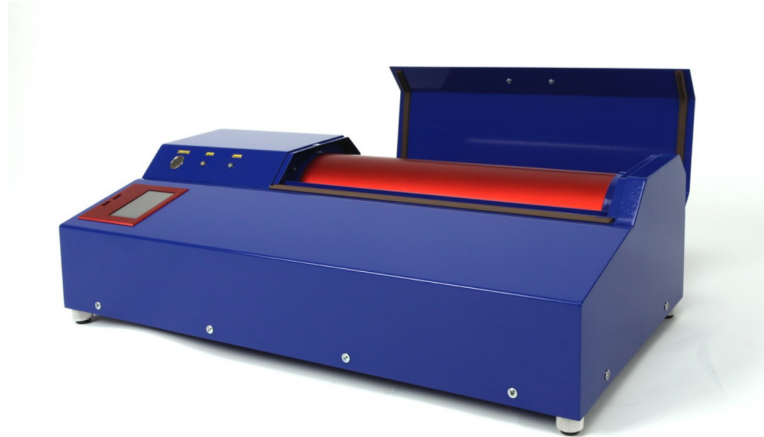


### Introduction

Filmstar-Plus is the name of the next generation of our bitmap photoplotter series. Optimized for in-house production of high end film layouts at reasonable price level the system can directly process Gerber files or bitmap files. Filmstar-PLUS does an excellent job, comes with an attractive design and a remarkably low price.



### Features:

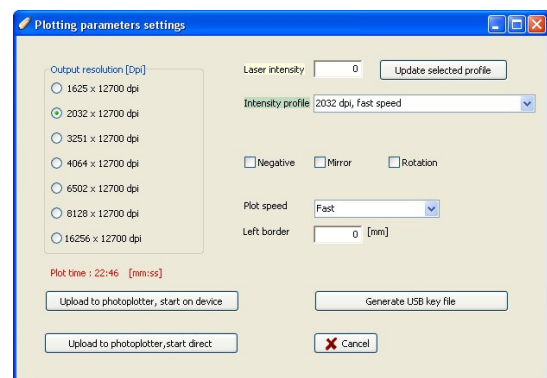
- precise edge definition in photo quality
- perfect blackness results in perfect opacity
- extended software package included in delivery

### Improvements compared to Filmstar FP 8000:

- higher resolution; up to 16 256 x 25 400 dpi
- Stand alone unit - no separate PC necessary. Data can be transferred to plotter either via USB-stick or via USB-cable
- New electronics with Touch-Display and intuitive user interface
- Software update: customized Windows optics, Windows routine for opening and saving of files, higher resolutions in Gerber2Bitmap, various calibration programs in Run\_Filmstar
- 3 different plot speeds for either high precision or less time consumption

### Description:

- The film is fixed on a rotating drum. A highly focused red light laser diode is moving step-wise alongside that drum, driven by a precise stepper motor with worm and gear drive. Of course, all settings are software adjustable, calibrated and controlled.
- Data are either transferred via USB-cable from your computer to the plotter or read in from any USB stick. Software is part of delivery. It allows panelization of layout and drill data, rework of aperture tables and contains functions like negative plot, mirroring, preview and drill data export.
- Interactive, absolute or relative positioning of the layouts on the film.
- Preview and rework of various aperture tables of different layout systems.



### Technical Data





**Maximum plot size:** 365 x 375 mm (L x B)  
**Maximum film format:** 405 x 395 mm (L x B)  
**Maximum file size:** 256 MB  
**Speed:** 7 mm of film width / min. at 2032 dpi  
**Light source:** Laser-diode 670 nm (red)  
**Data formats:** Gerber, Extended Gerber, Hi-Res BMP  
**Extent of delivery:** Photoplotter and Software on CD  
**System requirements:** Windows XP / Windows 7 / Windows 8  
**Dimensions:** 710 x 340 x 200 mm (L x W x H)  
**Weight:** Approx. 25 kg  
**Power supply** External power supply Input 100V-240V / 47–63 Hz; Output 36V- DC

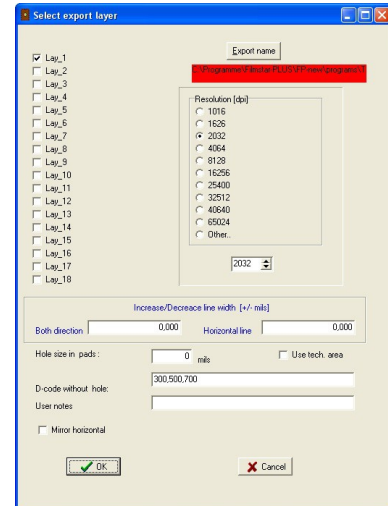
### Technical resolution:

**Resolution X:** 1625, 2032, 3251, 4064, 6502, 8128, 16256

**Resolution Y:** 25 400dpi

### Graphical resolution:

1) Finest point/ Finest line = 5 $\mu\text{m}$ (0.005 mm/0.19685 mil).	
2) Finest space between 2 lines = 10 $\mu\text{m}$ (0.01 mm/0.3937 mil)	
3) Finest space between 2 areas = 18 $\mu\text{m}$ (0.018 mm/0.70866 mil)	
4) Finest inverse spot diameter (transparent point in black area) = 25 $\mu\text{m}$ (0.025 mm/0.98425 mil)	



### Safety Regulations:

Carefully read this instructions and especially the safety regulations before using the unit. Also pay heed to the safety data sheets of the photographic chemicals. Keep these instructions in a safe place in case you need to refer to them in the future.

The photoplotter Filmstar Plus is designed for use in the laboratory and may be operated only by trained professionals.

Apply the general safety regulations for the operation of electrical equipment.

Before any maintenance work disconnect plotter from mains voltage.

# Photoplotter FilmStar-PLUS

## Instructions to Use

Inside the Plotters are no user-serviceable parts. The case may be opened only by experts.

Connect only to the specified voltage and current.

During plotting, the film is exposed by a laser beam. This can damage the human eye. Do not look into the laser beam during operation!

Temperature and humidity affect the accuracy of the plotter. Avoid variations in temperature and humidity. Environment should be clean and dust-free and by no means corrosive!

The photo films are very light-sensitive. Protect them till the end of the fixing process from light!

Store film and chemicals in a cool, dark and dry place.

Before you use the film, let it acclimatize 24 hours at min. to the processing temperature.

When handling chemicals wear personal protective equipment (gowns, gloves, goggles).

The drum surface should be kept clean and dry. To remove any remnants of the tape, use a soft cloth moistened with a liquid detergent. Do not use a spray.

The fixer contains silver and must be recycled! Safety data sheets for the developer and fixer concentrates are available. These are actually no dangerous goods according to transport regulations.

### Amount of Delivery:

**1 Plotter**

**1 Software CD**

**3 Testfilms** (1 x lightbar for light calibration, 1 x test grid film for dimensional calibration, 1 x test film with plot samples)

**1 power supply**

### Accessories

Dark Room for Filmstar-PLUS,		Fixing Pins	
Dark Room lamp assembly green 60 cm complete		Developer and Fixer	
Film-Punch		Triple Tank for Filmstar	

### Setup – Short Instructions

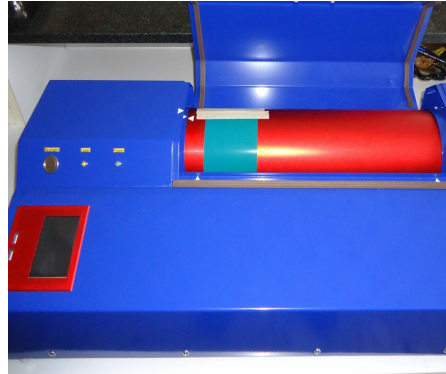
Remove Filmstar-PLUS from the packaging and inspect for transport damages.

Set up Dark Room (no light may penetrate from the outside!).

Install and connect the special safelight.

Place plotter in the darkroom and connect to power supply.

Establish a USB connection from the plotter inside of the Dark Room to the PC outside of the Dark Room, if plotter shall run directly from PC.



Perform a first test plot:

- In the Dark Room cut one film in strips of 7 cm
- Fix a strip to the drum, so that the arrow of the drum and the arrow of the housing face each other (picture above)
- Close the lid and turn on main power
- At the touch panel press "Lightbar"
- Click on "1625"
- And subsequently, 125/12
- Press START
- The Filmstar-PLUS now plots 8 test patterns with 1625dpi and with intensities of 125, 137, 149, 161, 173, 185, 197 and 209.

While the Filmstar-PLUS plots, you can setup the photochemicals in the cuvette:

1. mix developer (2 parts water, one part developer)
2. mix fixer (2 parts water, one part fixer)
3. the middle chamber fill with water

After plotting has finished, switch off the plotter, remove the film in Dark Room condition and develop a minute and fix a minute. Then rinse the film thoroughly and dry. The result of your first test plot should look like in the picture below (Test plot light bar).

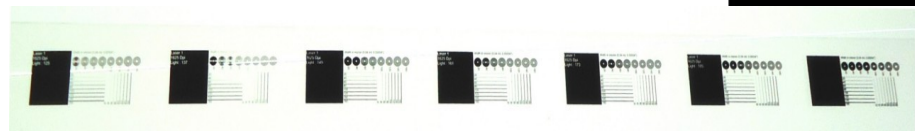
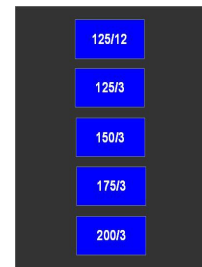
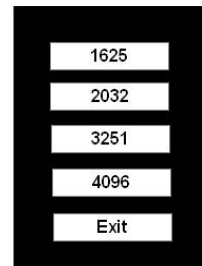
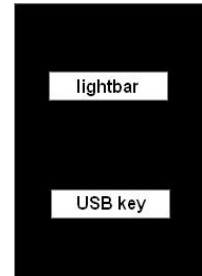
Now the plotter is set up and ready to use.

Next, install the software and read in the machine parameters (Setup - Import table setup). A detailed description of the installation, see the Software chapter.

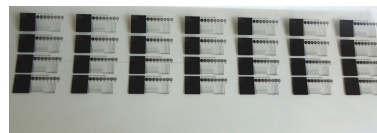
After software is installed, make two test plots:

1. A **Multi-resolution-lightbar**, to check the light settings
2. A **Test Grid** to verify the correct dimensions

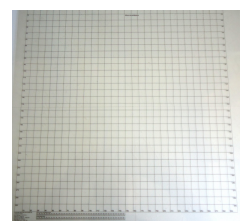
The preparation of the test plots is described in Chapter *Run-Filmstar*.



Lightbar



Multi-resolution-lightbar



Test Grid

### Instructions – Long Form

Please address any inquiries related to the photoplotter hard- or software to your local dealer first. The Photoplotter software is subject to copyright. All information enclosed here is subject to change.

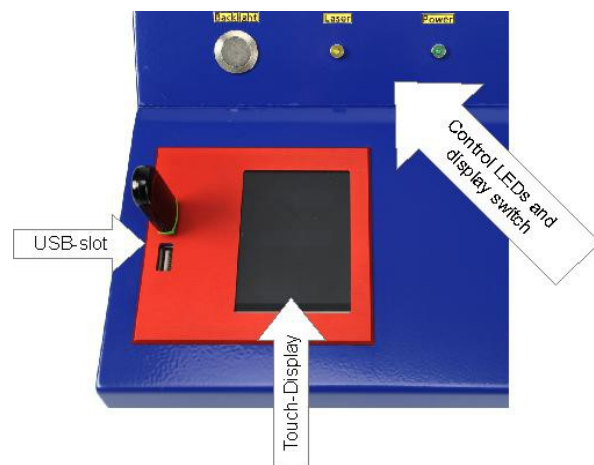
FilmStar-PLUS uses films sensitive to red light, as standard in photoplotting industry. These films come in sheets or on rolls and usually have 0.1 or 0.18 mm thickness. Suppliers are e. g. Agfa, Kodak, Fuji. We supply 0.1 mm thick sheets cut to size ready for use on FilmStar-PLUS. As usual these films require a Dark Room where they go through a standard development and fixation procedure. The Dark Room needs a special green safe-light illumination.

### Setup and Commissioning of the Photoplotter

#### Dark Room

All feeding or removing of film from the photoplotter, as well as the subsequent development and fixation, require Dark Room conditions and a special green safe light. Install the unit in an appropriate room together with trays or tanks one each for development, fixation and rinse. In this room you will further need a main supply for the plotter and the safe light. If you want to run the plotter directly from the PC, then you need to establish a USB connection from the plotter inside of the Dark Room to the PC outside of the Dark Room.

We recommend vertical mounted tanks with cover for the chemical processing. These need little installation footprint and the liquids have a small surface compared to their volume, which increases their life time. Further, vertical film handling has the big advantage that no air bubbles can stay underneath the film and spoil development.



#### Installation

On the front of the plotter is the touch screen with the two USB ports, two LEDs and a switch for the touch-display-backlight. On the left side of the case there is the main switch. On the back of the plotter there is the plug for the power supply and the connection for the USB cable. The power supply also has a pilot light. Of the two USB ports only one can be used. The other is intended as a hidden reserve.

Place the photoplotter in the Dark Room and connect the power supply unit. Do not turn on the plotter yet. If you want to run the plotter directly from the PC, connect the supplied USB cable.

# Photoplotter FilmStar-PLUS

## Instructions to Use

### Test run

You will need some adhesive tape to mount the film on the drum. We suggest you use 20mm white paper tape (painter's utilities), as this white tape can be best seen in the Dark Room light and it can easily be cut off the roll by hand.

Enter the Dark Room, turn on the green safe light and make sure there is no extra light from outside dropping in. Open Filmstar's lid. You will see the drum. Turn it by hand until the white arrow on the drum faces the white arrow on the left of the drum housing. Take a sheet of film from its box and tape the upper end to the drum in a way that the tape sits about 5 mm on top over the arrow.

Since we only need a small strip for the first test plot, you can cut the film with a scissor or similar to strips of approx. 7 cm.

The emulsion side of the film must be facing the drum. Films coming on rolls are already wound accordingly. Under the green light, the emulsion side of the film normally looks gray, the top side is darker.

It is also possible to place the emulsion side (gray) to the other side (the laser diode). But be careful, in this case the correction factor for drum circumference changes, because the picture will now appear on the outer diameter of the film and not on the inner diameter of the film (= the diameter of the drum). If you want to plot with emulsion side outside, then you need to correct the drum diameter in Run-Filmstar software according to the film thickness.

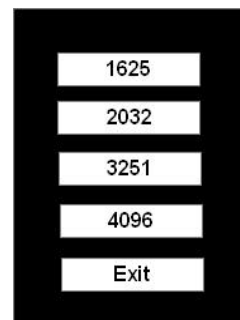
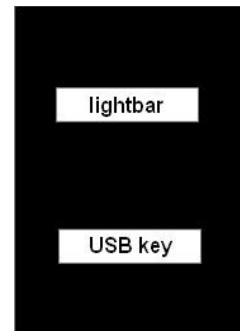
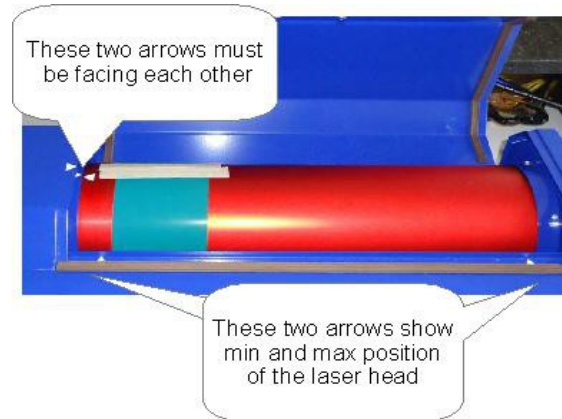
There is another white arrow on the lower part of the drum housing that you should use for lateral positioning of the film. After you fixed the upper edge of the sheet, turn the drum by hand and sweep over the sheet so it goes tightly on the drum. It is important that the sheet edges are parallel to the drum axis and that the upper and the lower sheet corners are facing each other, i. e. the film is not twisted, else the image will be distorted or the line edges will not be sharp. (Mounting films correctly will need some practice.)

In that state use adhesive tape to fix also the lower end of the film to the drum. Finally, it is very important that you turn the drum further to the starting position with the two white arrows in one line.

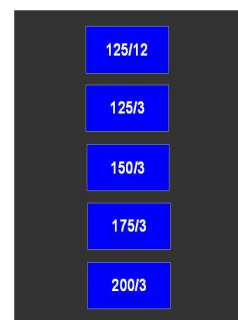
Close the lid and re-pack all film material into a safe box (!!). You can now turn on the plotter. The Laser LED will light up several times very shortly and you will hear some beeping noise. After that the LED light will be barely visible. When the exposure process has been started the LEDs will light up permanently.

### Annotations:

Films from different film supplier can have a different light sensitivities. In Addition the developing chemicals may differ. For that reason it is possible and necessary to adjust the intensity of the laser light depending on your personal working conditions as and in accordance to the desired resolution. To do so you can plot a so called **lightbar** either directly from the machine's touch



Resolution



Light intensity

# Photoplotter FilmStar-PLUS

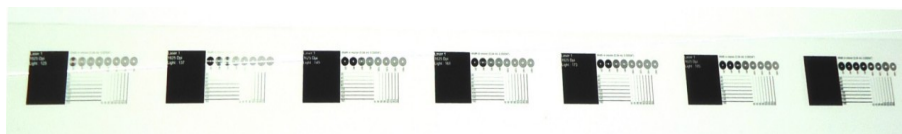
## Instructions to Use

panel or you produce a single **lightbar** or a **multi-resolution-lightbar** with the software "Run-Filmstar.exe". For a first test we will plot a lightbar directly from the machine with a resolution of 1625 dpi, a start laser intensity of 125 and steps of 12.

When you turn on the plotter, the welcome message *Bungard Filmstar-PLUS* appears. In the next dialog you can choose between *lightbar* and *USB key*. Choose *lightbar* and in the upcoming screen *1625*, after that *125/12* and at last press *START*.

Filmstar-PLUS will now plot 8 test samples with a resolution of 1625 dpi and with light intensities of 125, 137, 149, 161, 173, 185, 197 and 209. After plot process has finished, go back into the Dark Room, take the film from the plotter and develop as described in the chapter below.

After the developing and fixing process your test plot should look similar like the picture below:



Lightbar



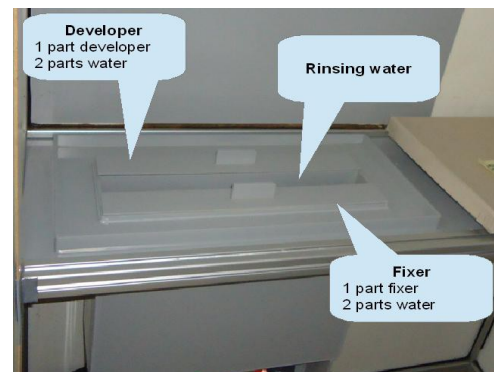
The drum rotates at first slowly and with considerable noise (normal resonances of the stepper motor). After the drum reaches its operating speed, it rotates with a constant rotational speed and the plotting begins. During the exposure process the "laser" labeled LED lights or flashes. Pressing STOP on the display, you can interrupt the process at any time (press several seconds). If the plotting is completed or interrupted, the drum stops to rotate and the laser head will return to its starting position.

Before you start a new plot, please wait, until the laser head has fully achieved its zero position on the left side of the drum.

### Film Developing and Fixing

In this chapter we assume that you are using the film and chemicals that we supplied and that you are treating the film in the Dark Room also made by us. If you are using other consumables or equipment you will have to adapt to your working conditions the instructions given here below.

The setup concentration of the developer and fixer concentrate are written on the jerrycans: Dilute one part of concentrate in 2 parts of water. As a precaution, if your tap water is very hard please use deionized water. The three vertical tanks in our Dark Room take 9 liters each, so you will need each 3 litres of concentrate and 6 litres of water at room temperature.



The fixer goes in the first tank from the front, the middle tank takes the rinse water and the last tank is to be filled with developer. Be careful when filling in the liquids. The developer will be destroyed if fixer drops in. Please keep all tanks closed by the lids. The water in the middle tank will need to be replaced frequently. Components of the film emulsion will leave pasty residues in this tank. To empty the tanks,

take the flexible hose from the holder, close the opening by your thumb, put the end over the container where you want to drain the liquid in and release the thumb. Wash all tanks with water and make sure there are no residues sitting on the walls. If necessary rub the walls with paper towel. From 2013 on the cuvettes will be delivered with cock valves instead of hoses.

The procedure to develop a film exposed on Filmstar-PLUS takes not more than a minute. If you do not like to touch the liquid by hand (wear thin Latex gloves) you should use a film clamp.

Especially big sheets of film tend to stick to the tank wall. To avoid this, try to handle the sheet so that it goes in the tank in an S-shape. This little disadvantage in handling is minor compared to the advantage that there will be no air bubbles at all under the film surface, as known from horizontal development trays. Moreover, the tank offers only a small liquid surface to the air, so that the destructive oxidization of the developer will be delayed. In addition the annoying process of decanting the liquids from and back into the storage containers can be omitted.

After exposure a short rinse is sufficient. In the fixer the film will mostly be clear after 30 seconds. It is good practice and gives better long term stability, though, to keep it in the fixer for double time. Rinsing after fixing is highly important. Finally, to dry the film, put it to the Dark Room wall and wipe the first side with a smooth fuzzle-free paper tissue. Remove the film, dry the wall, reverse the film and wipe the second side. Repeat the procedure with a fresh tissue. You may also profit from a hot air dryer. A well dried film looks fully transparent. Rests of opaque, bluish color indicate insufficient drying. The ambient humidity and the drying grade of the film will highly affect the film precision!

As mentioned, the developer will oxidize when in contact with air. It will take a brown color and cannot blacken the film sufficiently any more.

**Test:** Expose a piece of film for 2 seconds to normal daylight. After max. 1 minute of development at ambient temperature the film must be entirely black opaque. If this is not the case the developer must be exchanged. If you use the tank lid and take care not to pollute the developer it will have a life time of approx. 6 months. For frequent use the developer may be replenished with concentrate that you add in portions. The life time of the fixer mostly depends on the throughput. The time needed to clear the film will be longer with increasing use.

**Attention:** The fixer contains silver and must be recycled! Safety data sheets for the developer and fixer concentrates are available. These are actually no dangerous goods for road transportation.

### Software

#### Overview:

The CD contains the file *SetupFilmstar.exe*. Please double click on this file and run the software installation. The Filmstar-PLUS software will be installed in the directory C:\program files\Filmstar. In the Filmstar folder you will find plotter software *Run-Filmstar.exe* and these additional folders:

**Convert Bitmap to FPF:** BMP2Fpf.exe and BMP\_Gray2Fpf.exe. With these programs you can convert high resolution Bitmaps into the plotter format FPF. For BMP2Fpf.exe you need monochrome files, BMP\_Gray2Fpf.exe also processes gray-scale pictures.

**Convert Gerber to FPF:** Contains the program Gerber2Bitmap.exe. With the help of this program you can convert your vector based Gerber data into raster based Bitmap-files.

**Drivers:** contains the drivers for the plotter when running the plotter directly from the PC. Please install the file CDMxxxxx\_Setup.exe (current version:CDM20824\_Setup.exe) in this case. If you are going to transfer the data via USB-stick, you do not need to install any driver.

**Inspect FPF:** Contains the program „View\_FPF.exe“. This program inspects your created FPF-files.

**Machine parameters - import to Run\_photo\_USB2.exe:** This folder contains the PHS-file with the machine configuration. Please import this file into the program „Run\_photo\_USB2.exe“.

**Manual:** Contains this manual.

**Samples:** Contains sample data for your first steps.



### Gerber2Bitmap

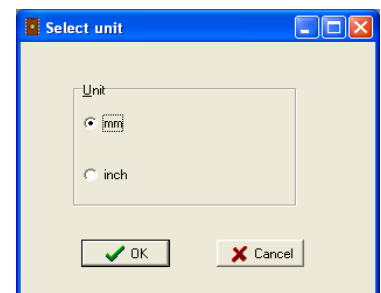
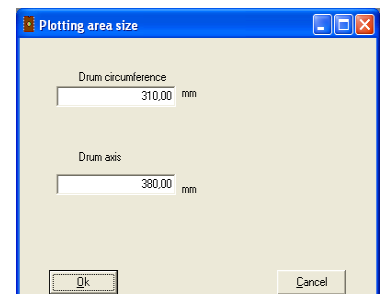
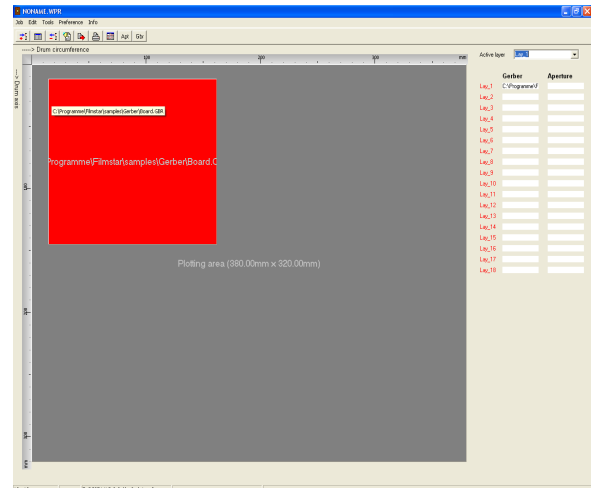
Gerber2Bitmap handles Gerber data. You may load files, place the artwork image on the plot area, and view them. You may also convert the aperture tables of non-extended Gerber data. Further, this software can panelize boards and generate drill data from the panels. Finally, Gerber2Bitmap creates raster data that are ready for use with the following program that drives the photoplotter. These raster data are actually a bitmap that comes in a special FPF format. There is an additional output possibility for 250 dpi Windows BMP files, so that you can inspect the conversion results by double clicking the BMP file in Windows Explorer.

Here we describe only the features that are required to create the plot data. For more CAD / CAM functions such as panelization, drilling data export and fiducials we recommend the software IsoCam. Upon request, we will provide a more detailed guide to the program Gerber2Bitmap and Run-Filmstar.exe.

The program screen is divided in the menu bar, the icon bar, the (dark gray) plot area and, at the right of the screen, a vertical list of layers and aperture files. The icons have bubble help coming up if you place the mouse cursor over them.

The plotting area shows the maximum film size that the plotter can handle. Please set the value to what applies to your unit. This is done in the menu *Preference / Plotting area*. In *Preference / Units* you may set your preferred measuring unit (metric, inch). A last, but important setting that must be done only once, is under *Preference / memory size*. Set this value according to the table below.

Computer RAM	Set used memory
less than 0,5 GB	128 MB
0,5 - 1 GB	384 MB
1 - 1,5 GB	512 MB
more than 1,5 GB	768 MB
768 MB is max. allowed value for "used memory".	

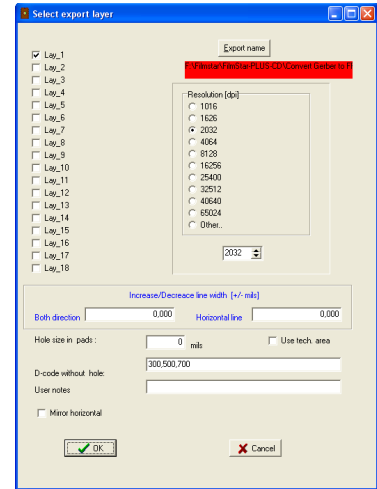
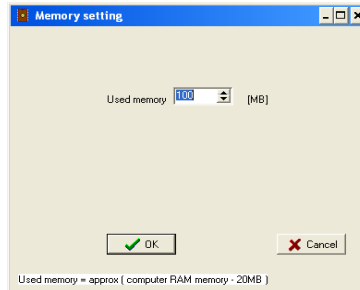


Here is a typical work flow with Gerber2Bitmap:

1. *Job / Import Master Gerber* opens a file selector that allows to import Gerber files, either standard or extended. In a first approach we assume you have selected a file in Extended Gerber format, since the Standard Gerber Format is not state of art anymore. A rectangle comes up in the upper right corner that corresponds to the artwork in size and orientation. You drag this rectangle versus the plot origin in the upper left corner.

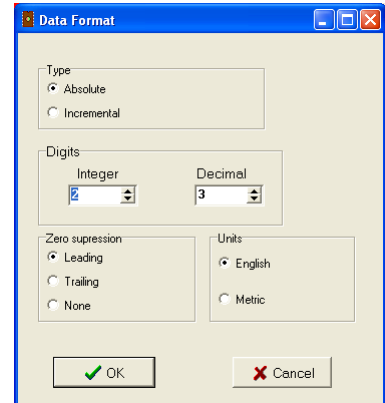
Repeating this step you may arrange several layouts on the plot surface. If you right click the red rectangle a pop up menu comes up that allows to position, lock, unlock and delete the particular image. If you have several images on the screen the one in red color is the active one.

Some programming reasons require that the assignment of the X and Y axes on the screen look different than on the photoplotter: The plot image is both mirrored and twisted by 90 degrees. That causes that the direction of the drum circumference shows from the left to the right, and the laser head movement is on an axis showing vertically on the screen (you can imagine looking from inside of the drum against the film). For maximum execution speed you should try to arrange all artwork horizontally on the screen (in the direction of drum rotation).



2. *Job / Preview* opens a preview window to show you the total of all layouts that you loaded.

3. *Job / Export Fotoplotter File (FPF)* creates the raster data in an internal format called FPF. These data are written into a file of your choice that can later be used by the Run-Filmstar software. In this menu you select also the resolution (dpi) in which data will be converted. If you choose high values, the film will be structured more fine and the file size increases, however, enormous. Since today's computers do well with large file sizes, we recommend to choose a rather high resolution and reduce the resolution in the plotting process.



### Annotation: Standard-Gerber:

If you have no Extended Gerber files you need to specify the measuring unit and the zero suppression for each Gerber file. This is done in *Preference / Data Format*. Second, and again for all Gerber files, you need to load an appropriate aperture file. This is done from the *Job / Import Apertures* menu. A dialogue window will show up that allows to select the type of aperture file to load, and allows to select to use an aperture converter. The aperture files from CAM350, GC-CAM or IsoCam are supported directly. (You may also use the external ViewMate software to convert aperture files to the Lavenir format .ENV.)

The aperture converter built into Gerber2Bitmap will take all necessary information automatically. You just press "Guess format" and "Start". To quit the converter, press *Cancel*.

D-code	Shape	X	Y	Rotation/Int.Dia.	Custom Name
10	Round	0,00	0,00	0,00	C.0.0000
11	Square	50,00	50,00	0,00	R.0.0500<0.0500
12	Round	8,00	0,00	0,00	C.0.0080
13	Round	16,00	0,00	0,00	C.0.0160
14	Round	40,00	0,00	0,00	C.0.0400
15	Round	100,00	0,00	0,00	C.0.1000
16	None	0,00	0,00	0,00	
17	None	0,00	0,00	0,00	
18	None	0,00	0,00	0,00	
19	None	0,00	0,00	0,00	
20	None	0,00	0,00	0,00	
21	None	0,00	0,00	0,00	
22	None	0,00	0,00	0,00	
23	None	0,00	0,00	0,00	

The name of the aperture file will show in the column right to the one with the name of the Gerber file. Each Gerber file needs its own aperture table. If a Gerber image was removed from the plot area, the associate aperture table will be removed as well. Using standard Gerber files with no or wrong aperture tables gives faulty results.

You may view and edit the aperture file assigned to the actual layer: Select *Preference / Aperture table*. This menu also allows to create a new table. Each entry needs to have the right shape and size information typed in. After you clicked on *Save* and named the file this will be written to disk as a Lavenir aperture file with the \*.ENV extension.

By the way, the above mentioned column of several layers will only be necessary if you have one Gerber master file and want to create a set of films in the same spacing and arrangement, like a four color film set for publishing / printing. The *Tool/Panelize* function will then handle all associated Gerber files according to the Master file on layer 1 and the *Tools / Panelize* drill function will further allow to duplicate the drill data accordingly.

### Viewmate

On Request we will supply the Gerber-Viewer *Viewmate*.

### Bitmap2Fpf

Bitmap2Fpf is a simple converter, that converts high-resolution monochrome bitmaps into the FPF plotter format. The bitmap format is universal, but has the disadvantage that the files can be very large with a corresponding resolution. For this reason we supply the converter Bitmap2Fpf.

If your design program is not capable to produce Gerber files, you can save your layout with the highest possible resolution as a monochrome Windows bitmap. If monochrome is not possible, you can eliminate the color information with e.g. Windows Paint. Note the original image size and the selected resolution!

You need to enter the proper resolution value of input BMP file in BMP2FPF program. In case you set wrong resolution value, you get wrong film result (smaller or larger image).

Example: you want to convert the file TestBitmap25400.bmp into the FPF-format.

Load the file into the converter, define the name of the output file and click *Convert*.

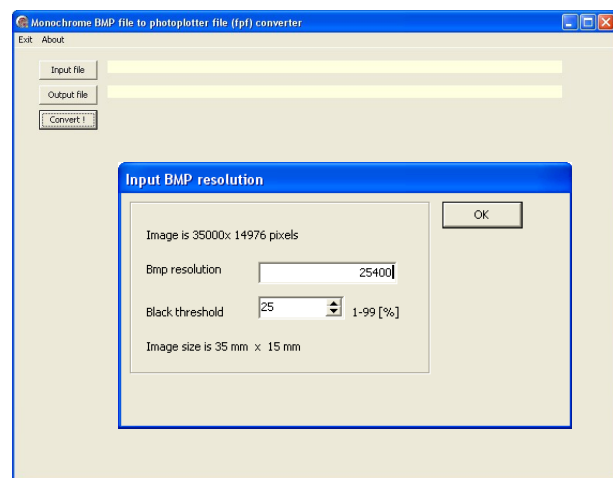
In the upcoming dialog, the input resolution is displayed in pixels.

In the field *BMP resolution* you can enter the desired resolution and the program calculates the resulting picture size of the FPF file:

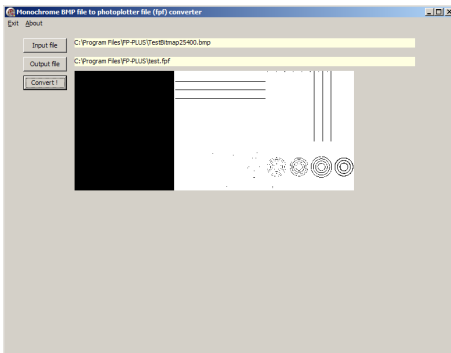
$35.000 \text{ Pixel} / 35 \text{ mm} \times 25,4 \text{ mm} / \text{Zoll} = 25.400 \text{ Pixel} / \text{Zoll} = 25.400 \text{ DPI}$

$14976 \text{ Pixel} / 15 \text{ mm} \times 25,4 \text{ mm} / \text{Zoll} = 25.400 \text{ Pixel} / \text{Zoll} = 25.400 \text{ DPI}$

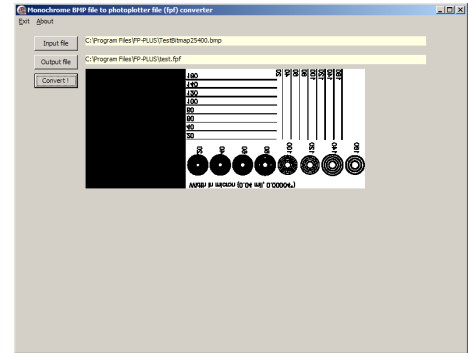
When the FPF-file is generated a preview image is created automatically, too.



This preview image is stored into the FPF file and displayed as preview when the FPF file is loaded into the program Run\_Photo\_USB2. This preview image has a low resolution (200 x 200 pixels), so many pixels need to be merged. In the field threshold you can set at what percentage of black dots the merged dot will be black or transparent. On the left the preview picture is rather light, because 75% of the pixels have to be black before the merged pixel will become black. On the right the preview picture is rather black, because only 10% of the pixels have to be black before the merged pixel will become black. Note: The threshold has only effect on the preview picture, not on the real plot picture.



Threshold 75 %



Threshold 10 %

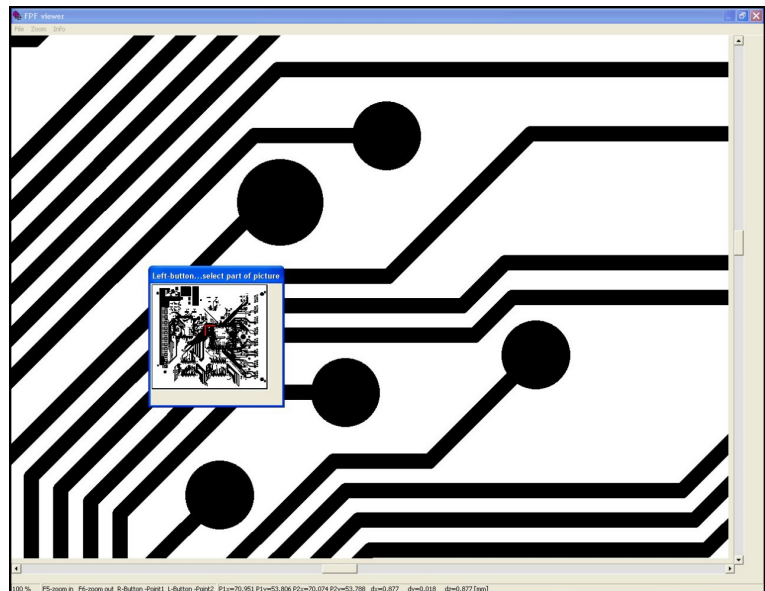
### View\_FPF

View\_FPF is a simple image viewer for the plotter format FPF. You can load files, zoom into the image with *F5* (in steps 10, 11, 14, 16, 20, 25, 33, 50, 100%) and zoom out by pressing *F6*. You can adjust the viewing section with the *scroll bars* on the right and below, or click in an area in the small *preview window*.

View\_FPF also contains a measuring function e.g to compare the bit-map dimensions with the original Gerber data.

First select an appropriate magnification, then move the cursor on the first measuring point and click with the left mouse button. The point is displayed as P1 in the bar at the bottom of the program (P1x = 114.983 P1Y = 67.504). Proceed

with the mouse to the 2nd measuring point and click the right mouse button. This point is displayed as P2 in the bar at the bottom (P2x = 120.547 P2y = 67.443). Now you can read the distance in the X direction (dx = 5.564), the distance in the Y direction (dy = 0.060) and the diagonal (dz =  $\sqrt{(dx^2 + dy^2)}$  = 5.564). All values in mm.



### Run-Filmstar

Run-Filmstar reads in in the FPF file generated in Gerber2Bitmap and controls the plotter. To get precise plot results the individual machine parameters have to be loaded once.

In addition, you can decide on the output resolution of your plot and whether the image shall be positive or negative, mirrored and/or turned. If you want to run the Filmstar-PLUS directly from the PC, you need to install drivers. To do this, go to folder Filmstar - Drivers and run the file CDMxxxxx\_Setup.exe (current version: CDM20824\_Setup.exe).

In Run-Filmstar the operating sequence begins with loading the file (*File / Open*). A preview pictures of your selected file is shown as well as the input resolution and, if there, user comments made in Gerber2Bitmap.

If you confirm with OK, you will return to the main screen. Here the plot image will be displayed (dimensions will vary with the size of the software window).

To continue click on the triangular *START*-button or press *F5*.

In the next dialog please set the desired output resolution, check the corresponding laser light intensity and chose whether you want to mirror or turn the image or make a negative plot.

The choice of plotting speed (*Slow, Medium or Fast*) influences the drum speed and hence the plotting speed. Depending on the natural resonance of the device, a certain speed can lead to higher vibrations. Default setting is *Fast*.

The execution time is shown at the bottom left. It depends on the output resolution. With a slow computer the calculated time may not match the real execution time.

There are 3 options to forward the data to the plotter:

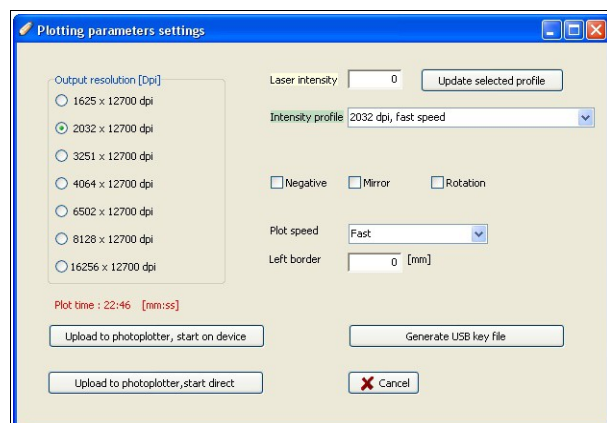
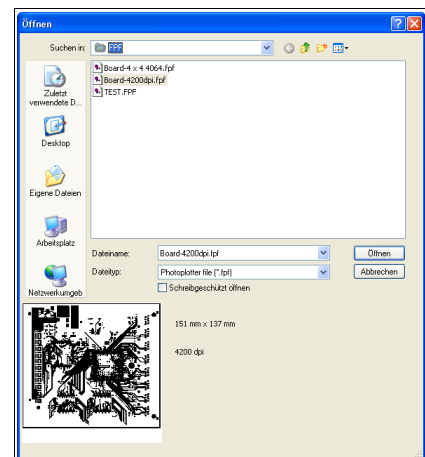
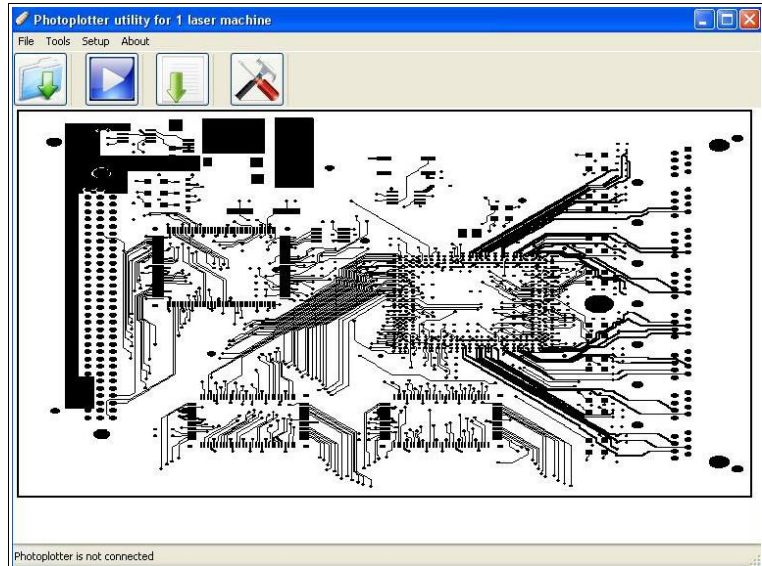
*Upload to photoplotter, start on device:*

data is transferred via USB-cable, but plotter is started with the touch panel of the plotter.

*Upload to photoplotter, start direct:*

You transfer the data via USB-cable, the plotter will start automatically.

*Generate USB key file:*



# Photoplotter FilmStar-PLUS

## Instructions to Use

Here you do not need any connection to the plotter.

The software will create a plot-file (.fp2), which you can transfer to the plotter with a USB-stick.

Attention: the USB-Stick needs to be formatted in FAT16/FAT32 (NTFS is not supported!).

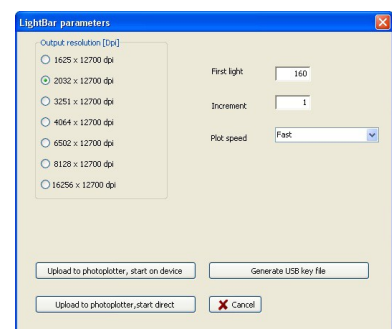
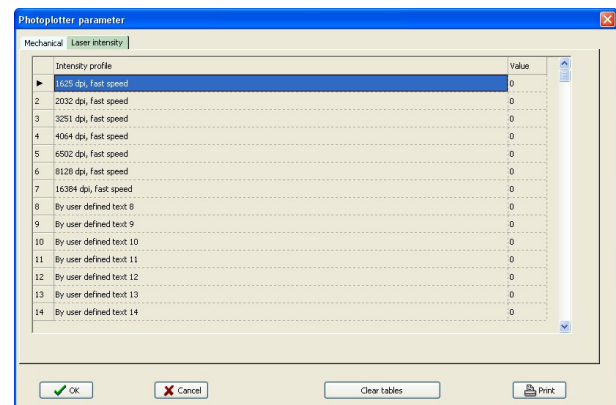
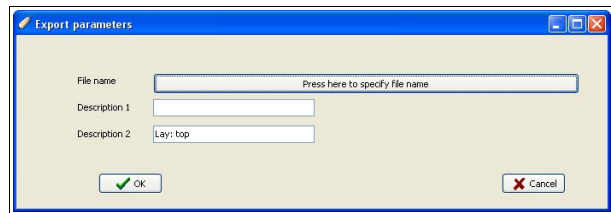
If you want to transfer the data via USB-stick, insert the stick containing the plot file into the USB-slot, switch on the plotter and select "USB key". If you have multiple plot files on the stick, you can jump between the files back and forth with the arrow keys. Select a file by pressing *Enter*. With *X* you go back to the welcome screen. The next steps in the display are self-explaining. Pressing *X*, *Return* or *Stop* you will always return to the welcome screen. The stop button while plotting has a delayed reaction, so the plotting is not stopped by accidental contact. If you want to cancel the plotting, press the *Stop* button for a few seconds.

After the start, it can take several seconds before the plotter drum reaches its rated speed. Then the plot starts. The screen displays a progress bar. To prevent accidental exposure of the film, the display shuts off after a few seconds. To light the display again press the silver button.

### Configuration:

When you install the software for the first time, the configuration will contain default values. To get proper layouts it is absolutely necessary to run the plotter with the machine specific parameters. To do so you can either go to *Setup – Setup Table* and type in the values from the printed data sheet, or, even better, go to *Setup – Import Setup Table* and import the file from the CD. This configuration file is named xxx-yy.phs (with xxx as serial number and yy as year, e.g. 707-13.phs).

**Test light intensity:** The light intensity settings are of course proposal values only. They will vary with the type of film and developer that you use, so you have to adapt them to your specific conditions by test. The settings are stored at menu *Setup – Setup Table* and there on register *Laser intensity*. To find out the correct laser intensity the software comes with two integrated calibration functions.



If you need the laser intensity for only one resolution, choose *Tools – Plot Lightbar*. In the upcoming menu you need to select the desired resolution, the start intensity of the test row (*First Light*) and the laser gradations between the samples (*Increment*). Leave *Plot speed* for this moment on *Fast* and select the way of transferring the data to your plotter, as described above.

If you want to test more than one resolution at the same time, go to „*Tools – Multi Resolution Lightbar*“. There you can configure a test row as before, but you have the opportunity to select 4 different resolutions with different start light. A sample of a test row is coming with the plotter and will give you a hint at what point to start your own testings.

**Test dimension precision:** If there are very special requirements on the plotter precision - and suitable measuring devices assumed - the plotter can be calibrated both in the drum and spindle direction. For this purpose the *Tool / Generate Test Grid* menu creates a grid with lines each 10 mm. You may measure the actual line spacing and enter the results into the columns *Error on drum diameter* and *Drum linearity*. As you will rarely need these micrometer range corrections we are not going more into details at this point. If you need further assistance please call our support.

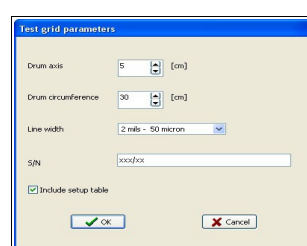
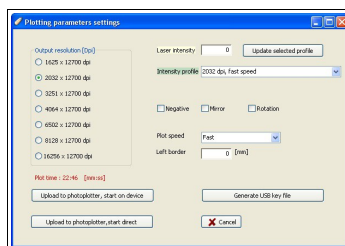
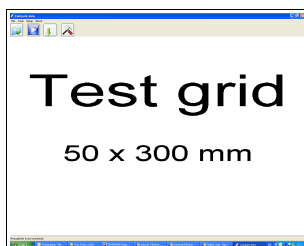
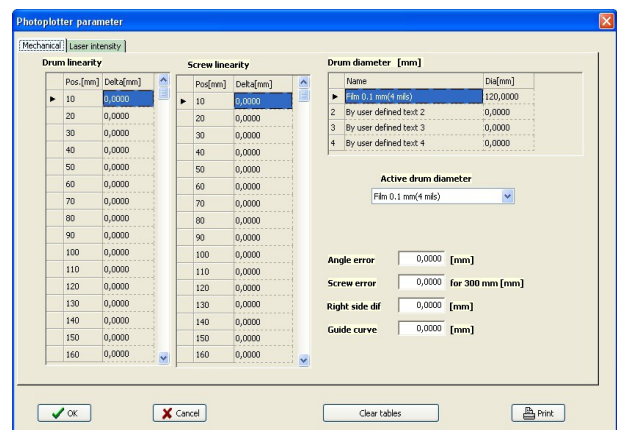
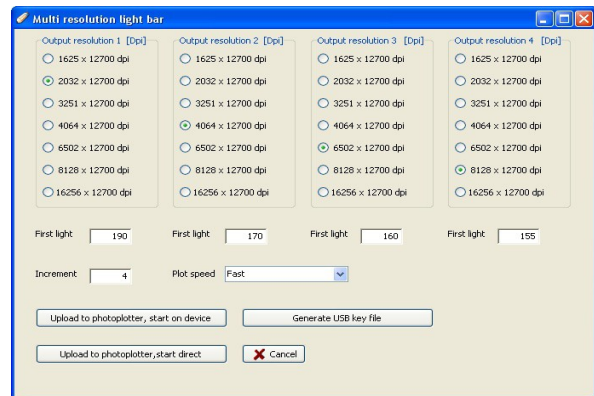
We prefer the test grid, which is generated with *Tools - Generate Test Grid* to external produced test patterns, because this way all sources of errors from previous preparation steps are eliminated (error in design, error in transformation etc.). Insert the desired length and width at *Drum axis* and *Drum circumference*. *Line width*, should be set to 2 mil..

If you click „*OK*“ the picture will be generated internally.

To continue click on the triangular *START*-button or press *F5*.

In the next dialog please set the desired resolution, control the corresponding laser light intensity and chose whether you want to mirror or turn the image or make a negative plot of the image.

After that you have again the choice between the 3 ways of transferring the data to the plotter : *Upload to photoplotter - start on device*, *Upload to photoplotter - start direct*: and *Generate USB key file*.



### *Guarantee*

All machines are submitted before distribution to examination on function and continuous operation firmness. On the machine we grant a work warranty of 12 months to our customers starting from purchase date on accuracy in material and processing. We warrant at our choice by exchange of incorrect parts or by repair of the machine in our house. Old parts change into our possession.

### *Disclaimer of warranty*

All parts subjected to wear are excluded from this warranty. Any direct or indirect damage resulting from over-heat or chemical reaction shall void all warranty claims. This also applies to defects to the machine caused by non-observance of this manual or of parts of it. Unauthorized repairs or interventions to the machine will result in the loss of all warranty claims.

We cannot accept subsequent claims from damage or destruction of workpieces worked on in the machine, because we have no knowledge or control over the operating conditions at your site. This is valid in a general manner also for requirements from damage to articles, buildings and persons as well as the environment.

We do not warrant that the function of the machine will meet the customer's requirements or that the operation of the machine will to this regard be error free.

In no event will we be liable to the customer for any incidental, consequential, or indirect damages of any kind, including loss of profit and prosecution for environmental pollution, even if we could have been aware of the possibility of such damages.

All information was arranged with great care. We reserve ourselves however mistake and technical changes without previous announcement.

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