

ADAGE FSS 3000

ADAGE FORTRAN SUPPORT SUBROUTINES

FORTRAN Support Subroutines (FSS 3000) is a package of high-level, FORTRAN-callable subroutines designed to provide a straightforward and efficient interface between the Adage 3000 Color Raster Display System and device-independent application software packages. FSS 3000 offers a convenient tool for enhancing the creativity and productivity of professional application engineers. With FSS 3000, the user maintains access to the dynamic power and flexibility of the Adage 3000.

Local hidden surface display is a key feature of the FSS 3000 package. The package includes local interactive 3-D perspective transformation and clipping of complex solid objects. Smooth-shaded hidden surface display is provided for these objects.

Other advanced features, including real-time 3-D anti-aliased vector display and fast raster operations, are part of the comprehensive set of graphics display operations.

FSS 3000 interfaces with a set of microcode routines and an interpreter, which run on the Adage 3000 high-speed graphics generator (GPS). FSS routines build a display list in the host machine to draw primitives such as rectangles, polygons, circles, and vectors. Other FSS routines then send the display list to the Adage 3000 System for execution and manipulation. The result is dynamic, interactive graphics programming at the FORTRAN level.

Control Functions

FSS also contains a set of FORTRAN-callable routines to initialize or update components of the Adage 3000 System. Routines are available to:

1. Set display control-resolution, pan, scroll, and zoom.
2. Write an array to the color look-up tables.
3. Set the look-up table input channel selector.
4. Set the XBS video crossbar switch.
5. Set the write masks and shade registers.

2-D and 3-D Primitives

Absolute and relative moves and vectors; polygons, including non-convex polygons, and polygons with holes; anti-aliased vectors; text strings, user-defined character font, character rotation and zooming; area-fill; circles; rectangles; and logical RASTER-OP (block move functions).

ATTRIBUTES

Attributes such as color, line style, and resolution ($1024^2/512^2$) are global in nature and are written to a specific area in scratch pad memory separate from the user's display list. This means, for example, that an attribute such as line style (anti-aliased or jagged) can be set once and will apply to all subsequent vectors. By engaging these attributes, a user program may easily make use of the advanced capabilities of the Adage 3000 System. Attributes include:

Graphics:

Line type: *absolute or relative vectors.*

Line style: *jagged or anti-aliased.*

Screen resolution: *1024 × 1024 or 512 × 512.*

Hidden surface mode.

Polygon stipple mask.

Polygon-fill type: *hardware or software-fill.*

Circle type: *outline or fill.*

Raster operation type: *move or bit-wise Boolean operation.*

Flood read mask: *for control of area-fill.*

Color:

Full color or pseudocolor.

Gamma correction factor for colormap load.

Polygon shading: *flat, smooth (Gouraud).*

Character:

Character font: *FSS 3000 8 × 8 font table.*

Text attributes: *foreground and background color, character spacing, transparent or opaque background, character orientation (rotation), x and y zoom.*

Extensions

FSS 3000 may be extended to include user-defined functions.

Computer Independence

FSS 3000 is written in ANSI FORTRAN and is easy to implement on most computers. All machine-dependent aspects of I/O and file handling are in a small number of isolated subroutines.

Device Drivers

FSS 3000 uses standard Adage 3000 drivers for popular minicomputers.

Worldwide Sales and Service

Adage Sales and Customer Service representatives are located throughout the U.S., Europe, and Japan. For the location of the nearest Adage sales or service office, contact Adage at one of the offices listed below.

ADAGE

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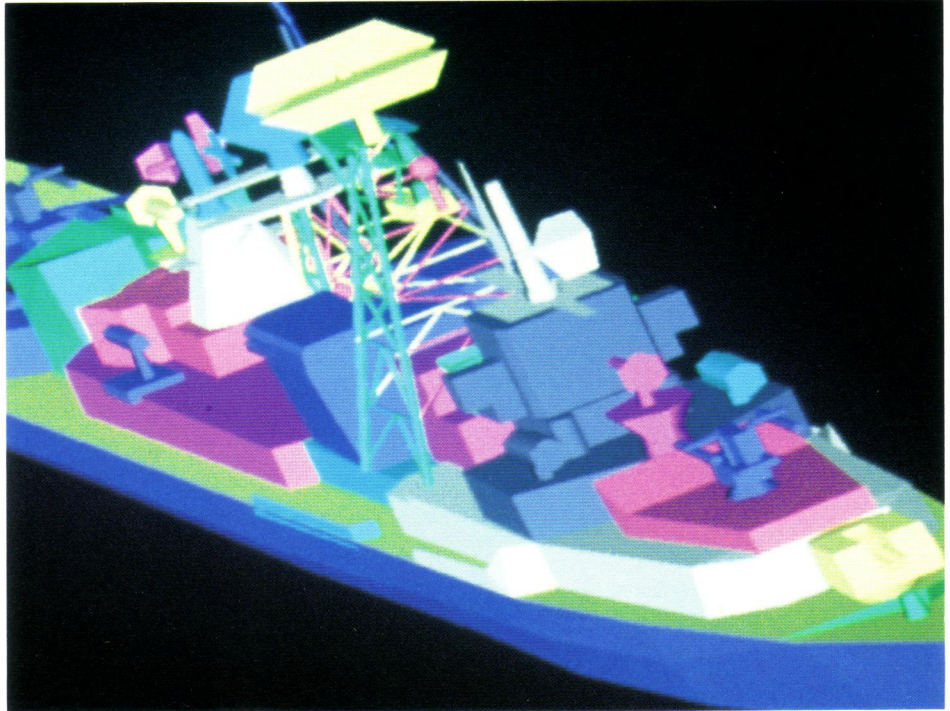
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Adage 3000 FORTRAN Support Subroutines

ADAGE

- 3-D polygon and vector display with hidden surface removal
- Real-time antialiased vectors
- Local transformation capability
- Display list driven graphics processor



Display of data sent from host—hidden surfaces locally removed. Data courtesy of NTEC.

The Adage FORTRAN Support Subroutines (FSS 3000) package features a library of high-level, FORTRAN-callable subroutines for use with the Adage 3000 Color Raster Display System. Designed to provide a straightforward and efficient interface between the Adage 3000 and device-independent application software packages, FSS 3000 offers a convenient tool for enhancing the creativity and productivity of professional application engineers. With FSS 3000, the user maintains access to the dynamic power and flexibility of the Adage 3000. The FSS 3000 package can reside in either the host computer or the workstation.

Local hidden surface removal is a key feature of the FSS 3000 package. The package includes local interactive 3-D perspective transformation and clipping of complex solid objects. Smooth-shaded hidden surface removal is provided for these objects.

Other advanced features, including real-time antialiased vector display and fast raster operations, are part of the comprehensive set of graphics display operations.

The FSS 3000 FORTRAN-callable subroutines interface with an interpreter, which runs on the Adage 3000 high-speed graphics generator (GPS). FSS routines build a display list in the host machine to draw primitives, such as rectangles, polygons, circles, and vectors. Other FSS routines then send the display list to the Adage 3000 System for interpretation and manipulation. The result is dynamic, interactive graphics programming at the FORTRAN level.

CONTROL FUNCTIONS

FSS also contains a set of FORTRAN-callable routines to initialize or update components of the Adage 3000 System. Routines are available to:

- Set display resolution, pan, scroll, and zoom
- Write to the color look-up tables
- Set the look-up table input channel selector
- Set the XBS video crossbar switch
- Set the write masks and shade registers

2-D AND 3-D PRIMITIVES

2-D and 3-D primitives included with the package are: absolute and relative moves and vectors; polygons

(including non-convex polygons and polygons with holes); text strings; area-fill; circles; rectangles; and logical RASTER-OP functions. The text strings are displayed using characters from a standard FSS 8 x 8 character font or from user-defined character fonts.

ATTRIBUTES

Attributes such as color, line style, and resolution (1024x1024/512x512) are global in nature and are written to a specific area in scratch pad memory separate from the user's display list. This means, for example, that an attribute such as line style (normal or antialiased) can be set once and will apply to all subsequent vectors. By engaging these attributes, a user program may easily make use of the advanced capabilities of the Adage 3000 System.

Attributes include:

GRAPHICS

Line Type: Absolute or relative vectors
Line Style: Normal or antialiased
Screen Resolution: 1024x1024 or 512x512
Hidden surface mode
Polygon stipple mask
Polygon-Fill Type: Hardware or software-fill
Circle Type: Outline or fill
Raster Operation Type: Move or bit-wise Boolean operation
Flood Read Mask: For control of area-fill

Color

Full color or pseudocolor
Gamma correction factor for colormap load
Polygon Shading: Flat or smooth (Gouraud)

Character

Foreground and background color, character spacing, transparent or opaque background, character orientation (rotation), x and y zoom

FUNCTIONS

Transformation

Object Space Transformation
Clipping
Perspective
Stack Support or Transformation Hierarchy

Display List

Send List
Append to List
Update List

Double Buffer

Change Buffer
Clear Buffer

EXTENSIONS

FSS 3000 may be extended to include user-defined functions.

COMPUTER INDEPENDENCE

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West Germany Telephone 6121/70 00 34 TELEX 4186007

ADAGE 3000

SOLID MODEL DISPLAY SOFTWARE

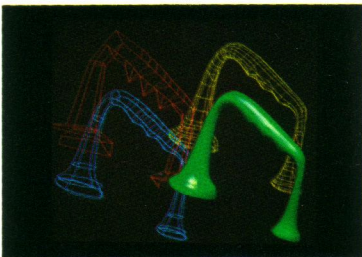
The Adage SOLID 3000 software package is a library of microcoded, FORTRAN-callable subroutines for the Adage 3000 Color Raster Display System. These subroutines allow the rapid display of 2-D and 3-D solid modeling data, as well as near real-time 3-D transformations of solid, shaded objects. The SOLID 3000 package is intended for software developers integrating the Adage 3000 into new or existing interactive CAD applications.

Dramatic performance gains in interaction and solid model display and manipulation are achieved by performing graphics processing locally. By handling all graphics display functions entirely within the Adage 3000, this system's powerful 32-bit, 208-nanosecond bit-slice processor frees the host CAD system to concentrate on the design process. The result is high-performance interactive solid modeling.

The Adage 3000—with its multi-processor architecture, advanced hardware and modular design—is uniquely suited for solid modeling CAD/CAM display tasks that require both high-speed graphics and imaging capabilities. In addition, high-performance Adage 3000 Systems are used in applications as varied as medical imaging, remote sensing, real-time 3-D flight simulation, and seismic data display and analysis.

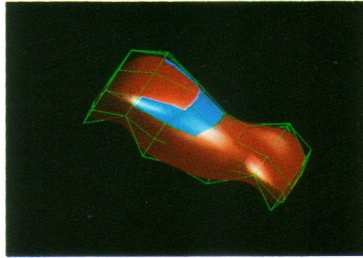
Unique display functions provided in the SOLID 3000 package include:

Curved surface and curved line display, including bi-cubic B-spline surface patches. Hidden surface elimination and smooth shading of complex curved surfaces are carried out in just a few seconds, allowing truly interactive design for the first time.



Bi-cubic surface control points, patches, polygon subdivision and shaded display: less than 3 seconds.

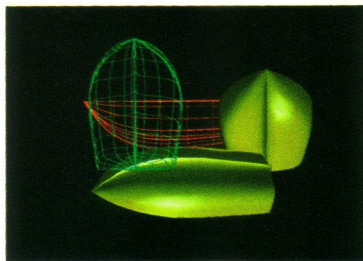
Easy interface to modeling programs. Curved surfaces and lines are concisely described to the Adage 3000 by just a few control points, and complete subdivisions and rendering are performed locally. Different types of curves and surfaces are supported by simply loading information about the appropriate parametric basis functions.



Bi-cubic patch display from control points: less than 5 seconds.

Object and polygon mesh data types. Fast vector and shaded, hidden surface display modes are provided. Shared vertex points are only loaded and transformed once, instead of for each occurrence in a polygon. This drastically cuts host computer loading and speeds user interaction by omitting any awkward reformatting of the CAD data base required for other display systems.

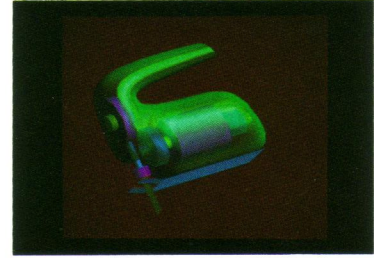
Positionable colored light sources with specular reflection (highlights). Image realism is enhanced and more information about surface curvature and structure is provided. High-speed microcode performs all shading calculations locally, without time-consuming host computer computation of surface normals and vertex shade intensities.



Bi-cubic patch display with highlights: less than 5 seconds.

Anti-aliased, hidden surface shaded images. Objectionable "jaggies" are essentially eliminated, giving a more accurate rendering of the model. Local microcode provides extraordinarily fast display generation. Interactive operation with improved user acceptance is the result.

Transparent shaded surfaces. SOLID 3000 provides a realistic transparency calculation with multiple layers and highlights, eliminating the annoying side effects of simpler "screen door" schemes. Complicated solid models can be presented by allowing the viewer to see through outer surfaces to inner parts. Fast, clear visualization of complex designs leads to increased CAD productivity.



Transparency for complex objects: less than 10 seconds.

The SOLID 3000 FORTRAN subroutines enhance and extend the standard Adage 3000 FORTRAN Support Subroutines display package. The standard FSS 3000 package provides such features as local rotation and perspective viewing, anti-aliased vectors, high-speed characters, and Z-buffer hidden surface display.

The SOLID 3000 package supports 1024 x 1024 and 512 x 512 screen resolutions, allowing, for example, a high-resolution, cost-effective, 64-color system to also be used for high-quality displays (16 million simultaneous colors) at the lower resolution.

The SOLID 3000 FORTRAN subroutines are written in ANSI FORTRAN and are easy to implement on most computers. The package uses standard Adage 3000 drivers for popular minicomputers. The microcode routines are written in a high-level language and may be modified or extended by using the ICROSS-3000 microcode compiler, which is available from Intermetrics, Inc.

Worldwide Sales and Service

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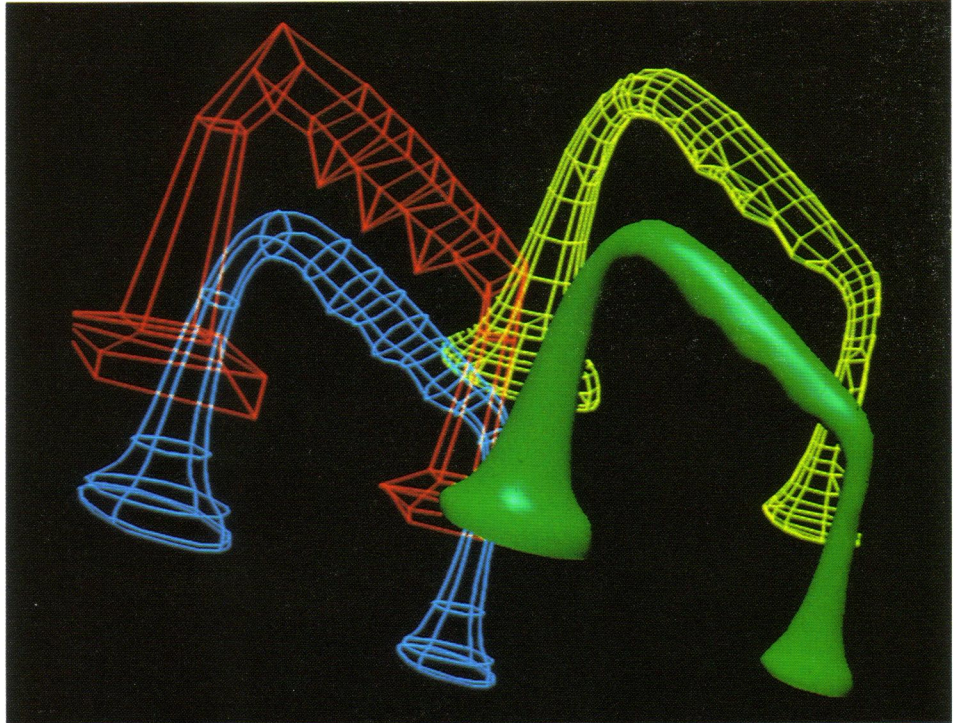
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Adage 3000 Solid Model Display Software

ADAGE

- *Curved surface and curved line display*
- *Bi-cubic B-spline surface patches*
- *Easy interface to modeling programs*
- *Hierarchical display list structure*
- *Object and polygon mesh data types*
- *Anti-aliased, hidden surface shaded images*
- *Transparent shaded surfaces*



Bi-cubic surface control points, patches, polygon subdivision and shaded display: less than 3 seconds.

The Adage SOLID 3000 software package is a library of microcoded, FORTRAN-callable subroutines for the Adage 3000 Color Raster Display System. These subroutines allow the rapid display of 3-D solid modeling data, as well as interactive 3-D transformations of solid, shaded objects. The SOLID 3000 package is intended for software developers integrating the Adage 3000 into new or existing interactive CAD applications.

Dramatic performance gains in interaction and solid model display and manipulation are achieved by performing graphics processing locally. By handling all graphics display functions entirely within the Adage 3000, this system's powerful 32-bit, bit-slice processor frees the host CAD system to concentrate on the design process. The result is high-performance interactive solid modeling.

The Adage 3000 — with its multi-processor architecture, advanced hardware and modular design — is uniquely suited for solid modeling CAD/CAM display tasks that require

both high-speed graphics and imaging capabilities. In addition, high-performance Adage 3000 Systems are used in applications as varied as medical imaging, remote sensing, real-time 3-D flight simulation, and seismic data display and analysis.

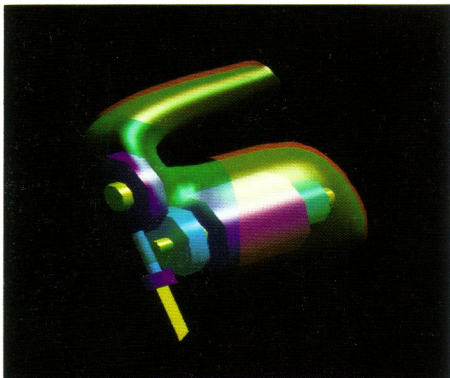
Unique display functions provided in the SOLID 3000 package include:

Curved Surface And Curved Line Display Including Bi-Cubic B-Spline Surface Patches

Hidden surface elimination and smooth shading of complex curved surfaces are carried out in just a few seconds, allowing truly interactive design for the first time.

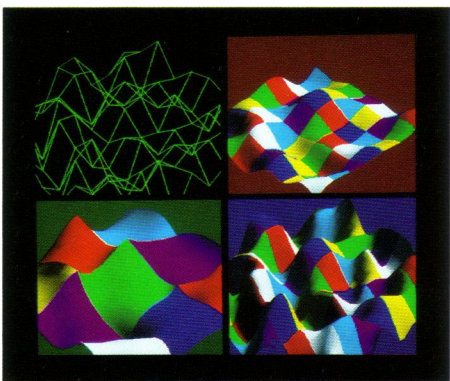
Easy Interface To Modeling Programs

Curved surfaces and lines are concisely described to the Adage 3000 by just a few control points, and complete subdivision and rendering are performed locally. Different types of curves and surfaces are supported by simply loading information about the appropriate parametric basis functions.

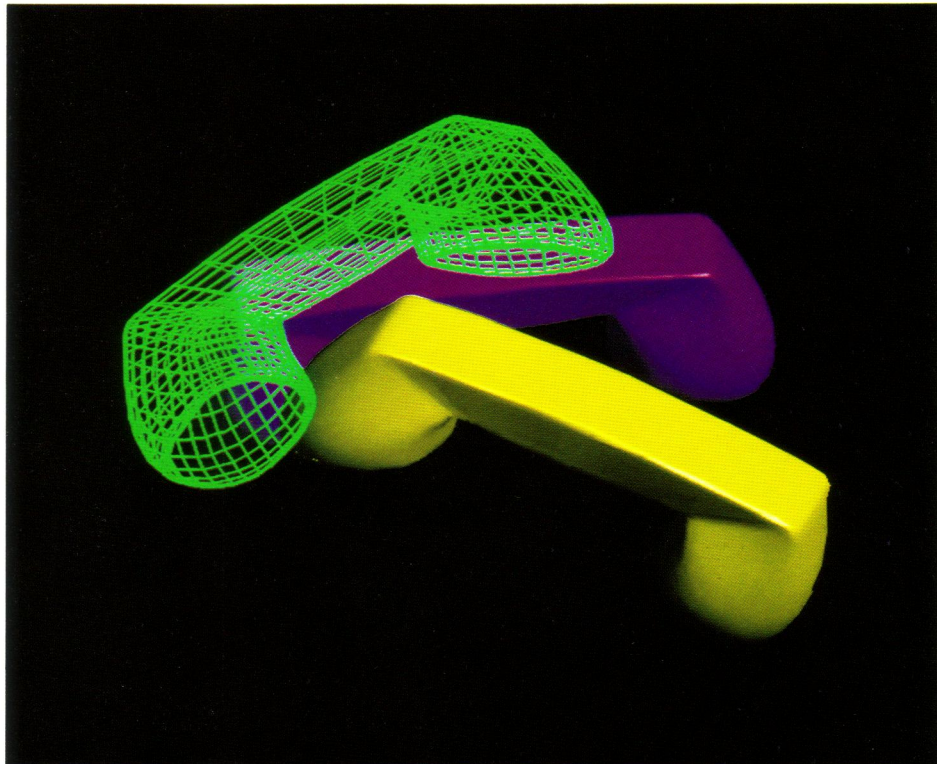


▲ Transparency for complex objects: less than 10 seconds.

Anti-aliased isoparametric curves and B-spline surface: less than 15 seconds. ▶



▲ B-spline, cardinal and Bezier patches: less than 15 seconds.



Hierarchical Display List Structure

A powerful yet flexible display list structure supports nested transformations, instancing, picking and other advanced concepts needed for interactive design systems. Also included are contouring and sectioning functions for evaluation of complex intersecting surfaces.

Object And Polygon Mesh Data Types

Fast vector and shaded, hidden surface display modes are provided. Shared vertex points are only loaded and transformed once, instead of for each occurrence in a polygon. This drastically cuts host computer loading and speeds user interaction by omitting any awkward reformatting of the CAD database required for other display systems.

Positionable Colored Light Sources With Specular Reflection (Highlights)

Image realism is enhanced and more information about surface curvature and structure is provided. High-speed microcode performs all shading calculations locally without time-

consuming host computer computation of surface normals and vertex shade intensities.

Anti-Aliased, Hidden-Surface Shaded Images

Objectionable "jaggies" are essentially eliminated, giving a more accurate rendering of the model. Local microcode provides extraordinarily fast display generation. Interactive operation with improved user acceptance is the result.

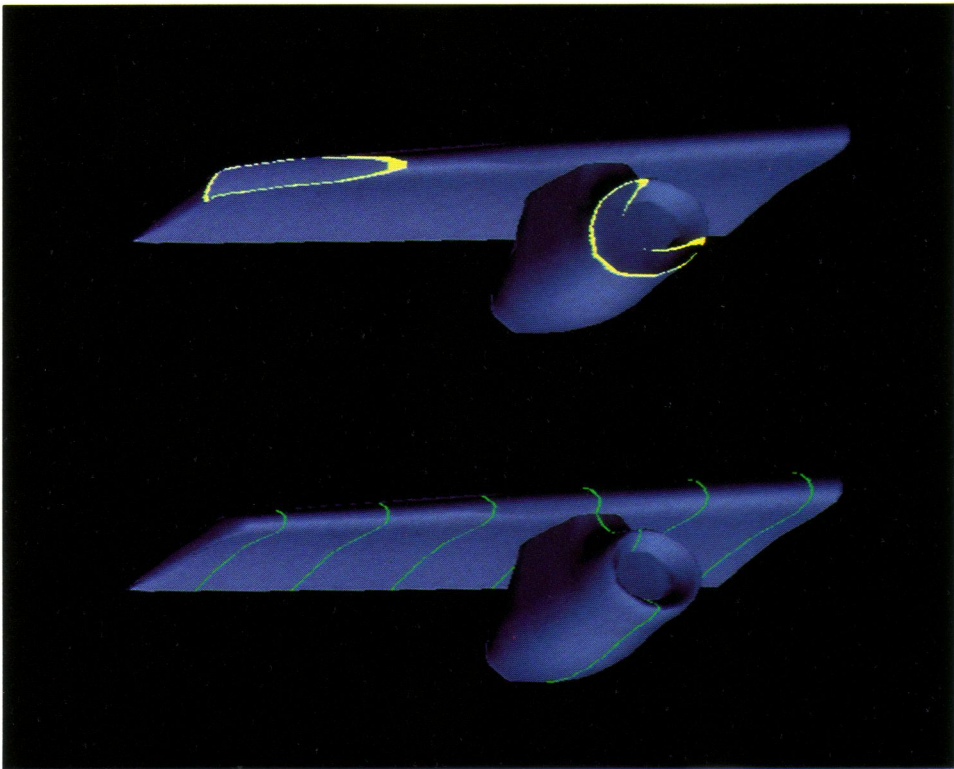
Transparent Shaded Surfaces

SOLID 3000 provides a realistic transparency calculation with multiple layers and highlights, eliminating the annoying side effects of simpler "screen door" schemes. Complicated solid models can be presented by allowing the viewer to see through outer surfaces to inner parts. Fast, clear visualization of complex designs leads to increased CAD productivity.

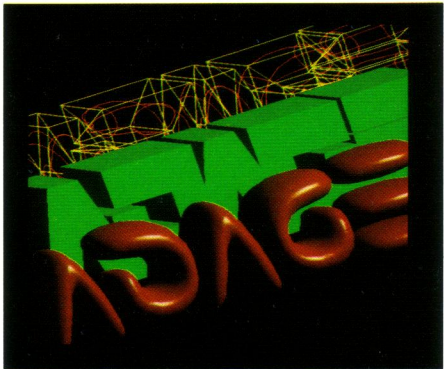
Advanced Display Techniques

In addition to true Phong shading with locally computed surface normals for accurate surface curvature display,

of Three-Dimensional Solid Modeling Data



▶ B-spline surfaces with highlighted sectioning and contouring planes: less than 10 seconds.



▲ Local surface rendition from 3-D data points: less than 6 seconds.

SOLID 3000 provides two sophisticated texturing techniques. A colored picture or intensity array can be mapped onto a displayed surface to simulate different materials or lighting effects in just a few seconds. Simultaneously, a surface roughness pattern ("bump map") can be used in calculating the surface shading. Thus, very sophisticated images for visual design evaluation or product advertising can be speedily produced.

The SOLID 3000 FORTRAN subroutines are in addition to the standard Adage 3000 FORTRAN Support Subroutines display package. The standard FSS 3000 package provides such features as local rotation and perspective viewing, anti-aliased vectors, high-speed characters, and Z-buffer hidden surface display.

The SOLID 3000 package supports 1024×1024 and 512×512 screen resolutions, allowing, for example, a high-resolution, cost-effective, 64-color system to be used for high-quality displays (16 million simultaneous colors) at the lower resolution.

The SOLID 3000 FORTRAN subroutines are written in ANSI FORTRAN and are easy to implement on most computers. The package uses standard Adage 3000 drivers for popular minicomputers. The microcode routines are written in the high-level C language and may be modified or extended by using the ICROSS-3000 microcode compiler, which is available from Intermetrics, Inc.

SPECIFICATIONS:

SOLID 3000 FORTRAN Subroutines Summary

NOTE: SOLID-64K requires 16 bits/pixel image memory
SOLID-16M requires 24 bits/pixel image memory

Data Types

- Define a polygonal or curved surface with a list of vertices, and, optionally, lists of pointers, surface normals, and/or colors.
- Define a polygon or polyline with a list of vertices, and, optionally, lists of surface normals and/or colors.
- Define a string of text at a screen location.

Display Attributes

- Enable shading or line drawing.
- Enable smooth shading or flat shading.
- Enable back-facing polygon cull.
- Define the default color of data.
- Enable Phong shading (interpolate surface normals and calculate light source intensity at each pixel) — SOLID-16M only — or Gouraud shading (calculate light source intensity at each vertex and interpolate color at each pixel).
- Enable anti-aliasing by calculating sub-pixel coverage — SOLID-16M only.
- Enable translucency as averaged color — SOLID-16M only — or as a "screen door" mask.
- Define the "screen door" translucency pixel mask.

Light Source

- Define a light source with position, color, and ambient, diffuse, and specular components. (No specular component for SOLID-64K.)
- Enable one, several or all light sources.

Viewing Attributes

- Define the current clipping window.
- Define the world to screen coordinate mapping.
- Define current transformation (including perspective).
- Enable sectioning of data by a plane on the Z axis.
- Enable contouring of displayed data with arbitrary 3-D data.

Mapping (SOLID-16M Only)

- Enable parametric mapping.
- Enable texture mapping of image data onto 3-D surfaces.
- Enable 3-D surface normal perturbation by bump mapping.

Curves/Surfaces

- Define curve/surface basis (such as B-spline, Bezier, Catmull-Rom).
- Enable rational curves/surfaces.
- Enable curve drawing or surface patch subdivision.
- Define curve/surface end knot conditions.
- Define curve/surface subdivision tolerance.
- Enable curve/surface control vertex mesh drawing.

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ADAGE 3000

SEISMIC DISPLAY SOFTWARE

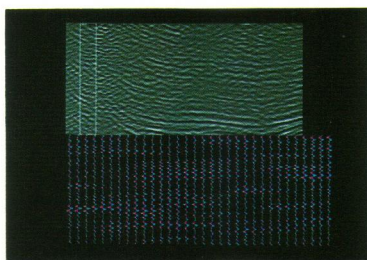
The Adage SEISMIC 3000 software package is a library of microcoded FORTRAN-callable subroutines and utility programs for the Adage 3000 Color Raster Display System. These subroutines were designed specifically to allow rapid display and interactive manipulation of 2-D and 3-D seismic data on the Adage 3000 Color Raster Display System. The package is intended for software developers integrating the Adage 3000 into new or existing seismic interpretation applications. SEISMIC 3000 provides easy-to-use graphics and imaging functions tailored to the data formats and display requirements needed for interactive seismic systems.

Local performance of display functions by the Adage 3000 System, which includes a 32-bit, 208-nanosecond bit-slice processor and fast internal data pathways, provides dramatic performance gains in interactivity, display generation and computation. The host computer maintains control over the interactive session, while being relieved of display functions more efficiently performed within the Adage 3000 System.

The Adage 3000—with its multi-processor architecture, advanced hardware and modular design—is uniquely suited for seismic display tasks that require both high-speed graphics and imaging capabilities. In addition, high-performance Adage 3000 Systems are used in applications as varied as remote sensing, real-time 3-D flight simulation, and interactive solid modeling for CAD/CAM.

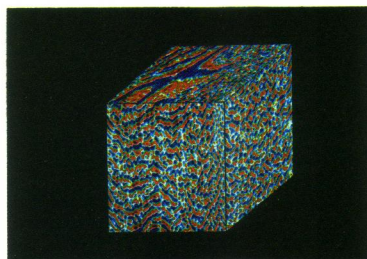
Unique display and manipulation functions provided in the SEISMIC 3000 package include:

Rapid interactive display of 2-D and 3-D seismic sections in variable density and variable area (VAR) formats. Extremely fast microcoded "wiggle trace" display routines allow real-time (less than 1/4 second) interactive generation of a full screen of seismic data. With the Adage 3000, a user can interactively select portions of a section in variable density format and instantaneously view a variable area display of the selected trace data. The host computer is completely freed from any raster-to-vector conversion and data re-transmission tasks.



Variable density/variable area (VAR) display: less than 1/4 second.

3-D data volume access with viewing from any x-, y-, or z-axis normal. High speed, microcoded unpacking of 3-D data provides an order of magnitude increase in display rates.



Mapped 3-D survey data: less than 2 seconds.

Split-screen presentation of intersecting seismic sections. Cross-section and cross-fault comparison and manipulation can be done interactively by moving the two areas. Display of stretched or squeezed data is provided for interpreting sections with cross-fault differential compression. Variable density, wiggle, and VAR format presentations are provided.

Interactive movie-loop display of parallel seismic sections, using high-speed data unpacking and interpolation microcode. Movie loops can be run directly from data stored on disk or from data stored in the large image memory of the Adage 3000 System (configurations up to 192 images, each 256 x 256 x 8).

Multiple format real-time display of trace data, providing:

Variable amplitude (wiggle).

Variable area (VAR).

Combined VAR/wiggle formats.

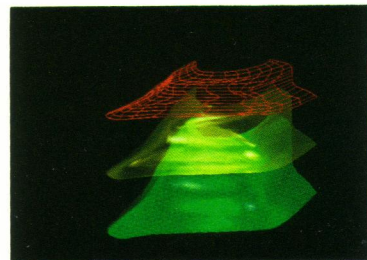
Variable intensity.

Selectable color and monochrome presentation formats.

Selectable aspect ratios, data precision and trace overlap.

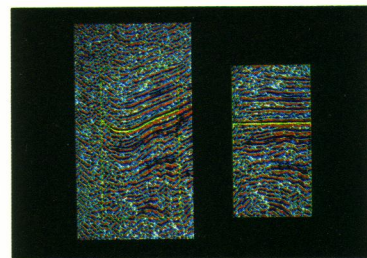
Interactive 2-D and 3-D drawing and storage of sub-surface structure interpretations.

This function provides the same real-time performance as Adage's CAD/CAM and simulation graphics systems. Functions for drawing interpreted surfaces (wire-frame or shaded display) as well as interactive picking of horizons are provided in high-speed microcode. Advanced features such as transparent surface display and automatic bi-cubic surface interpolation are included.



Sub-surface interpolation and display: less than 10 seconds.

Section display with sub-surface horizon flattening. Provided by custom microcode, this function occurs at truly interactive speeds.



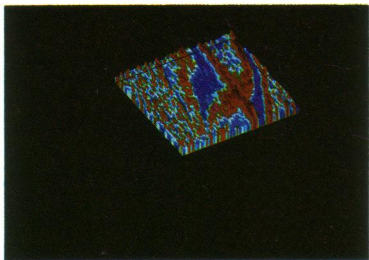
Horizon flattening: less than 2 seconds.

ADAGE 3000

3-D displays of seismic section data, sub-surfaces, and interpretations. Interactive display speeds bring an entirely new capability to the interpreter. Complex 3-D display computations are quickly done by the Adage 3000 Color Raster Display System without burdening the host computer. A wide range of viewing formats is provided for intersecting 2-D survey sections as well as 3-D survey volumes.

Interactive display of seismic section data.

Displays can be presented in novel formats, including 2½-D waterfall (pseudo 3-D VAR) and reflectance map (gradient surface) modes.



Pseudo 3-D variable area display: less than 1 second.

The SEISMIC 3000 FORTRAN subroutines enhance and extend the standard Adage 3000 FORTRAN Support Subroutines display package. The standard FSS 3000 package provides such features as local rotation and perspective viewing, anti-aliased vectors, high-speed characters, and Z-buffer hidden surface display.

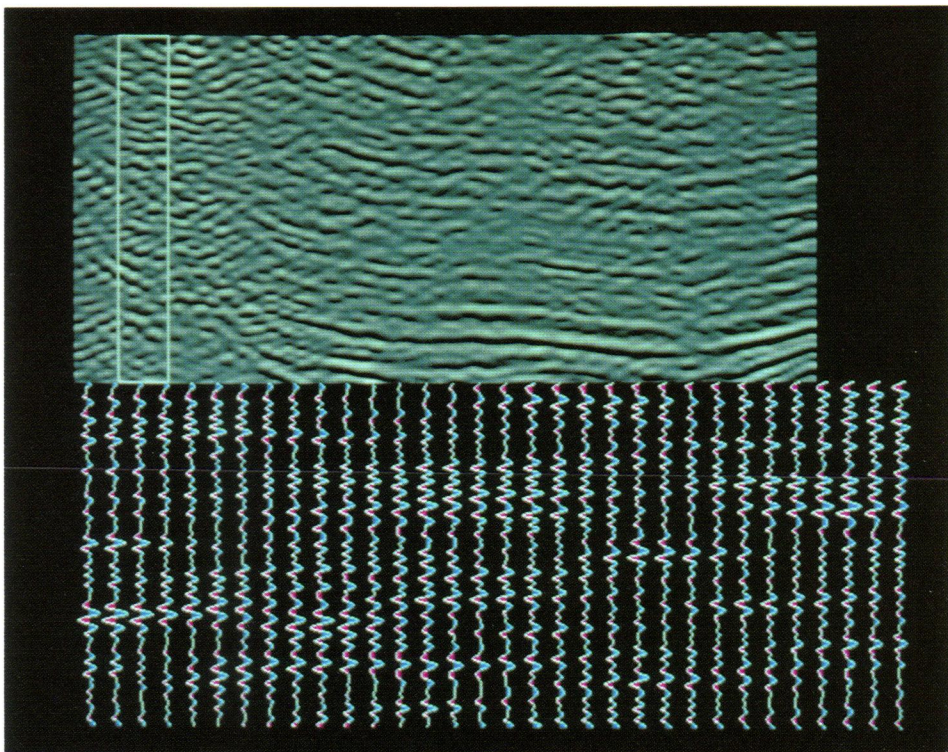
The SEISMIC 3000 package supports 1024 x 1024 and 512 x 512 screen resolutions, allowing, for example, a high-resolution, cost-effective, 64-color system to also be used for high-quality displays (16 million simultaneous colors) at the lower resolution.

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Adage 3000 Seismic Display Software

ADAGE

- *Rapid interactive display of variable density and variable area formats (VAR)*
- *3-D data volume access with viewing from any axis normal*
- *Interactive movie-loop display of parallel seismic sections*
- *3-D presentation of intersecting seismic sections*
- *Multiple format real-time display of trace data*
- *Interactive 2-D and 3-D drawing of sub-surface structure interpretations*
- *3-D displays of seismic section data, subsurfaces and interpretations*
- *Local disk storage option*



Variable density/variable area (VAR) display: less than ¼ second.

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relieved of display functions more efficiently performed within the Adage 3000 System.

The Adage 3000 — with its multi-processor architecture, advanced hardware and modular design — is uniquely suited for seismic display tasks that require both high-speed graphics and imaging capabilities. In addition, high-performance Adage 3000 Systems are used in applications as varied as remote sensing, real-time 3-D flight simulation, and interactive solid modeling for CAD/CAM.

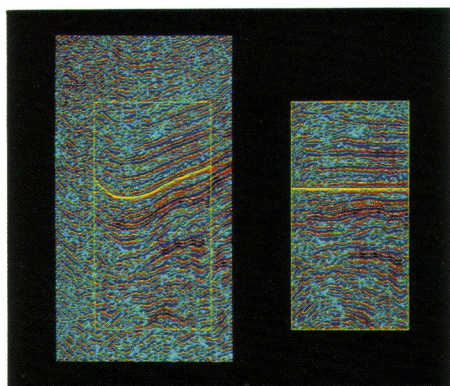
Unique display and manipulation functions provided in the SEISMIC 3000 package include:

Rapid Interactive Display of 2-D and 3-D Seismic Sections in Variable Density and Variable Area (VAR) Formats

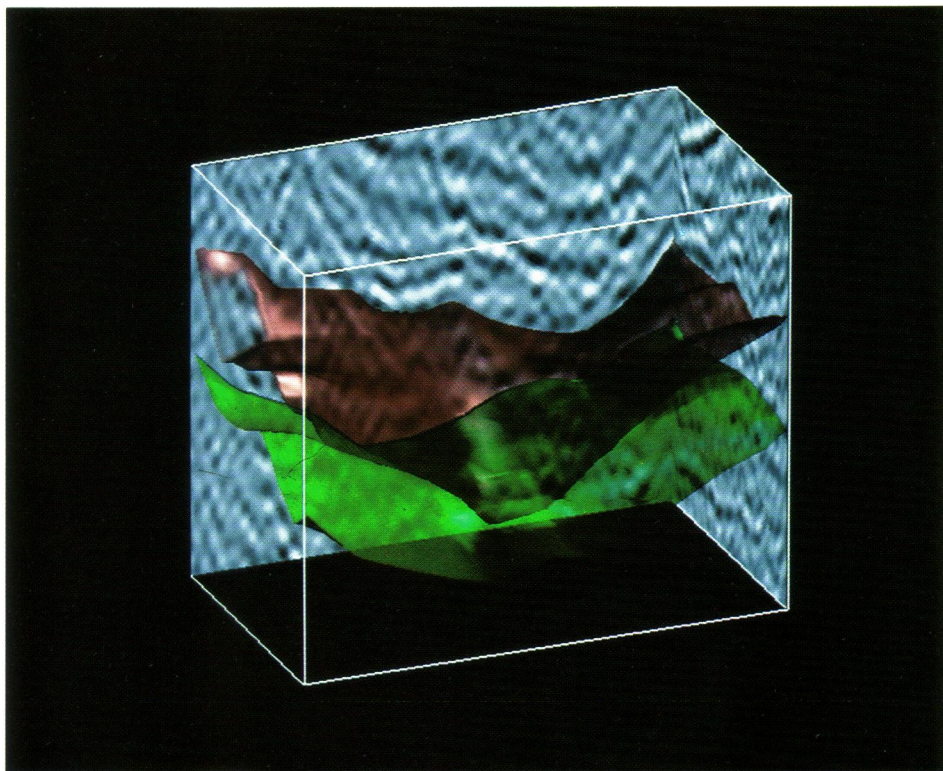
Extremely fast microcoded "wiggle trace" display routines allow real-time (less than ¼ second) interactive generation of a full screen of seismic data. With the Adage 3000, a user

Rapid Display and Interactive Manipulation

Sub-surface display with
translucency and intersecting
section data: less than 15 seconds.



▲ Horizon flattening: less than
2 seconds.



can interactively select portions of a section in variable density format and immediately view a variable area display of the selected trace data. The host computer is completely freed from any raster-to-vector conversion and data re-transmission tasks.

3-D Data Volume Access with Viewing from Any X-, Y-, Z-Axis Normal

High speed, microcoded unpacking of 3-D data provides an order of magnitude increase in display rates. Time-slices, in-line sections and cross-line sections may be extracted and viewed from a single disk-based 3-D volumetric database. Presentation methods include isometric projections of the rectangular solid volume, with arbitrary sectioning planes or cut-aways revealing the interior solid volume data.

Interactive Movie-Loop Display of Parallel Seismic Sections

Using high-speed data unpacking and interpolation microcode, movie loops can also be run directly from data stored in the large image memory of the Adage 3000 System.

Presentation of Intersecting Seismic Sections

Cross-section and cross-fault comparison and manipulation can be done by interactively moving the areas of interest. Display of stretched or squeezed data is provided for interpreting sections with cross-fault differential compression. Variable density, wiggle, and VAR format presentations are provided.

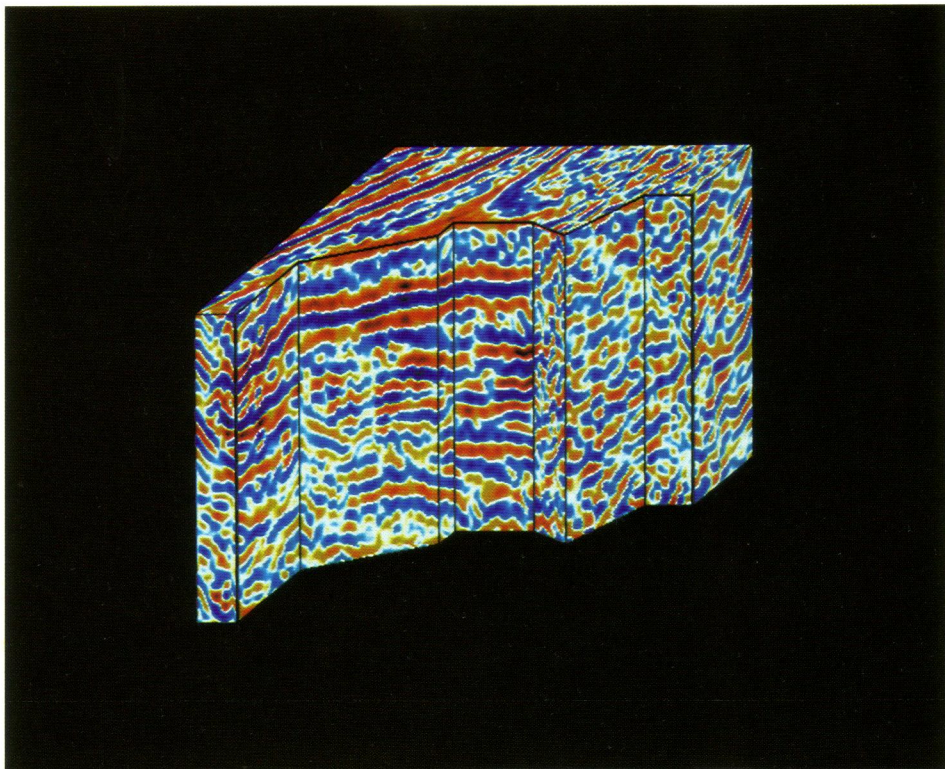
Multiple Format Real-Time Display of Trace Data Providing:

- Variable amplitude (wiggle)
- Variable area (VAR)
- Combined VAR/wiggle formats
- Selectable color and monochrome presentation formats
- Selectable aspect ratios and trace overlap

Interactive 2-D and 3-D Drawing of Sub-Surface Structure Interpretations

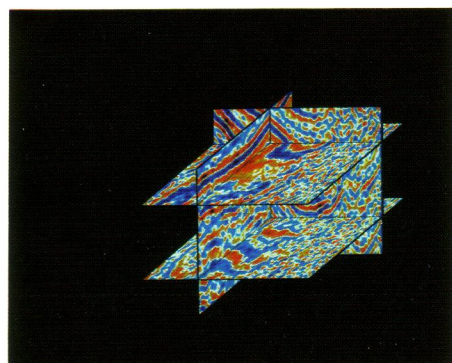
This function provides the same real-time performance as Adage's CAD/CAM and simulation graphics systems. Functions for drawing interpreted surfaces (wire-frame or shaded display) are provided in high-

of Two and Three-Dimensional Seismic Data



◀ 3-D survey data with arbitrary cutting planes: less than 15 seconds.

▼ Selected time-slices and vertical sections from 3-D survey: less than 15 seconds.



speed microcode. Advanced features such as transparent surface display, and automatic bi-cubic surface interpolation and multiple light sources are included.

3-D Displays of Seismic Section Data, Sub-Surfaces, and Interpretations

Interactive display speeds bring an entirely new capability to the interpreter. Complex 3-D display computations are quickly done by the Adage 3000 Color Raster Display System without burdening the host computer. A wide range of viewing formats is provided for intersecting 2-D survey sections, as well as 3-D survey volumes.

Interactive Display of Seismic Section Data

Displays can be presented in novel formats, including $2\frac{1}{2}$ -D waterfall (pseudo 3-D VAR) and reflectance map (gradient surface) modes.

Local Disk Storage Option

The Adage 3000 can be configured with local 160 Mb Winchester disks with a direct data pathway to image

memory. Data-sets can be downloaded from the host computer and then accessed locally, without being subject to host computer I/O loading or host data bus bandwidth limitations.

The SEISMIC 3000 FORTRAN subroutines are in addition to the standard Adage 3000 FORTRAN Support Subroutines display package. The standard FSS 3000 package provides such features as a local rotation and perspective viewing, anti-aliased vectors, high-speed characters, and Z-buffered hidden surface display.

The SEISMIC 3000 package supports 1024×1024 and 512×512 screen resolutions, allowing, for example, a high-resolution, cost effective, 64-color system to also be used for high-quality displays (16 million simultaneous colors) at the lower resolution.

The SEISMIC 3000 FORTRAN routines are written in ANSI FORTRAN and are easy to implement on most computers. The package uses standard Adage 3000 drivers for popular minicomputers. The microcode routines are written in the high-level C language and may be modified or extended by using the ICROSS-3000 microcode compiler, which is available from Intermetrics, Inc.

SPECIFICATIONS:

Seismic Display Functions:

- Wiggle trace display — Draws 2-D section region-of-interest in variable-area/wiggle-trace format, with selectable format, overlap, color and precision.
- Extract and display 3-D survey data — Used to rapidly extract time-slices or vertical sections from solid cube representation of 3-D survey.
- Flatten horizon on 2-D section — Given region-of-interest and horizon pick-point list, flattens section data to a straight line of specified slope.

Image Operations:

- Copy image memory rectangular area.
- Zoom region-of-interest, with bilinear interpolation.
- Copy and scale image rectangle — Performs filtered scaling operations to stage sides of a 3-D cube for interactive rotation.
- Copy and skew image rectangle, without scaling — Used to composite 2-D sections into 3-D cube views.
- Perform in-place coordinate swapping — Provides mirror imaging, 90/180/270 degree rotation of image.
- Extract x & y gradients of image — Used to highlight directional features via simulated light source.
- Perform image memory rectangle merging operations, such as add, multiply, difference, and & or.
- Perform pixel operations within an image memory rectangle, such as add, subtract, multiply, mask and scale.
- Texture-map image data to specified screen coordinates — Used to produce displays requiring arbitrary rotation and placement of section data in three-dimensional space, such as the intersection of 2-D sections, or a cube of 3-D survey data. Depth-buffering is supported, for fast, flexible rendering of complex three-dimensional structures.

Graphic Operations:

- Draw vector list, with optional translucency and depth buffering. Integer and floating-point formats are supported — Used when rendering three-dimensional views, such as intersecting sections containing a closed horizon loop.
- Flood-fill closed polygon — Used to extract an arbitrary region-of-interest, such as sub-surfaces thrown across a fault.
- Draw surfaces, with smooth shading, highlights transparency and hidden surface removal — Used for viewing subsurface structure.
- 3-D transformation of graphics data.

Interactive Demonstration Programs

TRACE
Demonstration wiggle trace display formats
CP
Cut-and-paste image region-of-interest
HZNFLT
Flatten 2-D section horizon

SURF
Construct surface presentation of 2-D/3-D
horizon closed-loop
READ3D
Display 3-D survey data in movie-loop and 3-D
cube formats
CUBE
Rotate 3-D solid cube to arbitrary viewing
positions

Worldwide Sales and Service

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