HARMAN technology Limited

TECHNICAL INFORMATION

HARMAN GDS FB PAPERS

B&W PAPER FOR DIGITAL EXPOSURE

PREMIUM QUALITY BLACK AND WHITE PANCHROMATIC PHOTOGRAPHIC PAPERS ON A BARYTA FIBRE BASE FOR USE WITH DIGITAL ENLARGERS.

HARMAN GDS FB has been designed using the very latest black and white silver halide emulsion technology. It has spectral sensitivity and exposure characteristics specially suited to optical digital exposure with tricolour laser enlarger systems produced by Durst, Océ, Polielettronica and others. It is coated onto a double weight Baryta coated fibre base. Overall Product weight is 310gsm.

HARMAN GDS FB has excellent contrast, sharpness and surface finish that will give superb continuous tone black and white images or text from digital files prepared from either black and white or colour film negatives or positives, prints and digital originals. The results are equal to those seen when using conventional black and white printing materials and exposing equipment.

HARMAN GDS FB has a neutral image and base tone and is available in the 1K Glossy and 5K Matt surface finishes as mural roll formats up to 127cm (50in) wide and 30m (98ft) in length.

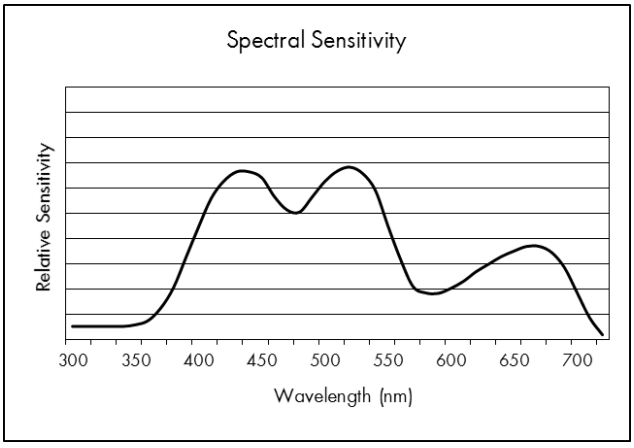
KEY FEATURES

HARMAN GDS FB features an emulsion specifically designed for digital exposure. The emulsion offers significant benefits;

- Dmax – Approx. 2.25 (Glossy) 1.40 (Matt)
- Dmin – Approx. 0.06 (Glossy) 0.03 (Matt).
- Stable latent image characteristics post exposure.
- Optimised sensitometric curve shape to improve ease of calibration and calibration accuracy.
- Excellent speed and RGB sensitivity balance.
- Reproduction of subtle highlight / shadow details as a result of more accurate calibrations
- Excellent toning characteristics
- The Matt surface is particularly well suited to hand colouring applications

SPECTRAL SENSITIVITY

Wedge Spectrogram to tungsten light (2850K)



HARMAN GDS FB paper exposed for 10^{-4} seconds to broad-band colour filters illuminated by a xenon flash tube. Developer: MULTIGRADE diluted 1+9.
Development: 1 minute at 20°C/68°F.

EXPOSURE

Most digital enlarger systems are designed to expose colour photographic paper. Manufacturers support for Black and White is limited, but excellent results can be achieved with some experimentation.

Safelight recommendations

HARMAN GDS FB has panchromatic sensitivity therefore we recommend that all handling of unpacked paper is done in total darkness.

Exposing light sources

HARMAN GDS FB is designed for use with the red, green and blue lasers used in digital enlargers. However, it can also be used with conventional tungsten or tungsten halogen light sources.

CALIBRATION FOR USE

The information we provide below is intended as a good starting point for calibration. It should be noted that black and white printing support by manufacturers of digital photo printers is limited and, in some cases, non-existent, therefore some experimentation will be required in order to achieve the best results.

Durst Lambda 130, 131 & 76 Plus Calibration

To calibrate any of the above models for HARMAN GDS FB follow the manufacturer's standard calibration sequence. When using the paper for the first time, create and save a new product file for "HARMAN GDS FB B&W (MATT OR GLOSSY)" in the drop-down list of products available, this can be done by copying an existing file in the Lambda's software.

Use the "No Contrast" and "No Sharpness" settings.

As a starting point to calibrate for HARMAN GDS FB use the figures in the following tables.

MATT

	Dmax	Basic Calibration (Starting values)*	
R	143	C	0.00
G	143	M	22
B	143	Y	48
		D	127

GLOSSY

	Dmax	Basic Calibration (Starting values)*	
R	210	C	0.00
G	218	M	22
B	225	Y	35
		D	135

*Approx. values for X-Rite DTP-36 densitometer only.

Expose and process a calibration strip – Dry thoroughly. Put the resulting step wedge through the Lambda's densitometer and allow it to calculate any corrections. Apply the corrections and repeat the test until no more corrections are called for.

A visual check of progress can be made by comparing the HARMAN GDS FB black and white calibration strip with a standard colour calibration strip. There will be some differences but overall the monochrome calibration strip should be a good tone representation of the colour one.

NOTE: Some site-specific differences may be observed, depending on differences in processing conditions and measuring equipment. It may therefore be necessary to adjust the Dmax targets to those observed at your site.

Océ (Cymbolic Science) Lightjet 430, 500XL Calibration

Before attempting to calibrate any of the Océ (CSI) Lightjets, the appropriate product profile information for HARMAN GDS FB must be added into the enlargers' look up tables. Please contact our technical services department technical@harmantechnology.com for a link to download these files.

Once the product profiles have been installed, add the product name to the list of those available and associate it with the product profiles. The product profile information provides the user with a good starting point. To proceed, follow the normal calibration sequence.

IMPORTANT NOTE MATT SURFACE ONLY: Please see important note about Fusion software contained in the profile download. It is recommended to calibrate with a damp calibration strip to avoid the Dmax lower limit of 1.4 in the Fusion software.

For a Lightjet running fusion v2/v3 software the following values may provide a good starting point. Set the resolution to 12 pixels/mm R = 35, G =35, B = 0

For each Lightjet model the product profiles folder is called "HARMAN GDS FB GLOSSY/MATT". This folder should be added to the files in X:\picto\blend\material20\ where X: can be either drive C: or D:

If using System manager 4.2 to calibrate and image, then just the target file needs adding to the correct folder; C:\Picto\targets

Lightjet 5000/5900 Calibration

Whilst it is possible to expose the material in this machine, tests have shown the transport to be unreliable with fibre papers. The use of HARMAN GDS FB is therefore not recommended in these machines.

IMAGE QUALITY

Density and Contrast Control

The density and contrast of the printed image is controlled by manipulation of the original digital file, this can be done by using the software of the enlarger, but it is mostly done off-line before the image is sent to it for printing.

Black and White prints can be made directly from colour digital files although the results are often unsatisfactory unless some adjustment to the contrast and density is applied. There are many third-party software applications suitable for converting colour images to B&W.
We would recommend RGB files finally be converted to Greyscale, prior to printing. The smaller files are much quicker to RIP and write.

Latent Image Stability

HARMAN GDS FB has very stable latent image characteristics in the 0-1hr period post exposure making very accurate calibration possible. No significant change in image density is observed post exposure for a period of 24 hours prior to processing, making image quality over long runs consistent.

MACHINE PROCESSING

Machine processing of fibre base photographic papers requires more specialised equipment than for resin-coated products.
Machines such as the Hostert LL140/45 FB are available for processing fibre paper. Machines of this type have additional washing tanks and transport better suited to fibre paper.
A conventional B&W processor may be used subject to suitable transportation tests, and supplemental separate washing and drying regimes.

Setting up a processor
To set up a processor for HARMAN GDS FB use ILFORD 2000RT developer/replenisher and ILFORD 2000RT fixer/replenisher.

ILFORD 2000RT chemicals are recommended for processing HARMAN GDS FB, these are normally diluted 1+4** to make tank and replenisher solutions, but the paper is also compatible with all other conventional black and white machine processing paper chemicals.
** **NB** It may be desirable to use fix diluted to 1+9 which will aid washing performance.

Note Photographic chemicals are not hazardous when used correctly. Always follow the health and safety recommendations on the packaging. Photochemicals material safety data sheets containing full details for the safe handling, disposal and transportation of ILFORD chemicals are available from ILFORD PHOTO.
www.ilfordphoto.com

To ensure that HARMAN GDS FB will calibrate with your digital enlarger and before the calibration procedure is started, it is very important to make sure that the developer in the processor is in good condition and able to get a good maximum density from the paper. To do this, use the following simple method: -

- Take a sample of HARMAN GDS FB and expose it to white light e.g. the normal room lighting or daylight. (The length of exposure is not critical but do not over-expose, 2 to 3 seconds is sufficient).
- Process the exposed sheet.
- Measure the black achieved using a calibrated reflection densitometer, (if it is available use the visual density measurement setting).
- The measurement should be approx. 2.25 (Glossy) or 1.45 (Matt)
- If it is, proceed to calibrate the paper in your enlarger.
- If it is not, carry out one or more of the following actions and re-test the paper until the required maximum density is achieved: -
  Adjust the development time.
  Adjust the developer temperature.
  Completely change the developer for fresh solution.
- Checking the maximum density from the processor should be done regularly. If it usually results in making adjustments to the settings or making fresh developer, then check the developer replenishment rate and increase it.
- The measured minimum density of the processed paper should not exceed an absolute density of 0.04 when measured by a calibrated reflection densitometer.

Suggested development times and temperatures
The preferred temperature range is 25-30°C/77-86°F.

Temperature (°C/°F)	Development time (sec) Including transfer time to next tank
20/68	120
26/79	90-120
30/86	75-90

These suggestions are only a guide and the processing time and temperature should be checked in the processor. The times are for either non-replenished systems, with a maximum solution life of seven days or for replenished systems with a solution life of up to three months. Replenishment rates will vary between different designs of processor and the use they receive. A guide for developer replenishment rate is 300-350ml/m^2 (28ml/ft^2) of paper processed.

Suggested fixing times
The same times and temperatures as for development can be used for fixing. These recommendations are suitable for both replenished and non-replenished systems. In replenished systems, the replenishment rates will vary with different designs of processor, but a guide for fixer replenishment is 300-450ml/m^2 (28-41ml/ft^2)** of

paper processed. For non-replenished systems, the maximum paper throughput is 4m² per litre (43ft²/US quart) of working strength solution. The maximum silver concentration in the fixer bath can be 4-6g/l.

**At a fixer dilution of 1+9 the replenishment rate should be double that quoted above

Note
If fixing is not complete, then adequate washing is impossible.

Washing times
The efficiency of the wash and water consumption depends on the processor design and water temperature. No specific recommendations can be given for machine processing of Fibre paper as this will depend on the number of tanks, dwell time, temperature, flow rate etc.

Hot air drying
Use temperatures up to 70°C/158°F.

DISH/TRAY AND TROUGH PROCESSING
HARMAN GDS FB can be processed in dishes (trays) or troughs in the same way as other fibre papers, but processing must be carried out in total darkness.

Note Photographic chemicals are not hazardous when used correctly. Always follow the health and safety recommendations on the packaging. Photochemicals material safety data sheets containing full details for the safe handling, disposal and transportation of ILFORD chemicals are available from ILFORD PHOTO.
www.ilfordphoto.com

Development
See the 'Processing summary' for dish/tray development recommendations.
On correctly exposed prints with ILFORD MULTIGRADE DEVELOPER 1+9, the image will begin to appear after 35 seconds. Development can be extended up to 6 minutes without any noticeable change in contrast or fog.

To give greater control during development, and for economy, the 1+14 dilution of MULTIGRADE developer can be used. HARMAN GDS FB paper can also be processed in other high-quality dish/tray developers.

Hand Processing summary (intermittent agitation)

ILFORD Chemical	Dilution	°C/°F	Time (min:sec)
Development			
MULTIGRADE or PQ UNIVERSAL	1+9	20/68	1:30-3:00
or			
BROMOPHEN	1+3	20/68	1:30-3:00
Stop Bath			
ILFOSTOP	1+19	18-24/64-75	0:10
Fixation			
ILFORD RAPID FIXER or HYPAM	1+4	18-24/64-75	1:00
Washing			
Fresh, running water	-	Above 5/41	30:00 - 60:00

Stop bath
See the 'Processing summary' for stop bath recommendations. The use of a stop bath is strongly recommended. A stop bath stops development immediately, reduces the risk of staining and will extend the life of the fixer bath.

Fixation
See the 'Processing summary' for fixing recommendations. The use of a hardening fixer is not recommended as it reduces washing efficiency. ILFORD RAPID FIXER and ILFORD HYPAM FIXER are non-hardening fixers. There is no benefit to extending fixation beyond the recommended time; some loss of print quality might be seen when long fixing times are given due to image etching and washing efficiency will be seriously compromised.

Washing
See the 'Processing summary' for washing recommendations.

Drying
A final rinse in ILFORD ILFOTOL wetting agent, diluted 1+200 with water, will aid even and rapid drying. After washing, squeegee prints on both sides to remove surplus water. Prints can be clipped back-to-back to minimise curl and air-dried at room temperature or glazed/ferrotyped or heat-dried.

OPTIMUM PERMANENCE

DISH PROCESSING
The standard fixing and washing recommendations will give excellent print permanence for all commercial needs. When optimum permanence is needed, perhaps for archival storage of prints, the following fixing and washing sequences at 18–24°C/65–75°F (including wash water) are recommended using ILFORD WASHAID. Do not add a hardener to the fixer. Be careful not to exceed the capacity of the fixer and not to extend the fixing time as both these make washing more difficult.

Optimum permanence sequence

Fixation	ILFORD RAPID or HYPAM FIXER (1+4) intermittent agitation	1 min
First wash	Fresh, running water	1min
Washing aid	ILFORD WASHAID (1+4)	5min
Final Wash	Fresh, running water	10min
		5min

Optimum permanence sequence with selenium toner

Fixation	ILFORD RAPID or HYPAM FIXER (1+4) intermittent agitation	1 min
Toning	ILFORD HARMAN SELENIUM TONER diluted with working strength ILFORD WASHAID instead of water, intermittent agitation	*min
Rinse	ILFORD WASHAID (1+4)	10min
Final Wash	Fresh, running water	30min

* Tone the print for the appropriate time to achieve the depth of colour needed.

FINISHING

HARMAN GDS FB responds in the same way as other fibre base papers to the usual techniques of toning, chemical reduction and retouching. It can be mounted using the standard techniques for fibre base papers.

STORAGE

Unprocessed paper

Store unused HARMAN GDS FB paper in a cool, dry place in its original packaging. Avoid conditions of high temperature and/or high humidity. HARMAN GDS FB will keep in excellent condition for up to two years when stored as recommended.

Prints

HARMAN GDS FB prints, which have been processed as recommended in this technical guide, will have a more than adequate storage life for most purposes. Print life will be shortened, however, in adverse storage conditions, or if the print is exposed to oxidising gases. It is recommended that prints made for display are toned to protect them from the oxidising gases that are found in many environments. ILFORD HARMAN SELENIUM TONER is recommended as it has little effect on the image colour of HARMAN GDS FB, but other protection methods can be used including sulphide toning, silver image stabilisers and laminating.

Long term print storage

When exceptionally long-term print life is needed, prints must be processed as described in this technical guide and then stored under special storage conditions. The ISO standard on print storage (ISO IT9.20 – 1994) has two levels of storage conditions: medium term and extended term. Medium term is for prints with a life expectancy of at least ten years. Extended term is for prints with a longer life expectancy and to prolong the life of all prints. Briefly the main conditions are; freedom from chemical contamination, either airborne or from storage containers, also protection from high levels of ultra-violet radiation, particularly sunlight but also fluorescent lighting.

For medium term storage: a stable temperature up to 25°C/77°F (but preferably below 20°C/68°F) with a maximum daily cycle of +/- 2°C/4°F; and a stable humidity between approximately 20%RH and 50%RH with a maximum daily cycle of +/- 10%.
For extended term storage: a stable temperature up to 18°C/65°F (but preferably lower) with a maximum daily cycle of +/- 1°C/2°F; and a stable humidity between approximately 30%RH and 50%RH with a maximum daily cycle of +/- 5%.

A wide range of technical guides are available which describe and give guidance on using ILFORD PHOTO products. Some products in this technical guide might not be available in your country.

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