Carter

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MODEL CPS800
LASER PATTERN GENERATING SYSTEM

Commonly Asked Questions

You call the Model CPS a Laser Computer Pattern Projection System. What exactly is that?

A Laser Computer Pattern Projection System uses a laser (similar to those that have been used for years in Guide Line Lights for aligning material on ripsaws and such) to produce a pencil thin beam of light which is then directed onto two small movable mirrors set at right angles to each other. These mirrors are attached to galvanometers driven by electronics under precise computer control. By sweeping the mirrors through angular movements which are exactly timed with one another, it is possible to move the laser dot along the contours of a pattern dictated by the program in the computer. If the dot is moved quickly enough, the pattern appears to exist over its entirety even though the dot is continuously moving.

What would I use such a system for?

Think of the *Model CPS Computer Pattern Projection System* as a plotter, capable of "drawing" images directly onto any flat surface. No longer is it necessary to plot drawings to paper and then manually translate those dimensions onto the work surface through laborious measuring and marking. The system simply "floats" the image onto the surface instantly -- in precisely the exact location and orientation you specify. And the image always remains on top of whatever material you place on that surface so it's always visible. You can use the patterns to position holding fixtures on top of router beds (or point-to-point boring machines) or to position the part blanks on top of those fixtures for final production. You can outline multiple parts on large blanks *before* the cutting begins to facilitate placement of part numbers or bar code stickers for easy part identification and sorting after production. You can also use the system to align individual elements being brought together in assemblies, or to exactly match features in materials being stacked for multi-layer cutting. The possibilities are limited only by your imagination.

What exactly is included with the system? Do I need to provide my own computer to control it?

The system can be supplied with a control computer as an option, but it is also possible to utilize one of your existing computers for the job. The included graphical control software runs on the Windows operating system, but the basic projection and control functions can be accessed by any computer or controller capable of sending text strings over a standard COM port. The projector's main unit, which is mounted overhead the projection surface, is a sealed metal case containing the laser, power supplies, mirrors, galvanometers, and an onboard computer. Image file data and image control functions can be transferred directly to this onboard computer from the controlling computer through an RS232 cable or by using the windows graphical interface through a network connection. Once the data has been transmitted to the system, the system assumes all the duties of controlling the projection of the image. Your host computer is available to do other work until it's time to pass additional information to the system. Naturally, the system comes with all necessary power and data cables.

What sort of data files can be used to define the patterns?

The *Model CPS Laser Pattern Generator* natively understands standard HPGL (Hewlett Packard Graphics Language) files just as you would use for plotting to paper. Most CAD systems can easily provide output in this format and third party graphics file translation utilities are available which can translate from other formats into HPGL. The included Windows graphical control software includes a built in DXF interpreter for direct projection of AutoCad compliant DXF files.

How large is the projection unit? How is it physically mounted?

The main projector unit weighs about 60 pounds and is about 32" by 12" by 7.5" in size. The case is of sturdy metal construction and comes with a basic mounting bracket for bolting the unit to a user supplied mounting structure.   The included mounting brackets provide some degree of rotational adjustment in at least two axes to facilitate set-up and alignment.

You say this system will project onto any flat surface. How large a surface will it cover?

Typically, a single standard unit will cover an area up to 20 feet by 20 feet when mounted about 12 feet above the surface it is projecting onto. The actual height and angle at which the unit is mounted will of course determine the exact area of coverage. The basic CPS model offers mirror movement up to 80 degrees in both axes. Larger areas can be covered by mounting the unit higher or by moving the unit toward one edge of the projection area and angling it back toward the center. Both of these approaches, however, will have

an impact on maximum accuracy and the preferred installation is to center the unit over the projection area for optimum results.

How does the system know what surface I'm projecting onto? What if the surface is not exactly flat and what about cases where the projector is mounted at an angle to the surface?

Part of each installation routine is to "calibrate" the *Model CPS Laser Computer Pattern Projection System* for the real world conditions under which it will be used. After the projection head is mounted above the projection surface and aligned as closely with the center of the surface as possible, the calibration routine begins.   The installation software provides a graphical representation of the geometry of the installation and allows the installer to input the precise values for the locations of the corners of the rectangular projection area. These form the basis for the initial calibration of the system. The beam from the projector is steered to each of the corners in turn and the system "memorizes" the position of the corner points. The internal set-up routine then uses this information to compute a complete map of the entire projection area and to compute the position of the laser projector in relation to the users coordinate system. This data is stored within the projector's non-volatile memory where it provides the basis for accurate projection of any pattern anywhere within the projector's field.

Is this installation and calibration something I have to do myself, or is help available?

Though the process is straightforward and simple, we're available to provide optional installation services if desired. In most cases, the customer will provide the physical structure to which the projection head will attach and can then complete the set-up routine on his own. A detailed operation and installation manual is shipped with each projection unit. Carter factory personnel are available to provide free telephone support to assist the customer with the process if needed. We'll also gladly provide information on our on-site installation services and rates upon request.

What happens if either the projection surface or the projector itself shifts its position later on? Will this entire process have to be repeated?

No, that shouldn't be necessary unless the movement is very large. As part of the initial calibration set-up, reflecting elements will be permanently attached to the structure of the projection surface. The positions of these special permanent calibration points are internally stored within the system. At any time, you may run a very simple routine to compare the actual positions of these points with their stored positions. If there has been any change in position, the system will take it into account and automatically recalculate the projection parameters accordingly. This correction routine is so quick, it can easily be done each time a pattern is projected, if desired.

I plan to use this system with a router. Earlier you said I could project patterns either onto the router bed itself (for fixture placement) or onto the tops of the fixtures (for part blank placement). How can this work when the tops of the fixtures lie so far above the top of the router table?

The system software includes a parameter for defining the height offset from the base surface for which it has been calibrated. By specifying an offset height value exactly equal to the height of your fixtures, you will cause the system to automatically resize and reposition patterns so that their shape and dimensions remain exactly right. A different height offset value can be associated with each pattern, so that regardless of what fixturing you use for a particular part, the pattern will be properly located and sized.

I use a twin table router, alternately cutting the same pattern on opposite tables while reloading the other table. Will I have to establish separate patterns for each table?

No, you won't. In addition to height offsets, you can specify that a pattern be projected with a particular offset in both the X and Y directions. This means that the same pattern used on one table can, with the proper offsets specified, be used to project onto the opposite table.

I have very large assemblies and would need to cover patterns larger than the dimensions mentioned earlier. Is there any way this can be done?

Yes there is. The advanced version of the system allows a single computer to control more than one projection head. The overall pattern is divided into sections, each of which is projected by a different projection head. Each projection head would be mounted over the area of the projection surface appropriate to the section of pattern it is responsible for. In this way, very large patterns can be produced. Such installations are generally custom in nature and we will work with you to help you determine exactly what is needed to meet your requirements.

All this sounds interesting. Is there more information available?

Yes. We'll be happy to send you the full brochure and all the latest specifications so that you can see exactly how the *Model CPS Computer Pattern Projection System* can make your part and fixture positioning problems a thing of the past. For complete information, please contact us at:

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