidental, or consequential damages of any character arising as a result of this License or out of the use or inability to use the Work (including but not limited to damages for loss of goodwill, work stoppage, computer failure or malfunction, or any and all other commercial damages or losses), even if such Contributor has been advised of the possibility of such damages.

9. Accepting Warranty or Additional Liability. While redistributing the Work or Derivative Works thereof, You may choose to offer, and charge a fee for, acceptance of support, warranty, indemnity, or other liability obligations and/or rights consistent with this License. However, in accepting such obligations, You may act only on Your own behalf and on Your sole responsibility, not on behalf of any other Contributor, and only if You agree to indemnify, defend, and hold each Contributor harmless for any liability incurred by, or claims asserted against, such Contributor by reason of your accepting any such warranty or additional liability.

US Government Use

Harlequin RIP software is a computer software program developed at private expense. If the Harlequin Host Renderer software is acquired under the terms of a proposal or agreement with the United States Government or any contractor therefor, the software is subject to the following restricted rights notice: "This Software is commercial computer software provided with RESTRICTED RIGHTS. Use, duplication, or disclosure by the U.S. Government is subject to restrictions as set forth in subparagraph (c)(1)(ii) of the Rights in Technical Data and Computer Software clause at DFARS 252.227-7013, FAR 52.227-17 Alternate III (g)(3), or subparagraphs (c)(1) and (2) of the Commercial Computer Software -- Restricted Rights at 48 CFR 52.227-19, as applicable, and their successor provisions. Contractor/Manufacturer is Global Graphics Software Incorporated, Waltham, MA 02451."