8100/GS

A SOLID FOUNDATION FOR CAD/CAM SYSTEM BUILDERS

Lexidata's 8100/GS is a unique hardware/software combination which offers the system builder the solid foundation necessary in the design of powerful, interactive CAD/CAM or other application-oriented systems. The 8100's high-level graphics functionality simplifies application development, enabling the system builder to meet rigorous design deadlines. Its wide range of features provide flexibility for specific needs.

Street grid map (above) as displayed on the 8100/GS distributed graphics processing system.

FEATURES

- Dual Processor Architecture
- High-Level Functionality
- 2 Billion X 2 Billion Virtual Addressability
- Local Viewing Operations and Transformations
- Local Peripheral Support
- Power-Up Diagnostics

BENEFITS

- Speeds Throughput and Reduces Host Workload
- Simplifies Application Development
- Allows Local Storage of High-Precision Models
- Offers High Degree of User Interactivity
- Eases System Interface Bottlenecks
- Insures Trouble-Free Operation

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SYSTEM ARCHITECTURE

The 8100/GS utilizes a dual processor architecture consisting of a geometry processor, and a display processor. The user's host computer, functioning as the master controller, completes the three-processor system hierarchy. Tasks are distributed to the appropriate processor, resulting in balanced system throughput. (See Figure 1.)

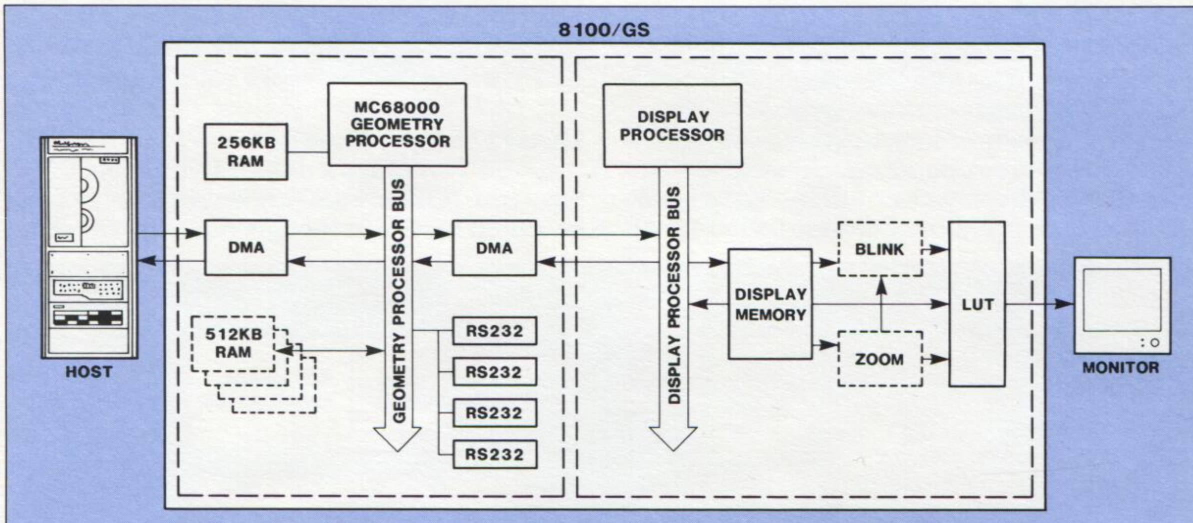

Figure 1. SYSTEM BLOCK DIAGRAM – The 8100's multiple processors perform operations in parallel, boosting overall system throughput. In conjunction with the user's host computer, the 8100/GS forms a highly-interactive distributed graphics system.

Geometry Processor

The geometry processor is a 16/32-bit Motorola MC68000 microprocessor, with 256KB Random Access Memory (RAM). High-speed, 32-bit arithmetic operations make the 68000 an ideal geometry processor; all viewing operations, including geometric transformations, are performed locally. Additionally, the geometry processor manages four serial ports used for interfacing graphic input devices such as a data tablet, keyboard, joystick or trackball. Data from the input devices is buffered by the geometry processor until requested from the user's host software, eliminating the host requirement to respond quickly to device interrupts. Up to two megabytes of error-correcting RAM is optionally available to the user, allowing large design data bases to be stored locally.

Display Processor

The display processor is a high-speed, Lexidata-proprietary bipolar processor, designed to rapidly perform bit-map manipulations such as vector-to-raster conversion and area fill. In addition, the display processor controls other video display functions such as the user-programmable hardware cursor and performs lookup table manipulations used for color selection.

Interfaces

The geometry processor and display processor are linked by a high-speed, Direct Memory Access (DMA) interface, allowing the two processors to perform operations in parallel – increasing the overall system throughput.

High-speed, 16-bit parallel interfaces are available for most popular mini-computers. An RS-232 host serial interface at up to 19.2K baud is also available.

Power-Up Diagnostics

After power-up, a set of PROM-resident diagnostics exercise all major components.

Hardware failures are reported via a set of four LEDs which indicate the source of the problem. The sequence is accomplished in approximately five seconds. Successful power-up is indicated by a system message on the display. Power-up diagnostics insure trouble-free operation and rapid field repair.

Variety of Configurations

The 8100/GS is a self-contained, rack-mountable unit, available in a wide variety of configurations. Display resolutions are available in 640x512/1280x1024 color or 1280x1024 monochrome. The 640x512 color and 1280x1024 monochrome systems are available for 50/60 Hz non-interlaced refresh, providing flicker-free operation. Up to 4096 colors can be displayed simultaneously from a palette of 16.7 million. Options include hardware blink, hardware pan and zoom, and graphic input devices such as data tablets, keyboards, joysticks and trackballs. (See 8100/GS Configuration Summary.)

LX/GP1 SYSTEM SOFTWARE

LX/GP1 is a sophisticated software package which runs locally in the 8100/GS. In conjunction with a host FORTRAN library, LX/GP1 provides a high-level, functional interface for the user's application software. LX/GP1 functionality was initially modeled after the proposed Core System graphics standard, a commonly-recognized set of high-level graphics functions. The implementation of LX/GP1, however, extended the Core methodologies in several key areas, making LX/GP1 conceptually similar to the more-recently proposed Graphics Kernel System (GKS). An important difference is that LX/GP1 performs all viewing operations locally in the 8100/GS. (See Figure 2.)

LX/GP1 Unique Features

LX/GP1 employs a descriptive Object Data Structure (ODS), allowing entire objects to be stored locally in the 8100/GS. The stored object can be manipulated dynamically through a series of simple commands provided by the host application program. Since LX/GP1 performs all viewing operations locally, screen update occurs rapidly in response to user interaction. Additionally, LX/GP1 offers a uniform means of handling graphic input devices, relieving the application program of this burdensome task.

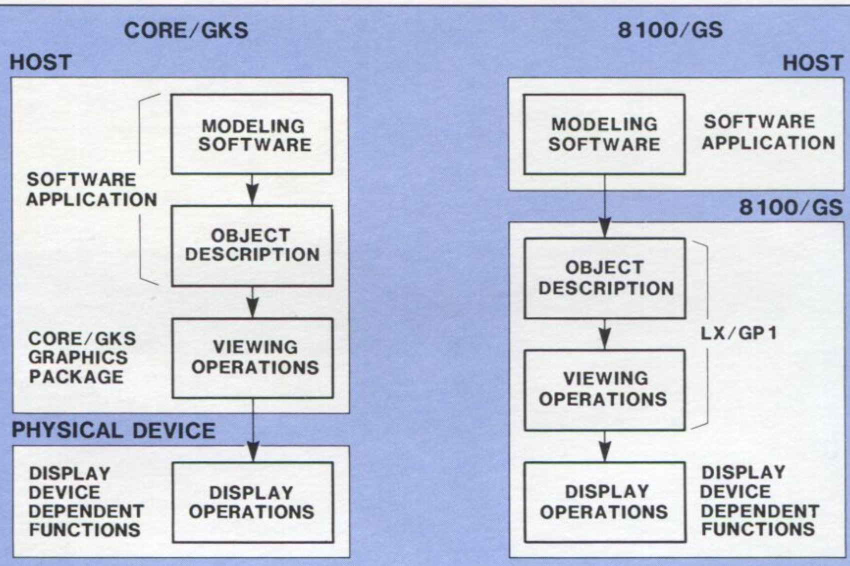

Figure 2. DEVICE INTELLIGENCE OFFLOADS THE HOST – LX/GP1 performs all viewing functions within the 8100/GS, eliminating the burden imposed by host graphics packages such as Core and GKS.

LOCAL DATA STORAGE

Coordinate Systems

The 8100/GS utilizes three distinct coordinate systems: World Coordinates (WC), Normalized Device Coordinates (NDC), and Device Coordinates (DC).

World Coordinates

A World Coordinate description is a geometrical representation of the object in two-dimensional space. All objects are stored locally in terms of their World Coordinate descriptions. The 8100/GS represents x,y coordinates with 31-bits of precision, yielding a virtual address space of two billion x two billion units – a significant advantage when designing complex or high-precision models.

Normalized Device Coordinates

Normalized Device Coordinates represent an abstract coordinate system which lies between World Coordinates and Device Coordinates. Since graphic input devices have various addressing ranges, and physical display resolutions may also vary, LX/GP1 utilizes NDC to map all devices to a common, "idealized" set of coordinates. This simplifies application programming and provides software device independence with respect to screen/bit-map resolution.

Device Coordinates

Device Coordinates are directly related to the screen/bit-map resolution. LX/GP1 automatically translates World Coordinate object descriptions into Device Coordinates, in order to display images on the screen.

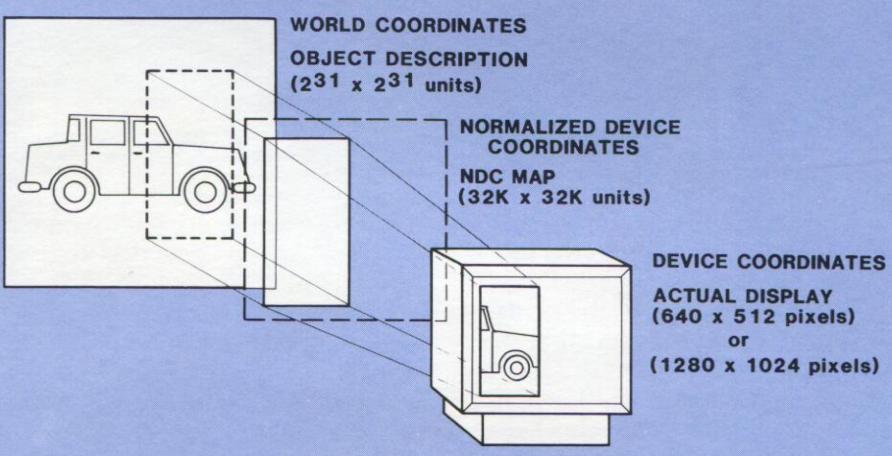

Figure 3. 2 BILLION X 2 BILLION VIRTUAL ADDRESSABILITY – LX/GP1 utilizes three coordinate systems. Since LX/GP1 stores and manipulates objects in a high-precision World Coordinate Space, the 8100/GS is ideal for creating complex or large-scale models.

OBJECT DATA STRUCTURE

World Coordinate objects are stored locally as a collection of descriptive graphic entities and are referred to as the Object Data Structure (ODS). There are three basic types of graphic entities which comprise the ODS: primitives, cells and segments. (See Figure 4.)

Segments

A segment is a collection of primitives and/or cells which represent a single unit. Segments are the entities upon which the powerful LX/GP1 image manipulation algorithms operate. LX/GP1 supports two classes of segments: temporary and retained. Temporary segments are not permanently stored in the ODS and can be used to display items temporarily on the screen. The retained segment is stored in the ODS for subsequent manipulation or editing. An important feature of the 8100/GS is that segments are stored with enclosing rectangle data. This greatly simplifies determination of those segments which fall in a particular area of interest, allowing LX/GP1 to process the ODS efficiently during viewing operations.

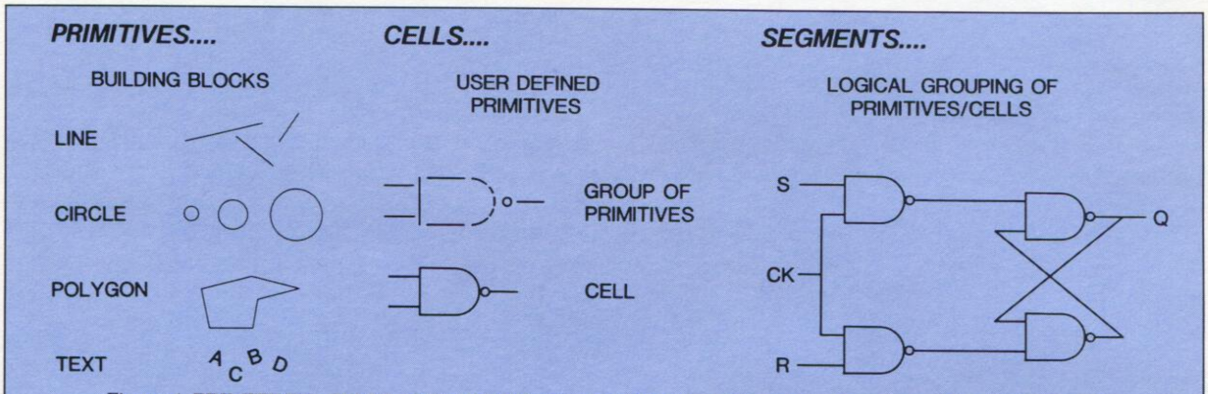

Figure 4. PRIMITIVES, CELLS AND SEGMENTS – LX/GP1 allows the user to group graphic entities to suit particular application requirements.

Primitives

The 8100/GS supports output primitives such as lines, polylines (connected line sequences), polygons, circles, text and messages. Primitives are described in terms of their most elementary defining characteristics (i.e. the endpoints of a line, or the center and radius of a circle) but also have other characteristics such as color or line thickness known as attributes. In contrast to "Display List" systems which store output primitives as a series of commands, LX/GP1 utilizes an approach (similar to GKS) where primitives are stored as descriptive blocks, thereby providing the means for simple editing or powerful manipulation of the ODS. (For a complete listing of output primitives supported by LX/GP1, see the Command Summary.)

Cells

Cells allow the user to create collections of primitives for the purpose of referring to them as a single entity. Cells differ from segments in that segments become immediately visible once created, whereas cells remain invisible until "instantiated" within a segment. "Cell instantiation" is the process whereby a previously-defined cell is given a location and orientation in World Coordinate Space. Cells provide ODS storage efficiency. Although a single copy of the "cell definition" is stored, the cell may be instantiated many times within one or more segments. Another important cell characteristic is nesting. As can be seen in Figure 5, a cell definition can itself include a cell instance of a previously defined cell. This process can occur to a depth of 32 levels, allowing the user to formulate complex cell structures to meet particular application requirements.

Attributes

Primitives, segments and cells have additional descriptive characteristics known as attributes. LX/GP1 supports two major classes of attributes: static, those which once assigned remain fixed; and dynamic, those which may be altered as required.

Static Attributes

Primitives can be created with a variety of static attributes. Lines, for instance, can have color, width, and pattern specified. Polygons can be filled or unfilled. For filled polygons, the user may specify a unique fill pattern. In the case of text, size may be specified. (For a complete listing of attributes supported by LX/GP1, see the Command Summary.)

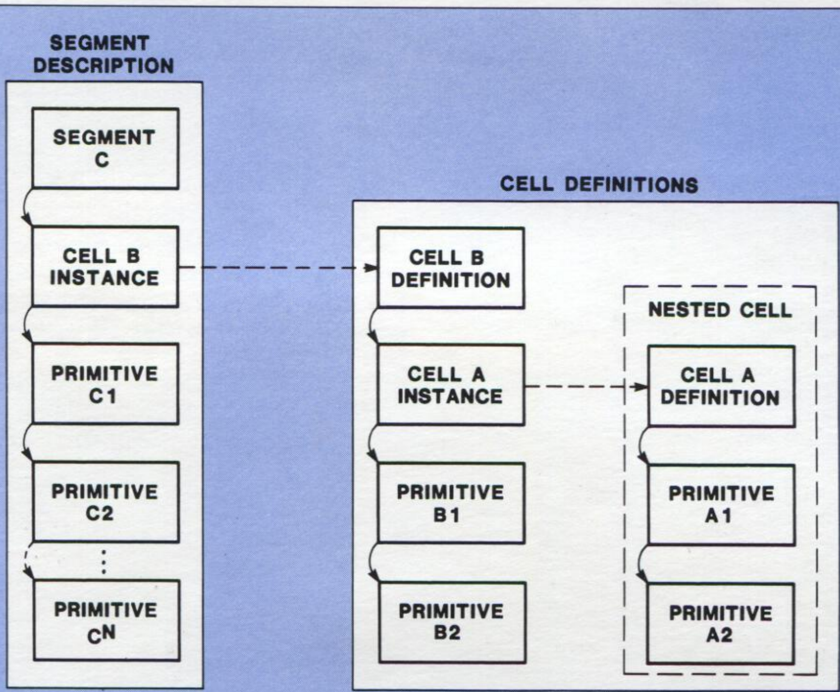

Figure 5. DESCRIPTIVE DATA STRUCTURE – LX/GP1 stores graphic entities as descriptive blocks. Segments can be dynamically manipulated using simple Host Commands. Cells can be nested to a depth of 32 levels. "Cell Instantiation" saves Object Data Structure storage space.

A cell reflects the attributes of its associated primitives. Additionally, each cell instance has its own static attribute which allows the user to specify an offset and orientation for the cell; a single cell can therefore be instantiated in several different orientations. This cell attribute feature eliminates the need to define multiple cells, reducing ODS storage overhead.

LOCAL MANIPULATION OF THE ODS

The ODS can be manipulated using a variety of powerful LX/GP1 functions. Segments may be transformed dynamically and edited locally without having to be recreated. These local processing capabilities contribute to making the 8100/GS a highly-interactive graphics subsystem, while reducing the requirement for a high-speed host interface.

Dynamic Attributes

Dynamic attributes allow the user to modify segments independently. Simple FORTRAN calls are used to dynamically alter position, orientation and visibility. For example, in a mechanical application, a gear may be represented using a segment. The operator would then be able to rotate, scale and position the gear to suit the design.

Transformations

One class of dynamic attributes – transformations – include translation, rotation and scaling. (See Figure 7.) These attributes may be applied separately or in combination in order to achieve the desired result. Both scaling and rotation are possible around an arbitrary point, enhancing the flexibility with which the user can manipulate the Object Data Structure.

Dynamic attributes affecting visibility include the capability to define a segment as visible or invisible within a particular view. This feature can be used to remove segments selectively from the display – decluttering. Additionally, segments can be highlighted (color/intensity change), providing useful operator feedback.

Entity Pick

Entity pick refers to the ability of users to single out a particular entity (segment, cell, or primitive) for editing, inquiry or manipulation. The ability to pick an entity provides the user with a convenient mechanism for manipulating or updating the 8100/GS Object Data Structure (i.e. "picking" a single Integrated Circuit (IC) on a Printed Circuit (PC) layout and moving it to a new location).

LX/GP1 performs the "pick" operation locally in the 8100/GS. An area of interest, a pick aperture, can be set under user control. At the time of creation, the user may specify whether entities may be picked. All pickable

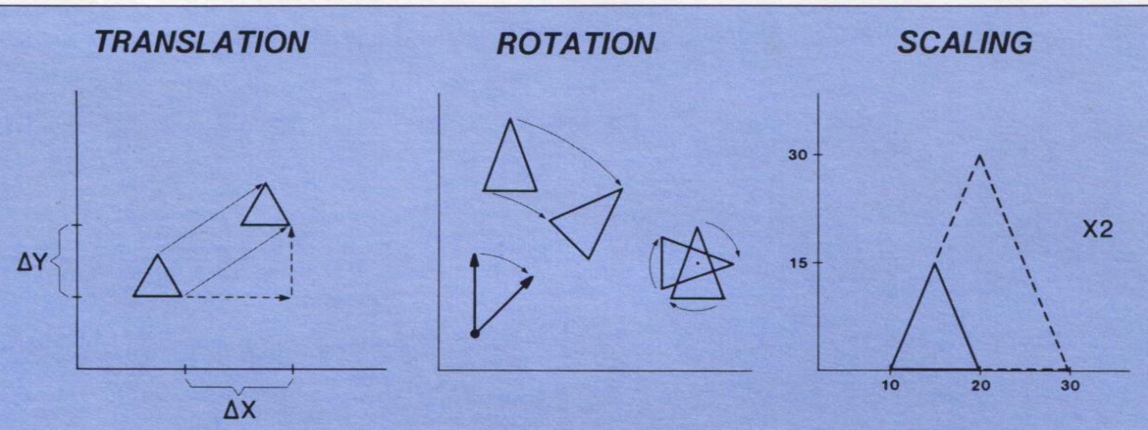

Figure 7. DYNAMIC MANIPULATION OF SEGMENTS – LX/GP1 performs all transformations locally in the 8100/GS. Simple host commands mean low interface traffic. The result – a powerful and highly-interactive design system.

entities which fall within the specified pick aperture will be returned sequentially to the host application program. Because segments are stored in the ODS with enclosing rectangle information, the pick operation occurs rapidly with only those segments falling within the pick aperture being selected.

Segment/Cell Editing

The user may edit segments and cells freely. LX/GP1 allows primitives to be deleted or appended to segments and cells without requiring them to be recreated. As items are deleted, LX/GP1 reclaims freed space automatically, utilizing available ODS storage space efficiently. Local editing results in a significant savings in both host processing and interface traffic, providing rapid response to operator inputs.

CONTROLLING THE VIEW

The 8100/GS provides the user with a good deal of control over viewing the object described by the ODS. The user may specify one or more rectangular areas in World Coordinate Space. LX/GP1 will automatically project these areas onto the physical display. The effect is to permit any rectangular portion of the object to be displayed at any magnification. (See Figure 8.)

Windows

As depicted in Figure 8, windows are rectangular areas specified in World Coordinates. LX/GP1 automatically selects segments which fall within these areas and performs clipping operations as necessary. The user may interactively change window size or location, immediately updating the display with a different view of the object. Changing window size provides a "soft zoom" capability; changing window location effectively allows the user to pan across objects stored in the ODS. Local World Coordinate windowing results in fast screen update with minimal host intervention.

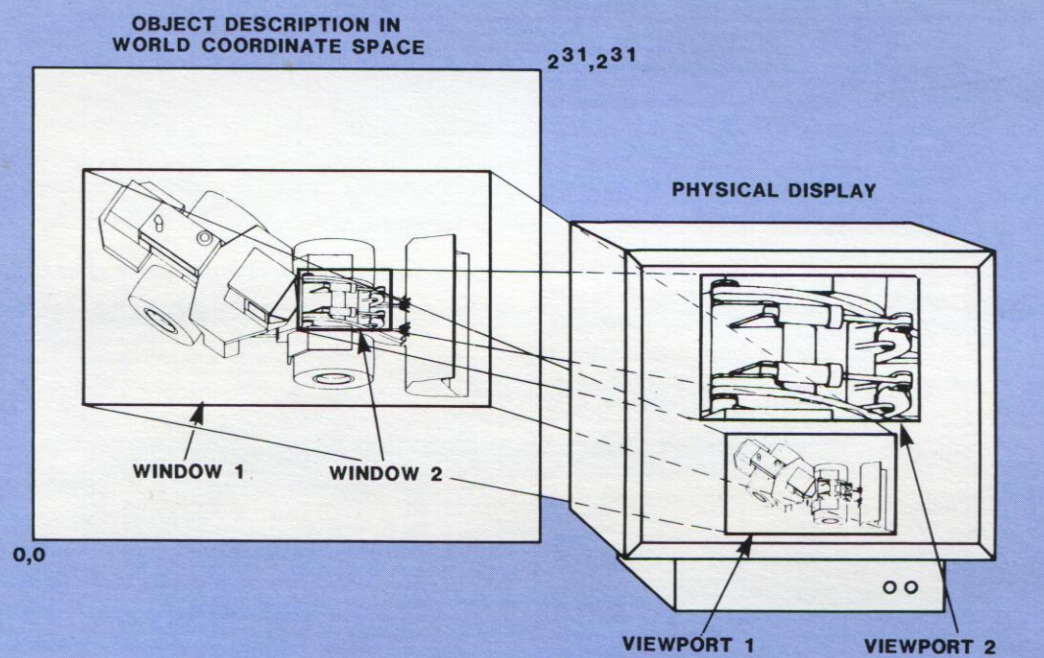

Figure 8. MULTIPLE ACTIVE VIEWS – With LX/GP1, the user is free to partition the physical display in up to 32 work areas simultaneously! He can then pan across the locally stored, high-precision ODS and display separate portions of the object at any magnification.

Viewports

In order to display a window, the user defines a viewport – an area of the screen onto which the window is to be projected. So as to provide a degree of device independence, the user specifies the viewport in terms of NDC space. Areas within this 32Kx32K space correspond directly to areas on the physical screen, regardless of its resolution. The user's application need not concern itself with physical display resolution; LX/GP1 performs the projection directly from the WC space using the NDC viewport as a map.

A unique feature of the 8100/GS is that up to 32 multiple viewports may be active simultaneously. In addition, viewports may overlap, further increasing the user's flexibility with respect to the display.

View Surfaces

The user may also control the range of colors available within a view. This is accomplished by specifying a view surface which relates a set of display memory planes to a specific window and viewport definition. The range of colors available within a view is determined by the number of memory planes selected. This feature also allows the user to allocate the display memory efficiently.

View Association

Once the view is created, the user has control over which segments are displayable within the view. Using the default case, all segments within the rectangular window area will be displayed. However, the user may select one or a group of segments, and associate them with a view. Only those segments which have been associated will be displayed within the viewport. This enables the user to display convenient groupings of segments. In the case of a PC layout application, segments describing the board layers could be associated with specific views. IC segments could be associated with yet another view. The user would be able to display the entire board by making all views active simultaneously, while layers could easily be stripped away as required.

View Pipeline

The process of displaying the object on the physical display once a window and viewport have been established is called the "view pipeline." As can be seen in Figure 9, this process begins by applying transformations as required. Objects are then clipped against the WC window. In a standard Core System implementation, this is the point at which retained segments would be stored in NDC space. Since the 8100/GS allows segments to be stored in WC space, LX/GP1 simply uses the viewport definition (NDC space) as a map and issues commands to the display processor in actual Device Coordinates.

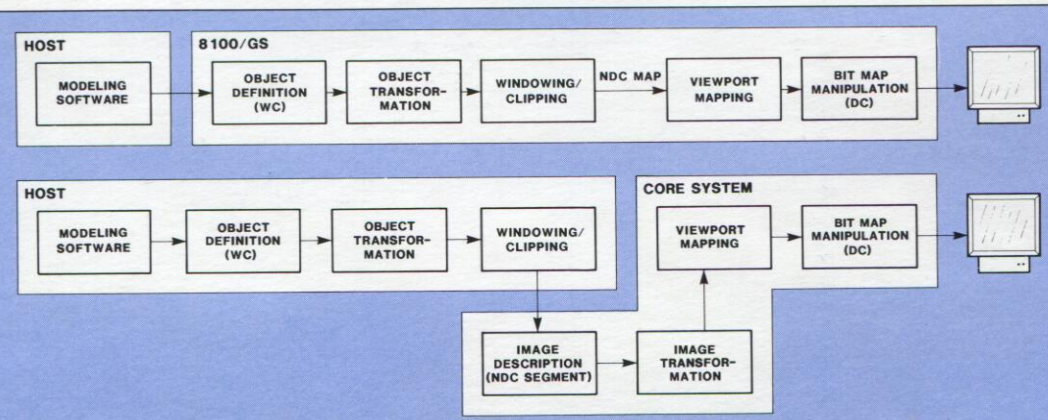

Figure 9. ALL VIEWING OPERATIONS PERFORMED LOCALLY – LX/GP1 handles the entire view pipeline. Note that the 8100/GS has no need to store NDC segments as in a Core System implementation.

Maintaining the ODS in World Coordinates

The advantage of maintaining an Object Data Structure in World Coordinates as opposed to a clipped normalized device coordinate image is apparent in the following example. Clipping occurs when an object such as an arrow crosses the defined window. The image may then be transformed to bring it entirely into view. (See Figure 10.) A system which implements the Core proposal would retain only clipped images. Therefore, after the transformation, only the portion of the arrow that was originally within the viewing window would be displayed. Because the 8100/GS retains a description of the entire arrow, the complete image is displayed on the screen.

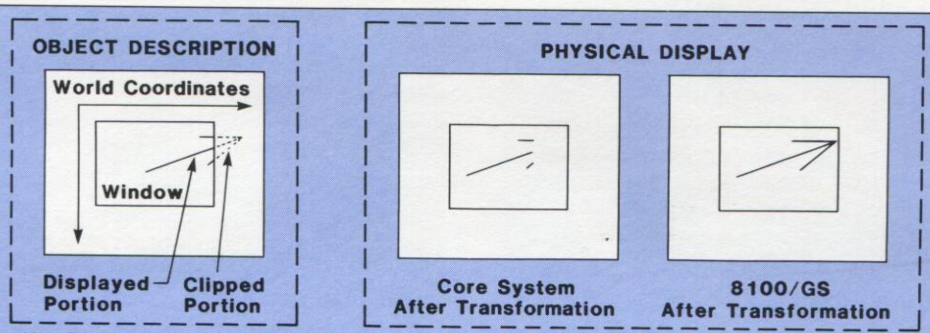

Figure 10. ADVANTAGE OF A WORLD COORDINATE DATA STRUCTURE – NDC segments may appear distorted after transformation. With the 8100/GS, clipping from World Coordinates occurs after segments are transformed, resulting in an accurate representation of the object.

CONTROL FUNCTIONS

The 8100/GS can support up to three graphic input devices: a data tablet, a joystick/trackball, and a keyboard. This eliminates the need for the host to respond quickly to device interrupts which may represent a severe burden, especially if the host is not dedicated to the graphics application.

Locator Device Input

Data tablets, joysticks and trackballs are classified as locator-type devices. LX/GP1 can use locator input to perform local cursor tracking. Additionally, LX/GP1 can return locator input to the user's application program in either World Coordinates, Normalized Device Coordinates, or actual Device Coordinates. This feature makes cursor tracking within specific viewports a straightforward operation, regardless of the graphic input device.

Keyboard Input

Input from the Lexidata keyboard can be returned directly to the host on a character-by-character basis, or it may be buffered and returned a line at a time. Additionally, text can be echoed locally on the screen without host intervention. These features can be especially helpful to an overburdened host.

Error-Logging

LX/GP1 features an error-logging facility for debugging new user applications. Errors can be reported to the display or on a separate console device, and can be returned to the host application program upon request. In conjunction with the Lexidata-supplied 8100/GS programming manuals, this feature helps minimize the effort required to create application programs.

SUMMARY

Lexidata's 8100/GS is a powerful hardware/software combination, designed to meet the flexible needs of the system builder.

A sophisticated software package, LX/GP1 runs locally in the 8100/GS graphics subsystem. LX/GP1's high-level functionality streamlines application development and minimizes system implementation time.

The 8100's local intelligence frees the host of many computation-intensive tasks and provides rapid response to operator requests regardless of host workload.

LX/GP1 COMMAND SUMMARY

The following is a list of LX/GP1 functions currently available on the 8100/GS. They are organized into logical groups for convenient reference. All commands, with the exception of the IDOS (Image Display Operating System) Emulation Commands, operate on the 8100/GS Object Data Structure. IDOS is a set of functions previously offered on Lexidata 3400 systems. IDOS emulation provides software compatibility for 3400 IDOS users. In addition, IDOS emulation enables the user to send commands directly to the display processor Device Coordinates as desired.

OUTPUT PRIMITIVE FUNCTIONS

GCELIN	Add a Cell Instance
GCIRA	Create Circle Defined by Radius
GCIRR	Create Circle Defined by Specified Point
GINQCP	Inquire Current Position (CP)
GLINA	Generate Line from CP to Specified Point
GLINR	Create Line from CP to Relative Offset
GMOVA	Move CP to Absolute Position
GMOVR	Move CP Relative to Current Position
GPLNA	Create Multivertex Line Defined by Specified Points
GPLNR	Create Multivertex Line Defined by Relative Offset
GPOLA	Create Polygon Defined by Specified Vertices (WC)
GPOLR	Create Polygon Defined by Relative Offsets (WC)
GTXNDC	Create Text String (NDC)
GTXTWC	Create Text String (WC)

OBJECT SEGMENTATION

GCLSEG	Close Opened Segment
GCRCEL	Create Cell Definition
GCRSEG	Create Retained Segment
GCTSEG	Create Temporary Segment
GDASEG	Delete All Retained Segments
GDLCDF	Delete Cell Definition
GDLINS	Delete Cell Instances
GDLRSG	Delete a Retained Segment
GRNSEG	Rename Retained Segments or Cells
GRPCDF	Replace Cell Definition
GRPSEG	Replace Retained Segment or Cell Definition

ATTRIBUTE SETTING FUNCTIONS

GDCOLI	Define Color Index Table
GDINTI	Define Lookup Table Intensities
GRSXFM	Reset Cell Transformation
GSCHSZ	Set Text Character Size
GSCNDX	Set Intensity Index for Output Functions
GSETDM	Set Display Mode
GSFONT	Set Character Font
GSLPAT	Set the Line Pattern Parameters
GSFTYP	Set Fill Type
GSLWID	Set the Line Width or Weight
GSMSIZ	Set Message Text Characters Size (NDC)
GSSEGH	Set Highlighting Attribute (Dynamic)
GSSVIS	Set Segment Visibility (Dynamic)
GTRSCL	Translate a Cell Instance (Static)
GTRSRS	Translate Retained Segment (Dynamic)
GXFMCL	Transform a Cell Instance (Static)
GXFMRS	Transform Retained Segment (Dynamic)
GDPAT	Send Fill Pattern Definition

VIEWING FUNCTIONS

GACVS	Activate Viewing Surface
GACVU	Activate Specified View
GCFRAM	Control New Frame Actions
GDAVS	Remove a Viewing Surface
GDAVU	Deactivate Specified View
GDEFVS	Define View Surface
GDFVU	Define View
GDFWIN	Define Window Position
GDFVP	Define Viewpoint Position
GDYNAM	Select Dynamic Mode
GFRAME	Provide New Frame
GINTVS	Initialize Selected View Surface
GMPCUR	Force All Delayed Picture Changes
GSIVIS	Set Immediate Visibility
GSVUAS	Set View Association
GTRMVS	Terminate Access to Specified Surface
GRUPDT	Update Graphics

INPUT PRIMITIVE FUNCTIONS

GCKBE	Clear Keyboard Echo Area
GDFBT	Define a Single Button
GDFBGF	Define Group of Buttons
GDFKBE	Define Keyboard Echo Type
GDFLMX	Define Locator Transformation Matrix
GDFLPT	Define Locator Port Extents
GDVDSB	Disable Device
GDVENB	Enable Device
GDVINI	Initialize Device
GDVTRM	Terminate I/O Operation
GRDBT	Read Single Button Status
GRBTG	Read Status of All Buttons
GRDKBD	Read Keyboard
GRDLC	Read Locator Coordinates (WC and NDC)
GRDNDC	Read Locator Coordinates (NDC)
GRDVAL	Read Locator Coordinates (DC)
GRDWC	Read Locator Coordinates (WC)
GRSLG	Turn Off a Group of Lights
GRSLT	Turn Off a Single Light

ENTITY SELECT (PICK)

GAPND	Pick Aperture Dimensions (NDC)
GAPWC	Set Pick Aperture Dimensions (WC)
GPCLS	Close Pick Function
GPDEV	Open Pick
GPICK	Pick Segment or Primitive
GPLAB	Set Primitive Base Label
GPNDC	Open Identify Function (NDC)
GPWC	Open Identify Function (WC)
GRDAP	Read Pick Aperture Center
GRLAB	Read Most Recent Primitive Label
GRPRI	Get Labelled Primitive
GSDET	Set Detectability

SEGMENT EDITING AND READBACK

GDCPR	Delete Current Primitive Record
GDPRI	Delete Labelled Primitive Record
GNPRI	Get Next Primitive
GOCEL	Open Cell
GOSEG	Open Retained Segment
GTPRI	Return Primitive Record

IDOS EMULATION FUNCTIONS

DSBCTL	Blink Control
DSBLIN	Set Blink Rate
DSBLOC	Send Data Block
DSBLR	Read Data Block
DSCER	Erase Cursor Matrix
DSCFG	Set Hardware Configuration for the Display
DSCHAN	Define Channels for Write Operations
DSCIR	Display Circle
DSCLD	Load Cursor Matrix
DSCLR	Clear Display
DSCLS	Terminate I/O in Progress and Detach Driver
DSCSL	Select Hardware Cursor
DSCXY	Set Cursor Position
DSECHO	Set Echo Mode
DSGET	Sequential Pixel Read
DSGKB	Get Keyboard Data and Set Lamps
DSGXY	Read Cursor Position
DSIWT	Wait for Read Operation to Complete
DSLIM	Set Rectangular Limits
DSLLU	Generate Lookup Table Ramp
DSLRD	Read from Lookup Table
DSLWT	Write to Table
DSMOV	Execute Movie
DSMRG	Set Display Margins
DSOPN	Open Specified Device
DSOWT	Wait for Write Operation to Complete
DSPLD	Load and Start Software
DSPNT	Display Points
DSPUT	Sequential Pixel Write
DSRNR	Random Pixel Read
DSRNW	Random Pixel Write
DSSAO	Set Text Parameters
DSSL	Set Trackball/Joystick Lamps
DSTXT	Display Text
DSVEC	Display Vector
DSZOM	Execute Zoom and Pan

CONTROL FUNCTIONS

GBSWAP	Swap All Bytes
GDFLD	Define Error Logging Device
GDFLP	Define Error Message Area
GINIT	Initialize 8100/GS
GINQDR	Inquire Maximum View Surface Display Coordinates
GRMRER	Report Most Recent Error
GTERM	Terminate 8100/GS Operations
LXDATA	Host Parameter Table

8100/GS CONFIGURATION SUMMARY

Model	8110	8120	8130	8140	8150	8160
Display resolution	640x512	640x512	1280x1024	1280x1024	1280x1024	640x512
Display refresh rate	50/60 Hz non-interlaced	50/60 Hz non-interlaced	50/60 Hz non-interlaced	25/30 Hz interlaced	25/30 Hz interlaced	50/60 Hz non-interlaced
Standard display memory	4 planes	8 planes	1 plane	4 planes	3 planes	12 planes
Video output	Color	Color	Monochrome	Color	Color	Color
Maximum number of simultaneously displayable colors	16	256	Not Available	16	8	4096
Color lookup table	10x8	10x8	Not Available	4x4	4x4	12x8
Overlay option	3 planes	3 planes	Not Available	1 plane	1 plane	4 planes
Hardware cursor	Standard	Standard	Standard	Standard	Standard	Standard
Hardware blink	Option	Option	Option	Option	Option	Option
Hardware zoom	Option	Option	Option	N/A	Option	Option
Standard ODS memory	256KB	256KB	256KB	256KB	256KB	256KB
Optional 512KB ECC ODS memory	up to 2MB	up to 2MB	up to 2MB	up to 2MB	up to 2MB	up to 2MB
Standard peripheral interface	4 RS-232	4 RS-232	4 RS-232	4 RS-232	4 RS-232	4 RS-232
Host parallel interface	Available	Available	Available	Available	Available	Available

8100/GS SYSTEM SPECIFICATIONS

Alphanumerics
A table-driven stroke font supporting upper and lower case, alphanumerics, and punctuation for graphic text. A pixel-oriented font for message text.

Cursor
Size and shape of non-destructive cursor is user-loadable within 64 pixel x 64 pixel matrix. Full screen cross-hair is also selectable.

Data Transfer Rate
Up to 800K words per second (16 bits/word) from host computer in burst mode.

Power Requirements
115 VAC ±10% 47-63Hz (3 wire)
230 VAC ±10% 47-63Hz (3 wire)
600 watts average.
Requirements vary depending on configuration size.

Environmental Requirements
Operating Temperature
10 to 40 degrees C

Storage Temperature
−35 to 70 degrees C

Operating Relative Humidity
10% to 90% (non-condensing)

Storage Relative Humidity
10% to 90% (non-condensing)

Altitude
8,000 ft.

Acoustic Noise Level
The acoustic noise level shall not exceed the NC-60 noise criteria curve.

Regulatory Compliance
Complies with the conducted and radiated EMI emission levels defined in FCC docket #20780 for class A equipment.

Chassis Dimensions
8.75″ high x 19″ wide x 27″ deep (not including monitor).

Weight
60-100 lbs. including power supply (not including monitor).

LEXIDATA

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