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IMAT GRAPHICS MANUAL

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IMAT GRAPHICS MANUAL

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INTRODUCTION

The Integrated Multidisciplinary Analysis Tool (IMAT) is a computer software system for the VAX/VMS computer that has been developed at NASA Langley Research Center (LaRC) to provide researchers and analysts with an efficient capability to analyze satellite control systems influenced by structural dynamics. IMAT uses a menu-driven executive system coupled with a relational database to link commercial structures, structural dynamics and controls codes. IMAT also provides a common interface for storing, retrieving, and displaying graphical information through the device-independent DI-3000 software developed by Precision Visuals, Incorporated (PVI), and the Raster Metafile system developed at LaRC. IMAT processors accomplish this task by converting plot files created by commercial software into device-independent metafiles which may be displayed on a variety of common graphics terminals or plotted on any hardcopy device supported by the Analysis and Computation Division (ACD). The IMAT graphics menu also features automated procedures to create publication-quality plots of formatted XY data (such as time histories or Bode plots), to combine NASTRAN mode shape plots in several views into single-frame plots, and to access PVI's PicSure and Draw software.

The purpose of this manual is to describe the features of the IMAT graphics system and to show users of commercial analysis codes (MATRIXx, MSC/NASTRAN, and I-DEAS) how to use the system to obtain high-quality graphical output using familiar plotting procedures. An introductory section explains the concepts of vector and raster metafiles, which are the key element in the IMAT graphics system. A section entitled "Interfaces to Commercial Software" describes the procedures for converting commercial analysis code output to metafile format and generating hardcopy plots. Step by step examples illustrate the process for each supported analysis code. The section entitled "IMAT Graphics Processors" describes in detail the functions of each of the graphics processors, and includes explanations of all menu options. Appendix A explains the function of the DI-3000 metafile translator and shows how to use it to manipulate graphics data. Appendices B and C describe the available graphics hardware and the IMAT-supported commercial software, and Appendix D contains definitions of key graphics terms.

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METAFILE GRAPHICS CONCEPTS

The IMAT graphics system provides a common interface for storing, retrieving and displaying graphical information primarily by converting commercial-code graphics output to generic plot files called metafiles. The form of the metafile depends on the type of output from which it was converted.

The IMAT system uses two types of metafiles. The first, and most common, is a vector metafile, which consists of commands to draw line segments (vectors) and to write text, and commands to set parameters such as color and line style. Vector metafiles are used to store 1) line drawings, such as MSC/NASTRAN or I-DEAS structure plots, or 2) XY plots such as Bode plots or simulation time-histories from MATRIXx. IMAT uses the proprietary DI-3000 metafile format developed and marketed by Precision Visuals, Incorporated (PVI) to process vector graphics. DI-3000 software is installed and maintained on Langley's Cyber (NOS), Cray (UNIX), and Convex (UNIX) computers and is also installed on several distributed computer systems such as the Building 1229 VAX-cluster. DI-3000 metafiles are machine-independent (i.e., the same file may be used on any computer) as well as device-independent (i.e., the same file may be displayed on any supported graphics terminal or plotted on any supported hardcopy device). Vector pictures can be easily magnified, translated, rotated or combined with other pictures. The DI-3000 Primer contained in Appendix A of this manual discusses in more detail the methods used to achieve device-independence and to manipulate DI-3000 metafiles.

The Raster Metafile system developed at Langley works in a similar manner, however, the information contained in a raster metafile is quite different from the information in a vector metafile. A raster picture is described by an array of horizontal scanning lines. Each scanning line consists of a series of visible dots called pixels. In a raster metafile, each pixel is described by red, green and blue color intensity values. The resolution of a pixel image is described by the number of pixels per scanning line and the total number of scanning lines. For example, a picture having a resolution of 1280 x 1024 consists of 1024 horizontal scanning lines containing 1280 pixels each. Currently, the only application of raster graphics in IMAT is shaded images created by I-DEAS. The quality or resolution of a shaded-image picture is a function of the graphics terminal which is used during the picture creation in I-DEAS. Common graphics terminals at LaRC have resolutions ranging from 480 x 360 to 1024 x 1280 and color display capabilities ranging from 8 colors to 4096 colors. IMAT processors offer three resolutions for raster metafiles - 512 x 512, 1024 x 1024, and 2048 x 2048. I-DEAS picture files are automatically centered in the IMAT raster metafile, and parts of the picture will be clipped, i.e., discarded, if the chosen metafile resolution is less than the resolution of the original picture. A disadvantage of raster images is that they cannot be magnified or manipulated in the same manner as vector images.

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INTERFACES TO COMMERCIAL SOFTWARE

The IMAT graphics processors were developed to provide users of commercial codes on the Building 1229 VAX-cluster computers with a means of obtaining high-quality graphical output on any of the hardcopy devices supported by ACD. This task is accomplished primarily by converting commercial-code graphics files to device-independent metafiles, which can be transferred to the ACD Cyber (NOS) computers. All IMAT-supported hardcopy graphics devices (except personal laser printers) are connected directly or indirectly to the NOS computers.

IMAT also offers post-processing capabilities, such as the creation of publication-quality XY plots from MATRIXx or NASTRAN data, and the commercial graphics codes PicSure and Draw, which allow users to create and/or modify XY plots, bar charts or existing metafiles. Figure 1 shows the procedures for generating graphical output from commercial-code data or picture files. The IMAT interfaces to the three supported commercial codes - MATRIXx, MSC/NASTRAN and SDRC I-DEAS - are described in the following sections and examples are included. The procedures were designed to be as simple and user-friendly as possible, however, they involve multiple files, operating systems, and hardware platforms. The section entitled IMAT Graphics Processors describes in detail the functions of each of the graphics processors, and Appendix B provides detailed descriptions of the IMAT-supported graphics hardware.

LASER PRINTER

EXAMPLE

FORCE, LBF

TIME, SEC

PUBLICATION-QUALITY XY PLOT

GRAPHICS DISPLAY TERMINAL

VERSATERM PRO to MACDRAW

MACINTOSH ONLY

LASER PRINTER

CYBER (NOS) COMPUTERS (ACD)

HARDCOPY DEVICES

(COLOR VERSATEC, CELCO, IBM 3800 LASER PRINTER, ETC.)

IMAT GRAPHICS/ DISPLAY METAFILE

IMAT GRAPHICS/ HARDCOPY METAFILE

FINAL HARDCOPY (COLOR OR B/W)

POSTSCRIPT FILE

DI-3000 METAFILE

POSTSCRIPT FILE

DI-3000 METAFILE

DI-3000 METAFILE

RASTER METAFILE

IMAT GRAPHICS/ PLOT XY DATA

IMAT GRAPHICS/ GENERATE METAFILE

IMAT GRAPHICS/ PLOT XY DATA

IMAT GRAPHICS/ GENERATE METAFILE

IMAT GRAPHICS/ GENERATE METAFILE

IMAT GRAPHICS/ GENERATE METAFILE

FORMATTED DATA FILE

LASER PLOT FILE

NASTRAN PUNCH FILE

NASTRAN PLOT FILE

VECTOR (LINE DRAWING) PICTURE FILE

RASTER (SHADED-IMAGE) PICTURE FILE

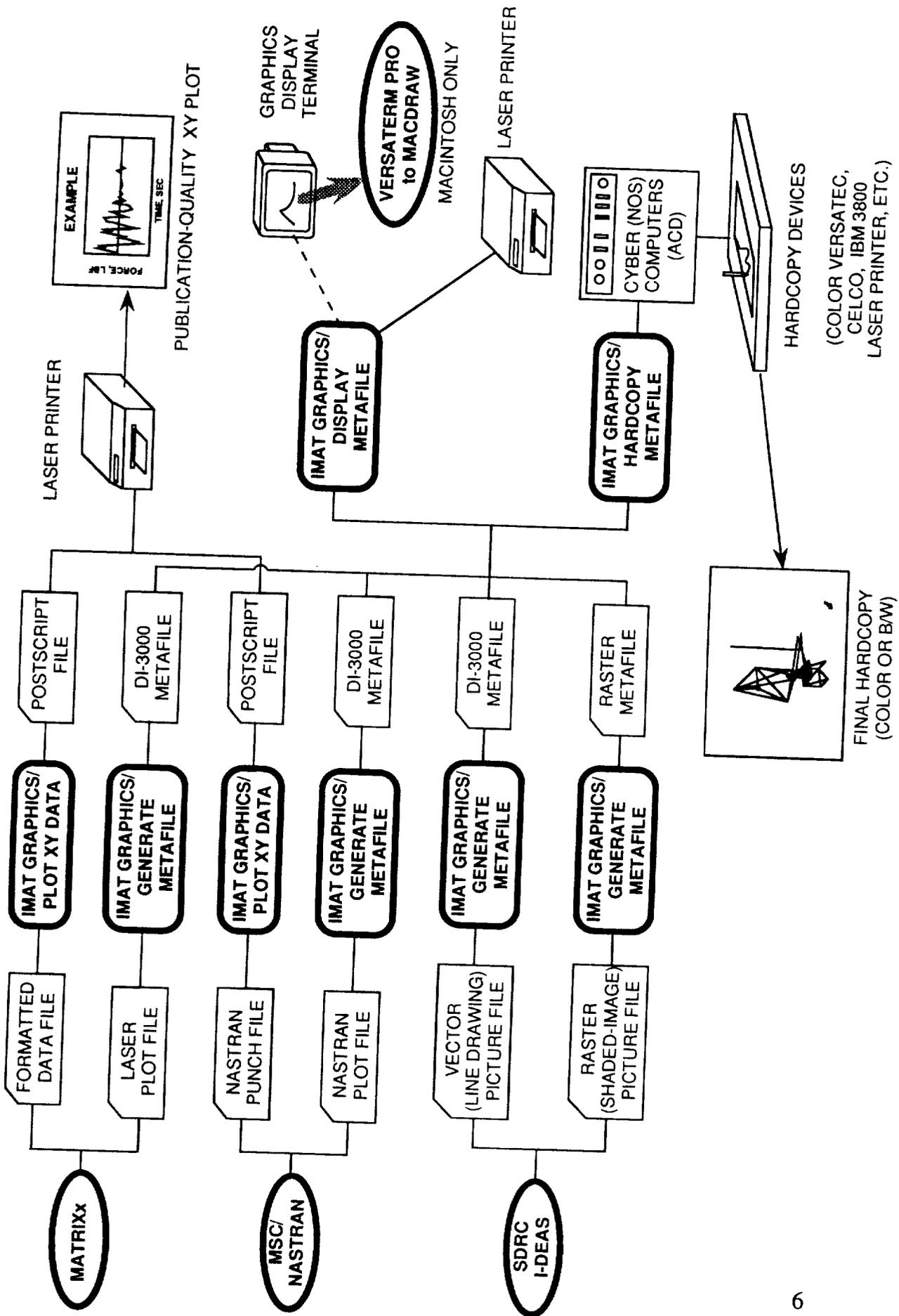MATRIXx

MSC/ NASTRAN

SDRC I-DEAS

Fig. 1 IMAT Graphics process

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I-DEAS

IMAT graphics processors generate device-independent graphics metafiles from SDRC/I-DEAS picture files (either binary or formatted), which are created in Solid Modeling, Finite Element Modeling, or any other I-DEAS family. I-DEAS picture files contain vector and/or raster data, depending on the Display Options selected in I-DEAS.

Vector data consists of lines, curves, symbols and text which are generated by a LINE (the I-DEAS default), HIDDEN_LINE, or FREE_FACE display, or by an XY plot. IMAT processors convert vector data files to DI-3000 metafiles.

Raster data, produced only by a SHADED_IMAGE display, consist of color intensity information for each "dot" (pixel) of the display screen on which the picture is generated. Therefore, the file is terminal-dependent, i.e., the resolution (number of pixels which make up the picture) is a function of the terminal used to create the original picture. For example, a Tektronix 4105 graphics terminal provides a 480 x 360 resolution, however, a Tektronix 4129 has a resolution of 1280 x 1024. An exception to this is the TT(Teletype) terminal type which can be used to execute I-DEAS without displaying graphical data. I-DEAS actually provides a resolution of 2000 x 2000 for SHADED_IMAGE picture files if TT is used. In this mode of operation, the picture file will be created but not displayed. Consult the SDRC publication "Using I-DEAS on VAX VMS" for a complete description of supported graphics terminals. IMAT processors convert raster data files to raster metafiles using the Langley-developed Raster Metafile Translator (RMT).

Examples 1 and 2 illustrate procedures for obtaining color hardcopies of I-DEAS picture files on the ACD plotters (See Appendix B for a list of available hardcopy devices).

EXAMPLE 1:   39 inch Color Versatec plot of an I-DEAS Finite Element model with node labels

In I-DEAS:

1. Go to the MODEL_FILE, PICTURE_FILE menu and turn on the WRITE SWITCH

2. After setting the desired DISPLAY_OPTIONS and VIEW options, go to DISPLAY_OPTIONS, LABEL_SWS and set the SIZE to 0.3 (The default I-DEAS label size (1.0) is too large; minimum size allowed by I-DEAS is 0.1)

3. Use the DRAW command and give a name (e.g., mypic) for the picture file (Let I-DEAS provide the default extension).

    Result: mypic.pfb (I-DEAS binary, vector-data picture file)

In IMAT:

1. Go to the GRAPHICS, GENERATE METAFILE menu, select I-DEAS, VECTOR, and answer the prompts.

    Result: mypic.mfl (a DI-3000 vector metafile)

2. (Optional) Go to DISPLAY METAFILE, VECTOR and view the new metafile on your graphics terminal to check the results.

3. Go to the GRAPHICS, HARDCOPY METAFILE MENU, select HARDCOPY EXISTING METAFILE and set the following options:

METAFILE NAME:	mypic.mfl (see Step 1 above)
DATA TYPE:	VECTOR
PLOTTER:	ZVER,39
PLOT CARD PARAMETERS:	DEFAULT
CONTINUATION CARDS:	DEFAULT
METAFILE COMMANDS:	DEFAULT

    Also include all requested NOS information, including login name, charge, password, and a name for the NOS version of your metafile.

    Final Result: A 39 inch Color Versatec plot which will be sent to your "Green-Tub" delivery destination. Figure 2 shows a smaller (8.5 x 11) version of a plot with node numbers. A portion of the plot is magnified to the approximate size which would appear on a 39 inch Versatec hardcopy.

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Note: this section enlarged to show actual size of plot as it would appear on the 39-inch Versatec plotter

Fig. 2 I-DEAS Finite Element Model plot with node numbers

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EXAMPLE 2:   4X5 Color Negative (using the Celco film recorder) of an I-DEAS solid geometry model

In I-DEAS:

1. Go to the MODEL_FILE, PICTURE_FILE menu and turn the WRITE_SWITCH on

2. Set the desired VIEW and DISPLAY OPTIONS

3. Use the appropriate draw command (e.g., DISPLAY_OPTIONS, SHADED_IMAGE, EXECUTE) and give a name (e.g., mypic) for the picture file (use I-DEAS default for extension)

    Result: mypic.pfb (I-DEAS binary, raster picture file)

    Note: The resolution of your picture is a function of the terminal on which you create the picture file.

In IMAT:

1. Go to the GRAPHICS, GENERATE METAFILE menu, select I-DEAS, RASTER DATA (1024 x 1024), and answer the prompts.

    Note: In this example it is assumed that the original I-DEAS shaded image was created on a Tektronix 4211 graphics terminal with a resolution of 1024 x 768. Therefore in order to avoid having part of the picture clipped, you must use the 1024 x 1024 processor. (If the picture had been created on a 4205 terminal with 480 x 360 resolution, the 512 x 512 processor would have been sufficient.)

    Result: mypic.ras (a raster metafile).

2. (Optional) Go to DISPLAY METAFILE, RASTER and view the new metafile on your graphics terminal to check the results

3. Go to the GRAPHICS, HARDCOPY METAFILE menu, select HARDCOPY EXISTING METAFILE and set the following options:

METAFILE NAME:	mypic.ras (see Step 1)
DATA TYPE:	RASTER
PLOTTER:	CELRAS,4
PLOT CARD PARAMETERS:	DEFAULT
CONTINUATION CARDS:	DEFAULT
METAFILE COMMANDS:	DEFAULT

    Also include all requested NOS information, including login name, charge, password, and a name for the NOS version of your metafile.

    Final Result: A 4 x 5 high-resolution color negative, which will be delivered to your "Green-Tub" delivery destination.

MSC/NASTRAN

MSC/NASTRAN users can use IMAT to obtain hardcopy output of NASTRAN plots on an ACD graphics plotter, display NASTRAN plots on any IMAT-supported graphics terminal, or generate publication-quality XY plots from data contained in a punch file. IMAT also provides an option to combine 2, 3 or 4 plots into a single frame. This capability is primarily intended to allow vibration mode shape plots in 3 or 4 views to be combined on a single page for each mode.

Example 3 illustrates the procedure for generating hardcopy output of MSC/NASTRAN plots, Example 4 illustrates the XY plot procedure, and Example 5 illustrates the procedure for combining mode shape plots.

EXAMPLE 3:   MSC/NASTRAN mode shape plots on the IBM3800 high-speed laser printer

In NASTRAN:

1. Use standard procedure for plotting mode shapes and submit run as usual.

    Result: myjob.plt (MSC/NASTRAN plot file)

In IMAT:

1. Go to the GRAPHICS, GENERATE METAFILE menu, select MSC/NASTRAN and answer the prompts.

    Result: myjob.mfl (a DI-3000 metafile containing all of the NASTRAN plots)

2. (Optional) Go to DISPLAY METAFILE, VECTOR, and view the metafile on your graphics terminal

3. Go to the GRAPHICS, HARDCOPY METAFILE MENU, select HARDCOPY EXISTING METAFILE and set the following options:

METAFILE NAME:	myjob.mfl (see Step 1)
DATA TYPE:	VECTOR
PLOTTER:	LASER
PLOT CARD PARAMETERS:	DEFAULT
CONTINUATION CARDS:	DEFAULT
METAFILE COMMANDS:	DEFAULT

    Also include all requested NOS information, including login name, charge, password, and a name for the NOS version of your metafile.

    Final Result: A set of plots printed on the unlined side of standard 132 column computer paper. The output is sent to your "Green Tub" delivery address. A typical plot is shown in Figure 3.

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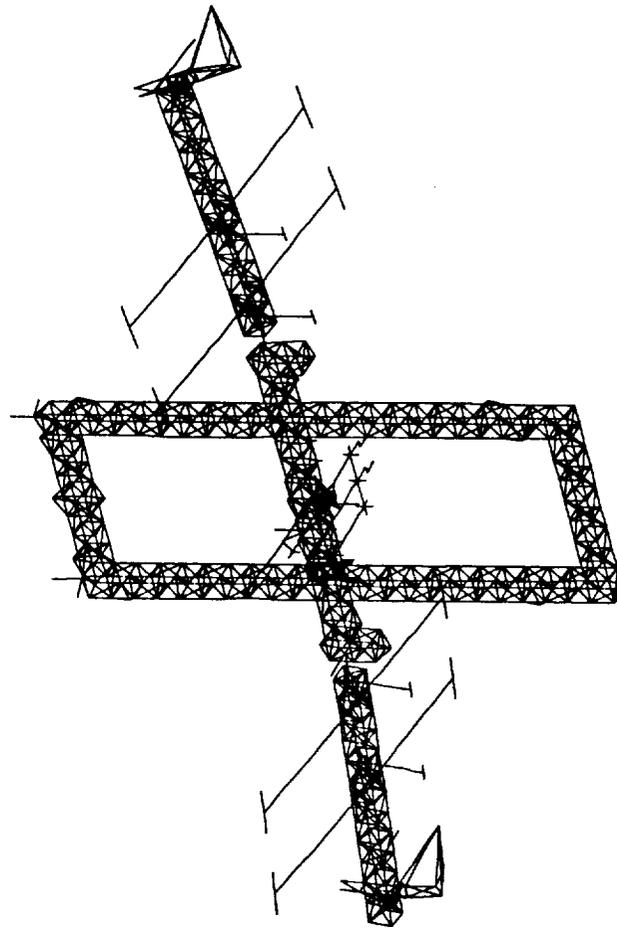
EOC ZERO ALPHA
NORMAL MODES ANALYSYS

MODAL DEFOR. SUBCASE 12 MODE 12 FREQ. 0.080569

Fig. 3 NASTRAN mode shape plot

13 10/1/90 MAX-DEF. = 0.14717815

EXAMPLE 4:   Multiple views of MSC/NASTRAN mode shapes on a single picture (frame).

In NASTRAN:

1. Use standard procedure for plotting mode shapes and submit run as usual.

    Result: myjob.plt (MSC/NASTRAN plot file)

In IMAT:

1. Go to the GRAPHICS, GENERATE METAFILE menu, select MSC/NASTRAN and answer the prompts. You will need to know your plot file name, and the number of plots of each mode that are contained in the file.

    Result: myjob.mfl (a DI-3000 metafile containing all of the NASTRAN mode shape plots)

2. Return to the GRAPHICS menu and select COMBINE NASTRAN MODE PLOTS. After you have answered the prompts, a batch job will be submitted for you. The batch job may take a long time to execute, if you have a large amount of information to process. (You can issue a SHOW QUEUE/ALL command at the VMS system level to check the status of your job).

    Final Result: A DI-3000 metafile containing one picture (frame) for each mode. Each picture contains multiple views of the same mode shape. You may obtain a hardcopy in the same manner shown in the previous example. Figure 4 shows an example of a multiple-view plot.
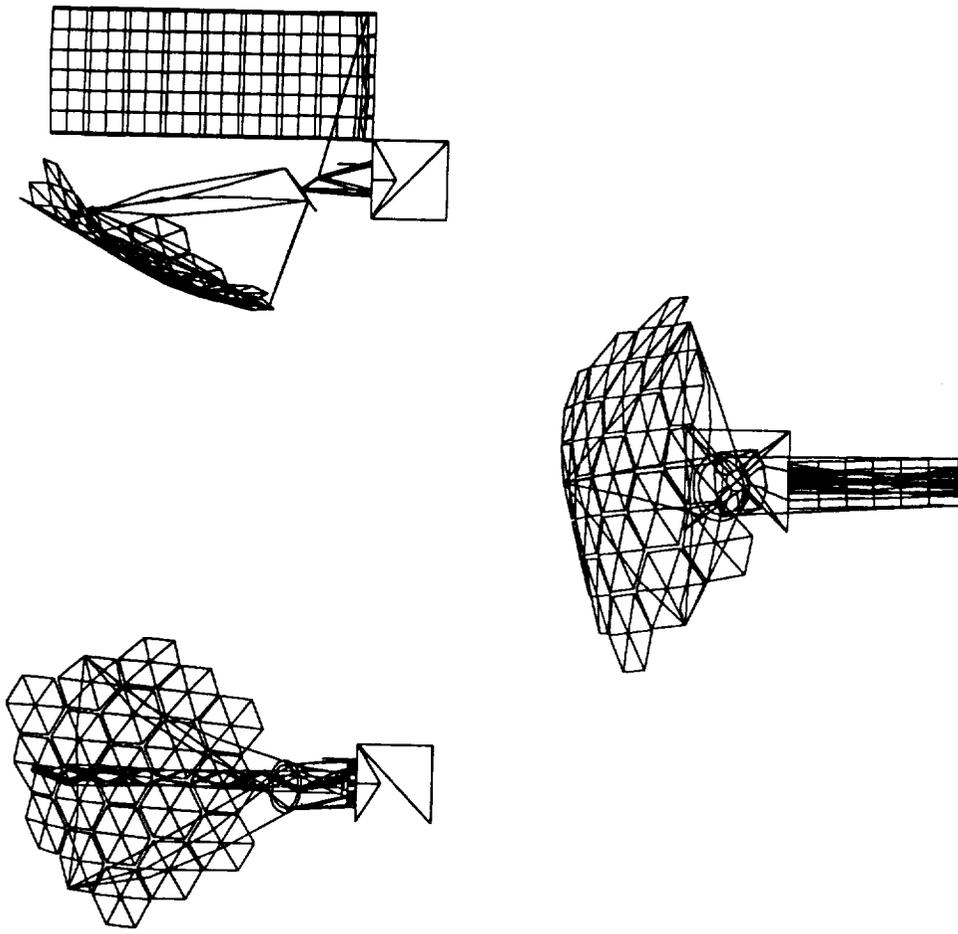
ROCKETDYNE 5D FINITE ELEMENT MODEL — CORRECTED JT MASS 6/90

MODAL DEFOR. SUBCASE 10 MODE 10 FREQ. 2.248430

Fig. 4 NASTRAN 3-view mode shape plot

EXAMPLE 5:   Publication-quality plot of NASTRAN XY plot data.

In NASTRAN:

    1.   Use standard procedure for XYPLOT output. However, you must replace the "XYPLOT" keyword with "XYPUNCH". The XYPUNCH command will send XY output to the PUNCH file instead of the plot file. (Note that format options such as titles and grids are not saved in the PUNCH file.)

        Result: myjob.pch (MSC/NASTRAN PUNCH file)

In IMAT:

    1.   Go to the GRAPHICS, PLOT XY DATA menu and select NASTRAN PUNCH. The processor will show you a list of XY plots contained in the PUNCH file and ask you to choose one plot. After you have answered the prompts, the program will create the following files for you:

        a)   A PicSure command file (PIC.CMD) that you can use with PVI's PicSure software to regenerate or modify the plot. (Note: PIC.CMD references two additional data files, one for x-axis data and one for y-axis data.) If you do not wish to modify the plot or use PicSure interactively, you can delete these files after you have obtained your output.

        b)   A batch command file which automatically executes PicSure and plots your data.

    Final Result: A file named POSTS.DAT which can be sent to any Postscript laser printer to obtain the final plot. Figure 5 (excluding the figure title at the bottom of the page) is an actual copy of a plot created by this process.
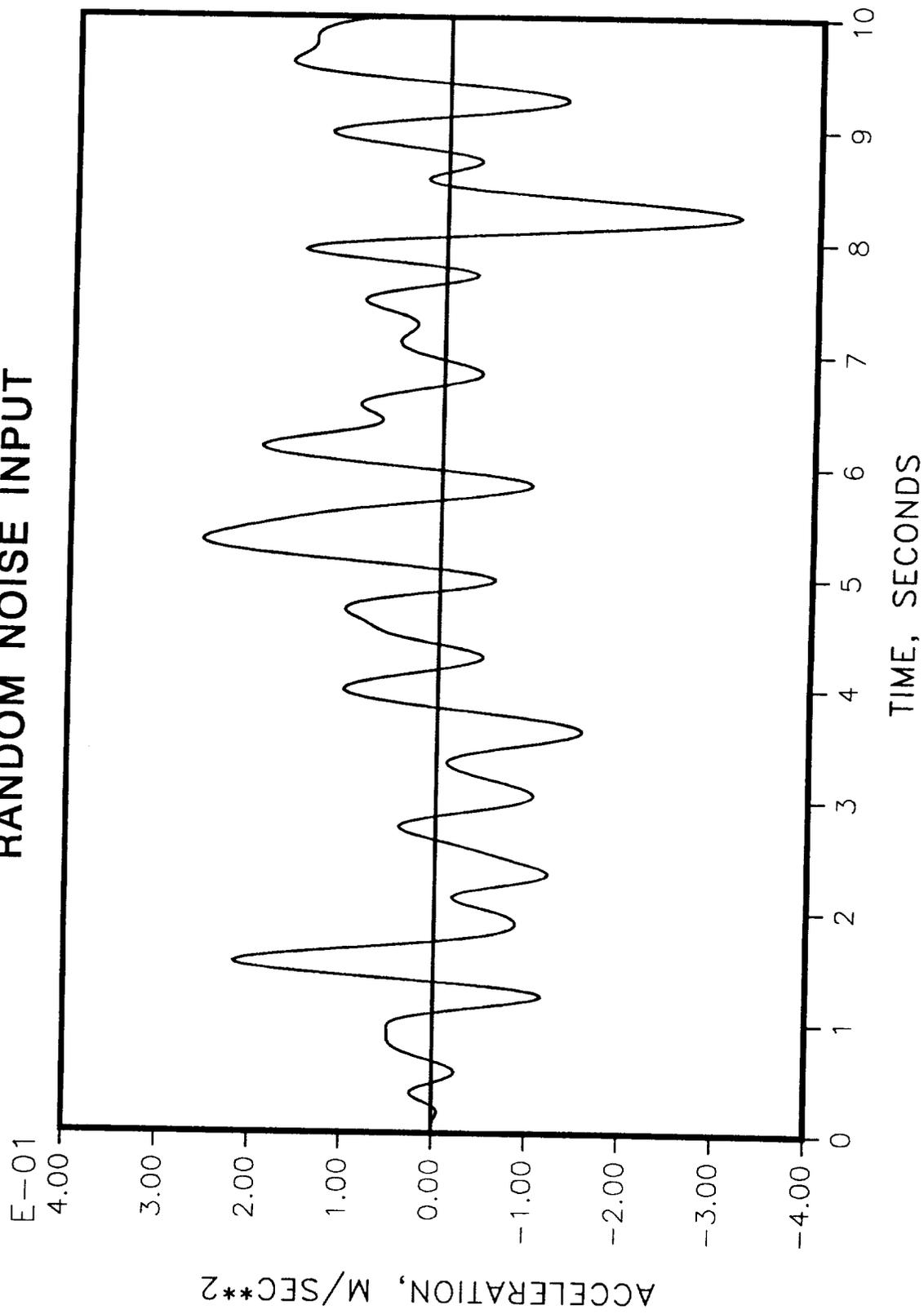
Fig. 5 NASTRAN XY plot using PicSure

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MATRIXx

MATRIXx users may obtain publication-quality XY plots of vector or matrix data by using the PLOT XY DATA option of the IMAT graphics menu. The MATRIXx interface allows you to plot any matrix data contained in a formatted file or create a standard Bode plot of a transfer function. The Bode plot can be formatted to include magnitude and/or phase information. Matrices must be written in column order, and it is the user's responsibility to choose the appropriate columns for the abscissa and ordinate of each plot. Examples 6 and 7 illustrate the procedures.

In addition to the XY plot capability, IMAT also provides a means of obtaining a DI-3000 metafile from a MATRIXx laser plot file (created using the MATRIXx "hardcopy" command).

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EXAMPLE 6:   Publication-quality time history plot of MATRIXx simulation output

In MATRIXx:

1. Use the MATRIXx "FSAVE" command to save the XY data you wish to plot. Data may be contained in more than one vector/matrix, however, column lengths must match.

    Note: The processor plots one or more columns (not rows) of data.

In IMAT:

1. Go to the GRAPHICS, PLOT XY DATA menu and choose MATRIXx VECTOR/MATRIX. The processor will display a menu of the variables contained in your formatted data file. Choose the appropriate variables for the independent and dependent datasets and provide the required title and labeling information. The program creates the following files:

    a) A PicSure command file (PIC.CMD) that you can use with PVI's PicSure software to regenerate or modify the plot. (Note: PIC.CMD refers to additional data files, one for x-axis data and one for each set of y-axis data.) If you do not wish to modify the plot or use PicSure interactively, you can delete these files after you have obtained your output.

    b) A batch command file which automatically executes PicSure and plots your data.

    Final Result: A file named POSTS.DAT which can be sent to any Postscript laser printer to obtain the final plot. Figure 6 (excluding the figure title at the bottom of the page) is an actual copy of a plot created by this process.

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SPACE STATION TRANSIENT DISTURBANCE
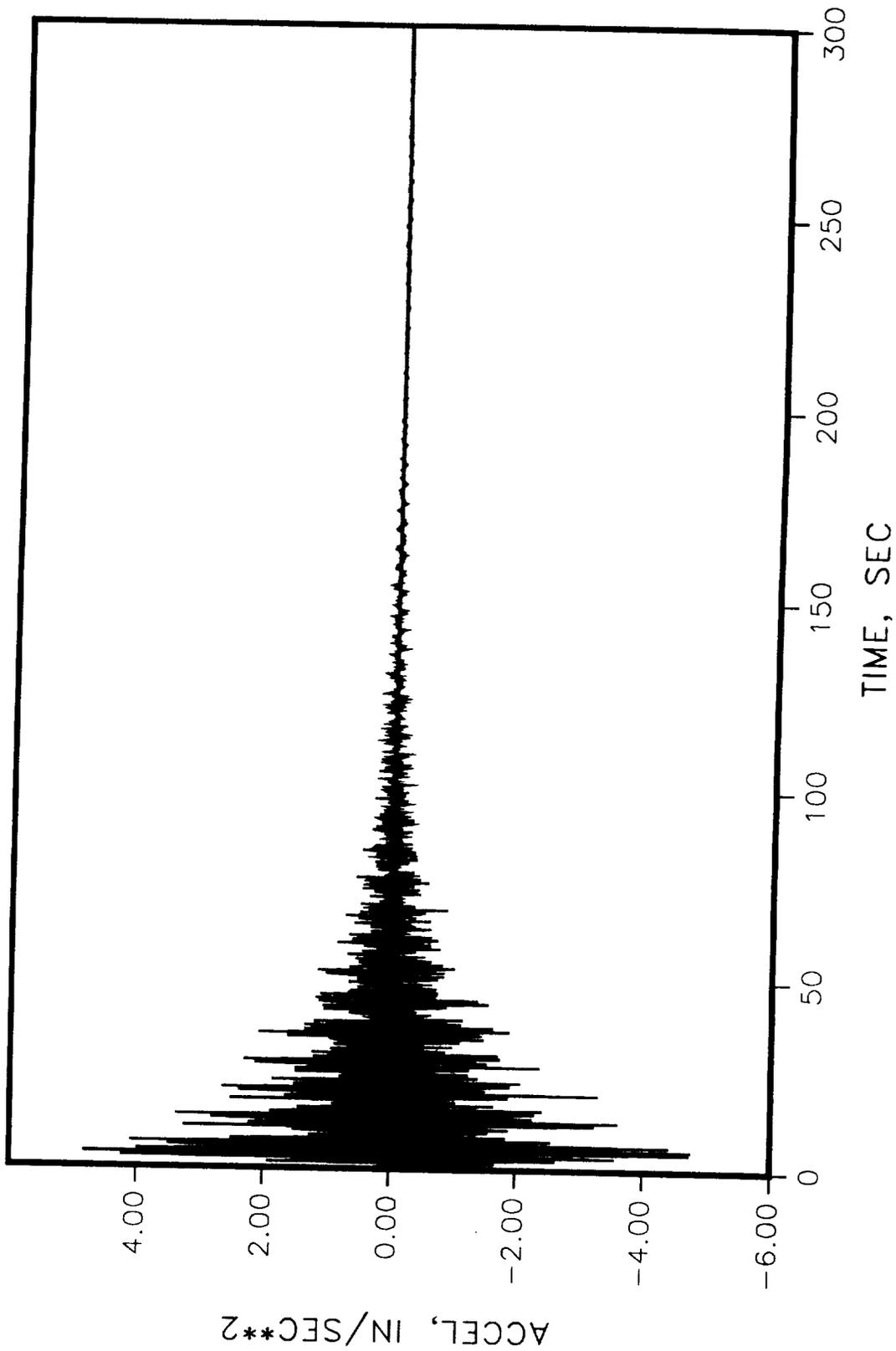## X ACCEL AT N11008 (CTR OF LAB MODULE)

Fig. 6 MATRIXx matrix/vector plot using PicSure

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EXAMPLE 7:   Publication-quality Bode plot, phase and magnitude

The procedure is similar to that of Example 6, except that MATRIXx BODE is selected in the PLOT XY DATA menu, and the data is automatically plotted using log scales. A sample plot is shown in figure 7.

MATRIXX EXAMPLE BODE PLOT
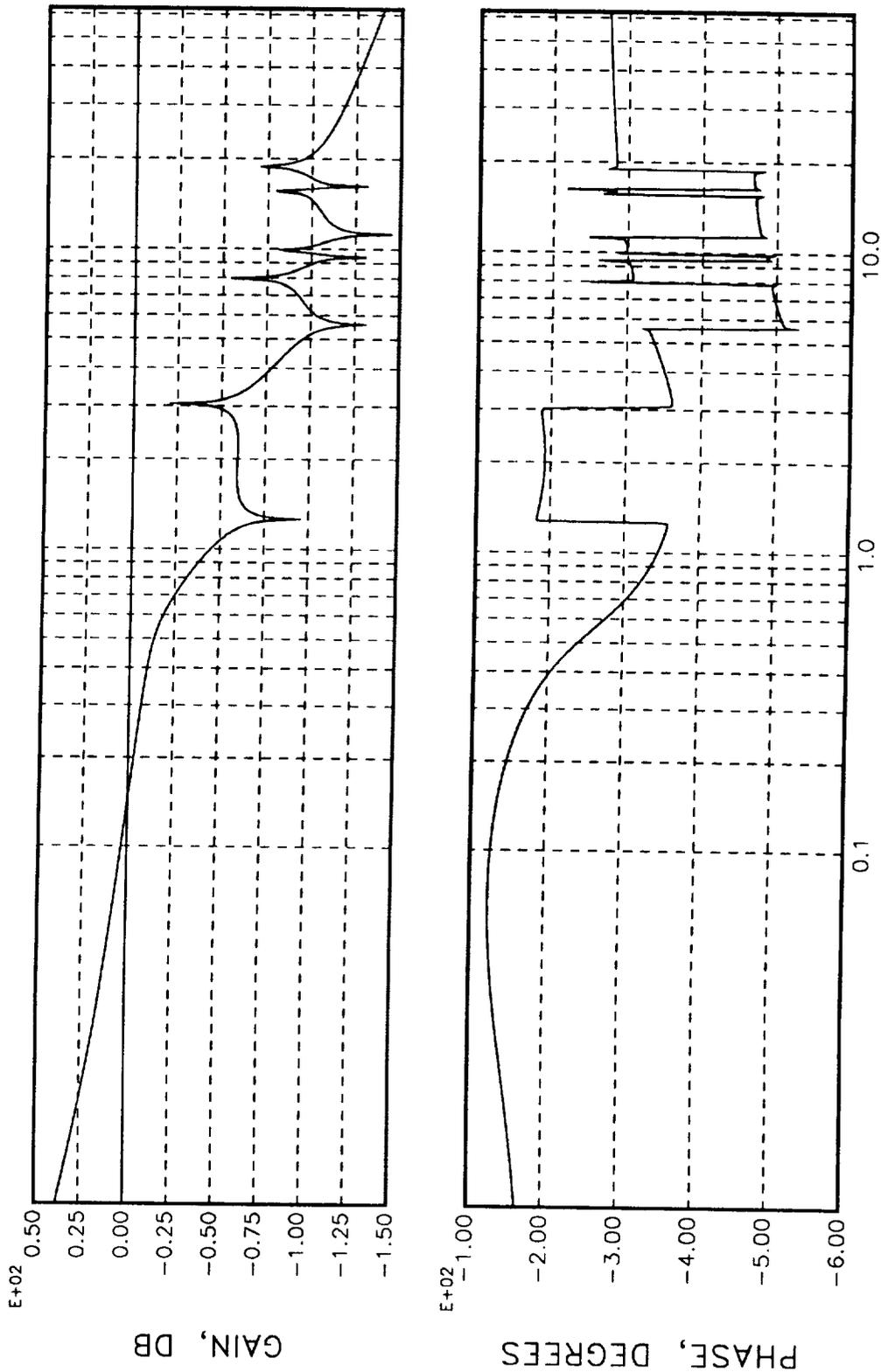
PHASE AND MAGNITUDE

FREQUENCY, HZ

Fig. 7 MATRIXx Bode plot using PicSure

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IMAT GRAPHICS PROCESSORS

The following sections describe in detail the IMAT graphics processors. The hierarchical menu structure and interactive query approach used by the processors are designed to minimize user input and reduce the amount of graphics expertise required. However, for users who need more information, each processor and its options are fully explained.

To access the IMAT software, simply type "IMAT" at the VAX system prompt. The IMAT MAIN MENU will be displayed:

EXECUTIVE: MAIN IMAT MENU

1. DATABASE MANAGEMENT MENU
2. GRAPHICS MENU
3. FINITE ELEMENT MENU
4. CONTROLS MENU

ENTER SELECTION: (1-4, H, M, Q, V)

NOTE: H = Help, M = Menu, Q = Quit, and V = VAX (execute a VAX command)

To access the IMAT graphics processors, select 2 (GRAPHICS MENU), which provides the following capabilities:

1. GENERATE METAFILE: converts picture files from several sources (I-DEAS, MSC/NASTRAN, MATRIXx) to vector or raster metafiles.

2. DISPLAY METAFILE: allows you to interactively view metafiles using a Metafile Translator.

3. HARDCOPY METAFILE: creates a hardcopy of the metafile, i.e., sends the metafile to an ACD plotting device.

4. PLOT XY DATA: generates a postscript file which can be sent to a laser printer to create publication-quality plots using data from MATRIXx, MSC/NASTRAN, or user-supplied XY plot data.

5. COMBINE NASTRAN MODE PLOTS: reformats a metafile containing plots in multiple views and creates a new 2, 3, or 4 views-per-frame metafile.

6. EXECUTE PICSURE: executes PVI PicSure interactive plotting software.

7. EXECUTE PV DRAW: executes PV Draw picture editor for DI-3000 metafiles.

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GENERATE METAFILE

GENERATE METAFILE translates graphics output from various commercial codes into device-independent vector or raster metafile format. Supported codes include I-DEAS, MSC/NASTRAN, and MATRIXx.

The first submenu allows you to select the type of output that you wish to process:

GENERATE METAFILE: TRANSLATOR MENU
1. I-DEAS
2. NASTRAN
3. MATRIXX
4. EXIT TO PREVIOUS MENU [DEFAULT]

ENTER SELECTION: (1-4, H, M, Q, V)

GENERATE METAFILE: IDEAS

The I-DEAS processor converts I-DEAS vector or raster/shaded data picture files to metafiles. It is the user's responsibility to know the type of data contained in the file. (Note: I-DEAS picture files will not contain raster data unless a shaded image has been drawn.)

The I-DEAS submenu features options for vector or raster data:

I-DEAS METAFILE: DATA TYPE MENU
1. VECTOR DATA (LINE, TEXT)
2. RASTER DATA (SHADED IMAGE) 512 X 512
3. RASTER DATA (SHADED IMAGE) 1024 X 1024
4. RASTER DATA (SHADED IMAGE) 2048 X 2048
5. EXIT TO PREVIOUS MENU [DEFAULT]

ENTER SELECTION: (1-5, H, M, Q, V)

The **VECTOR DATA** processor converts I-DEAS vector data into a DI-3000 metafile format. You will be prompted to enter the name of the file containing the I-DEAS vector data.

ENTER IDEAS PICTURE FILE NAME (PRESS <CR> TO QUIT):

The next question relates to the SDRC header information placed by default on all graphics output within I-DEAS.

INCLUDE SDRC HEADER INFORMATION IN YOUR PICTURE (Y/[N]):

Entering N (the default) will remove the SDRC header information from the final output written to the metafile.

Your file is immediately processed, the metafile name is displayed and you are returned to the beginning of the processor. Note that your metafile name is the same as your picture file name, except that it has a ".MFL" extension.

The **RASTER DATA (512 X 512)** processor converts I-DEAS raster/shaded data into the device independent raster metafile format with a resolution of 512 x 512. The resolution of your I-DEAS picture file is determined by the resolution of the graphics terminal used to create the picture. Raster files with a resolution larger than 512 x 512 will be clipped.

The **RASTER DATA (1024 X 1024)** processor converts I-DEAS raster/shaded data into a device-independent raster metafile format with a resolution of 1024 x 1024. Raster files with resolutions greater than 1024 x 1024 will be clipped. Files with resolutions less than 1024 x 1024 will be centered within the 1024 x 1024 resolution. Processing time may be up to 30 minutes.

The **RASTER DATA (2048 X 2048)** processor converts I-DEAS raster/shaded data into a device-independent raster metafile format with a resolution of 2048 x 2048. Raster files with resolutions larger than 2048 x 2048 will be clipped. Files with resolutions less than 2048 x 2048 will be centered within the 2048 x 2048 resolution. Processing time may be up to 30 minutes.

You will be prompted to enter the name of the file containing the I-DEAS raster data.

ENTER IDEAS PICTURE FILE NAME (PRESS <CR> TO QUIT):

The next question relates to the SDRC header information placed by default on all graphics output within I-DEAS.

INCLUDE SDRC HEADER INFORMATION IN YOUR PICTURE (Y/[N]):

Entering N (default) will remove the SDRC header from the final output. SDRC header selection is followed by the BACKGROUND COLOR MENU.

I-DEAS METAFILE: BACKGROUND COLOR MENU
1. BLACK
2. WHITE
3. USER DEFINED
4. BACKGROUND COLOR FROM I-DEAS FILE [DEFAULT]

ENTER SELECTION: (1-4, H, M, Q, V)

This menu allows you to redefine the color of the background. Selection of option 3 will require red, green, and blue intensity values from 0 to 255 to be entered. (Note: This is an advanced feature which most users will never need to use.)

ENTER RED COMPONENT (VALUE 0 - 255):

ENTER GREEN COMPONENT (VALUE 0 - 255):

ENTER BLUE COMPONENT (VALUE 0 - 255):

After processing, which may take 5 to 30 minutes, the metafile name will be displayed and you will be returned to the beginning of the processor. Note that your metafile name will be the same as your picture file name, except that it will have a ".MFL" extension.

GENERATE METAFILE: MSC/NASTRAN

The MSC/NASTRAN processor converts MSC/NASTRAN plot files to DI-3000 vector metafiles. You will be prompted to enter the name of the file containing the MSC/NASTRAN plot data.

ENTER MSC/NASTRAN PLOT FILE NAME (PRESS <CR> TO QUIT):

The frame number and the number of data points within the current frame will be displayed as each frame is converted. When processing is complete, the metafile name will be displayed and you will be returned to the GENERATE METAFILE menu. Note that your metafile name is the same as your picture file name, except that it has a ".MFL" extension.

This process may take a long time for large files, in which case it will be more efficient to use the "HARDCOPY METAFILE" processor to perform the same function in batch mode.

GENERATE METAFILE: MATRIXx

The MATRIXx processor converts MATRIXx laser output files to DI-3000 metafiles. The MATRIXx file must contain output from a laser device driver (e.g., LN03) created using the MATRIXx "hardcopy" command. Typically the default name of the MATRIXx laser output file is "MATLASER.DAT".

You will be prompted for the name of the file containing the MATRIXx laser picture data.

ENTER MATRIXX LASER FILE NAME (PRESS <CR> TO QUIT):

The FILE ACTION MENU will be displayed next:

MATRIXX METAFILE: FILE ACTION MENU
1. LIST FRAME NUMBERS
2. PROCESS FILE
3. EXIT TO PREVIOUS MENU [DEFAULT]

ENTER SELECTION: (1-3, H, Q, V)

LIST FRAME NUMBERS will list the number of frames in the selected data file.

PROCESS FILE processes the laser data file. A series of questions will be asked about the output attributes to be used during processing. The first attribute is the orientation of the data.

MATRIXX METAFILE: PLOT ORIENTATION MENU
1. PORTRAIT (TALL) [DEFAULT]
2. LANDSCAPE (WIDE)

ENTER SELECTION: (1-2, H, Q, V)

Portrait orientation will cause the data to be processed in a window 8.5 inches wide by 11 inches high. Landscape results in a window 11 inches wide by 8.5 inches high.

The number of frames to be processed is entered next.

ENTER FRAME NUMBERS TO BE PROCESSED:

STARTING FRAME NUMBER (PRESS <CR> FOR FIRST FRAME):

ENDING FRAME NUMBER (PRESS <CR> FOR LAST FRAME):

Entering <CR> causes all remaining frames to be processed. Entering a number will cause all frames through the ending frame number to be processed. Next, you will be asked to provide scale factors and font selections. If you are unsure about these choices, use the defaults.

ENTER SCALE FACTORS:

X-SCALE FACTOR (PRESS <CR> FOR 1.0):
Y-SCALE FACTOR (PRESS <CR> FOR 1.0):

A <CR> results in the default of no scaling of data. Entering a real number scale factor will result in data being scaled. X and Y scale factors should be kept proportional to the original X, Y ratio. This is user's responsibility. Next you will be prompted for the number of the DI-3000 character font .

ENTER FONT NUMBER (PRESS <CR> FOR FONT 1):

After the data has been converted the metafile name will be displayed and you will be returned to the MATRIXX METAFILE: FILE ACTION MENU.

DISPLAY METAFILE

The DISPLAY METAFILE processor allows you to display a metafile on a supported graphics device (or emulator) using the metafile translator. You will need to know the metafile type (raster or vector) in order to invoke the proper metafile translator. For additional information on metafile graphics refer to the sections in this manual entitled "Metafile Graphics Concepts" and "DI-3000 Metafile Primer" (Appendix A). For more information on PVI translator commands see ACD manual G-6/5, METAFILE TRANSLATOR USER'S GUIDE.

DISPLAY METAFILE offers the following menu choices:

DISPLAY METAFILE: METAFILE TYPE MENU
1. VECTOR
2. RASTER
3. EXIT TO PREVIOUS MENU [DEFAULT]

ENTER SELECTION: (1-3, H, M, Q, V)

DISPLAY METAFILE: VECTOR

The supported terminal types for displaying vector data appear in the first submenu:

DISPLAY METAFILE: DEVICE SELECTION MENU
1. VT 240
2. TEK 4105
3. TEK 4107/4109
4. TEK 4114
5. TEK 4115
6. POSTSCRIPT
7. EXIT [DEFAULT]

ENTER SELECTION: (1-7, H, M, Q, V)

After you have selected the display device, the PVI METAFILE TRANSLATOR is invoked, and the following commands are displayed on the screen:

YOU WILL NEED THE FOLLOWING COMMANDS TO RESPOND
TO THE METAFILE TRANSLATOR PROMPTS TO FOLLOW:

S MF # FILENAME	- SET METAFILE
	- TO FILE NAMED
D P # MF #	- DRAW PICTURE
D P FROM FIRST TO LAST	- DRAW ALL PICTURES
S W # (L R B T)	- SET WINDOW
S V # (L R B T)	- SET VIEWPORT
S DEV # ON/OFF	- SET DEVICE ON/OFF
QUIT	- EXIT TRANSLATOR

(NOTE: "#" REPRESENTS A VALID INTEGER. SEE APPENDIX A
OF THE IMAT GRAPHICS MANUAL FOR MORE INFORMATION.)

PRESS <CR> TO CONTINUE

Wait for M> prompt and enter the commands to display a metafile. Quit
returns you to the DISPLAY METAFILE: METAFILE TYPE MENU.

DISPLAY METAFILE: RASTER

The supported terminal types for displaying raster data appear in the first
submenu:

DISPLAY METAFILE: DEVICE SELECTION MENU
1. TEK 4107/4109
2. TEK 4125
3. AED767
4. DUMMY DRIVER
5. SCODL
6. SUN
7. SUN MONO
8. EXIT TO PREVIOUS MENU [DEFAULT]

ENTER SELECTION: (1-8, H, M, Q, V)

After you have selected the display device, the processor converts the file
to color table format. This is the only method for viewing raster data on a
graphics terminal. The processor will create a file named "myfile.clr", where
"myfile" is the name (without extension) of your metafile. You can delete this file
after viewing the raster picture. See reference 13 for further information.

The RASTER METAFILE TRANSLATOR is invoked after the color table
file has been converted. The following commands are displayed on the screen:

YOU WILL NEED THE FOLLOWING COMMANDS TO RESPOND
TO THE METAFILE TRANSLATOR PROMPTS TO FOLLOW:

SET MF # FILENAME	- SET METAFILE TO FILE NAMED
DRAW	- DRAW PICTURE
SET W # (XMIN XMAX YMIN YMAX)	- SET WINDOW
SET V # (XMIN XMAX YMIN YMAX)	- SET VIEWPORT
QUIT	- EXIT TRANSLATOR

(NOTE: "#" REPRESENTS A VALID INTEGER. SEE APPENDIX A
OF THE IMAT GRAPHICS MANUAL OR ACD DOCUMENT G-14 FOR
MORE INFORMATION.)

PRESS <CR> TO CONTINUE

Wait for RMT> prompt and enter the commands to display a metafile. Quit returns you to the DISPLAY METAFILE: METAFILE TYPE MENU.

HARDCOPY METAFILE

HARDCOPY METAFILE sends commercial-code plotted output to an ACD-supported graphics device. The processor can be used in two different modes, as shown in the initial submenu:

HARDCOPY METAFILE:

1. GENERATE AND HARDCOPY METAFILE
2. HARDCOPY EXISTING METAFILE

The first mode, GENERATE AND HARDCOPY METAFILE, allows you to convert a commercial-code plot file to a metafile and send the metafile to a plotter. The second mode, HARDCOPY EXISTING METAFILE, can be used if you have already generated the metafile (using GENERATE METAFILE, for example). If GENERATE AND HARDCOPY METAFILE has been selected, an appropriate IMAT graphics processor is first executed in batch mode to create a metafile. The hardcopy process, which works the same for both modes, sends a metafile to the CYBER (NOS) computers and executes a batch NOS file to plot the metafile. The processor accomplishes this by creating two files on the VAX computer. The first file (which has a .COM extension) is a command file which is automatically executed in batch mode on VAX by the HARDCOPY METAFILE processor. The command file uses the LARCNET FLINK utility to perform two operations: (1) send the metafile to NOS, and (2) initiate execution of the batch plot job on NOS. The second file (which has a .DTF extension) is the CCL (Cyber Command Language) file which is executed on NOS to obtain the plots. If you have a very large file which cannot be "FLINKed" to NOS, you may need to break the metafile into two or three smaller files (See Appendix A for a discussion of metafile translator commands).

The HARDCOPY METAFILE processor receives its instructions through a menu-type user interface. The menu, shown below, is a form which is filled out by the user, one item at a time. Some items on the form are automatically linked to some other items. For example, option 5 (plotter) will set the defaults for item 6 (PLOT CARD PARAMETERS). Therefore EACH ITEM SHOULD BE FILLED OUT IN NUMERICAL ORDER. To select a menu choice, type its number, followed by a carriage return.

The main menu, with its initial values, is shown below, along with explanations of each item. The SAVE and LOAD features, which are unique to this processor, allow you to SAVE your selected options in a file and recall them by LOADing the menu file during a later session. These features are useful if you frequently perform the same job (e.g., converting a NASTRAN plot file to a metafile and plotting it on the laser printer). The RESET option resets the menu to the processor's initial values, and the DONE option signals the program that all choices have been made and processing can begin.

It is strongly recommended that you either try using the processor before reading this section or read the manual as you are executing the processor for the first time.

GENERATE AND HARDCOPY METAFILE:

CURRENT DIRECTORY: current default directory

1. PICTURE FILE NAME: ?
2. METAFILE NAME :   ?

3. TRANSLATOR ->	?	9. NOS USER NAME:	?
4. DATA TYPE ->	VECTOR	10. NOS CHARGE:	?
5. PLOTTER ->	ZCAL,11	11. NOS MACHINE ->	A
6. PLOT CARD PARAMETERS ->	DEFAULT	12. NOS DELIVERY:	?
7. CONTINUATION CARDS ->	DEFAULT	13. NOS METAFILE NAME:	?
8. METAFILE COMMANDS ->	DEFAULT	14. NOS DAYFILE NAME:	?

ENTER SELECTION: (1-14, H, M, Q, V, OR [R]ESET, [S]AVE, [L]OAD, [D]ONE)

The menu choices are described briefly below and in more detail in the following sections.

CURRENT DIRECTORY- current default directory

1. PICTURE FILE NAME- name of picture file generated by I-DEAS, NASTRAN, or MATRIXx

2. METAFILE NAME- name of metafile to be generated from the specified picture file or name of existing metafile to be processed

3. TRANSLATOR- name of metafile translator (IDEAS, NASTRAN, or MATRIXX)

4. DATA TYPE - vector or raster

5. PLOTTER - vector or raster device

6. PLOT CARD PARAMETERS - plot card parameters for the selected hardcopy device

7. CONTINUATION CARDS - special instructions for the plotter operator

8. METAFILE COMMANDS - metafile translator commands required by some plotting devices

9. NOS USER ID- NOS user login name

10. NOS CHARGE - NOS charge number

11. NOS MACHINE - NOS machine (A, Y, or Z)

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12. NOS DELIVERY -   NOS job delivery information

13. NOS METAFILE NAME -   metafile name for NOS

14. NOS DAYFILE NAME -   file name for NOS dayfile information

H: HELP - display on-line help documentation

M: MENU - display the current menu

Q: QUIT - leave the current processor

V: VMS - enter VMS commands

R: RESET - reset the values for the menu items.

S: SAVE - save the values of the current menu to a file.

L: LOAD - load the menu values previously saved in a file.

D: DONE - create and use command file and NOS job deck to hardcopy a metafile in batch.

Be careful to select or enter the values of menu choices in numerical order as some of the options will set default values for other options. A detailed explanation of the menu items follows:

CURRENT DIRECTORY:

The current default directory is displayed for information only.

ITEM 1: PICTURE FILE NAME

The picture file name is the name of the graphics output file from I-DEAS, NASTRAN, or MATRIXx. If the picture file does not reside in the current directory, you need to specify the directory name as well as the file name. This menu item is ignored if you have selected the HARDCOPY EXISTING METAFILE option.

ITEM 2: METAFILE NAME

The name of the metafile to be generated is assigned by the processor using the given picture file name with an extension of ".MFL" for a vector data file or ".RAS" for a raster data file. By default, the metafile name has extension ".MFL". If you change the value of PICTURE FILE NAME, the value of this menu item will also be changed. The metafile is assumed to be in the current default directory. If you enter the name of an existing metafile which is not in the current directory, you must include the directory name as well as the file name.

ITEM 3: TRANSLATOR

Select the name of a translator according to the software program which was used to generate the picture file. The three options, IDEAS, NASTRAN, and MATRIXX are explained in detail below:

TRANSLATOR option 1: IDEAS

The I-DEAS modules such as Finite Element, Solid Modeling, System Dynamics or Test can produce picture files that are either vector format (lines, hidden lines, free-face, or XY plots) or raster format (shaded or continuous tone). You must know the type of data contained in the I-DEAS picture file. Selection of the wrong conversion translator may result in lost data or unexpected output results. Note that shaded images drawn within I-DEAS usually contain both raster and vector data. Therefore the raster converter should be selected for this type of picture. If polygon fill and vector (line drawing) routines are used in I-DEAS, then only vector data will exist in the picture file and the vector converter should be selected. After you select the IDEAS translator, the following menu and default values will be displayed:

```
IDEAS PARAMETERS:
1. DATA TYPE              VECTOR
2. FILE FORMAT            FORMATTED (or BINARY)
3. SDRC HEADER            NO
4. DATA SIZE             0
5. EXIT/NO CHANGE [ ]

ENTER SELECTION: (1-5, H, M, Q, V)
```

DATA TYPE toggles between VECTOR and RASTER. This selection invokes the appropriate conversion translator to create vector or raster metafiles. The default data type is vector. Changes made with this option will automatically set values for DATA TYPE, PLOTTER, PLOT CARD PARAMETERS, CONTINUATION CARDS, and METAFILE COMMANDS. If DATA TYPE is vector, the default vector plotter (ZCAL,11) and the related parameters will be used to initialize the menu items. If DATA TYPE is raster, then the default raster plotter (CELRAS, 8) and its appropriate parameter values will be used.

FILE FORMAT toggles between BINARY and FORMATTED. This selection specifies the format of the picture file created within IDEAS. It is set to FORMATTED if the given picture file has an extension of ".PFF" and BINARY if the picture file has an extension of ".PFB". The default file type is BINARY.

SDRC HEADER toggles between YES and NO. YES causes the SDRC header to be output to the metafile. NO causes the SDRC header to be clipped from the final graphics output to the metafile.

DATA SIZE is active only when raster data type is chosen. When the data type is vector, data size is set to 0. There are three data size options:

512 x 512, 1024 x 1024, and 2048 x 2048. Select the size desired for the final raster metafile. Size is denoted in pixels and should correlate with the size of the picture file. Default size is 1024 x 1024. See the description of the GENERATE METAFILE processor for more information on DATA SIZE.

TRANSLATOR option 2: NASTRAN

The NASTRAN translator is used to convert an MSC/NASTRAN plot file to a vector metafile. Selection of this option sets the value of DATA TYPE to VECTOR. Since NASTRAN files typically contain dozens or even hundreds of pictures, the IBM laser plotter (PLOT.ZLASER) is the recommended hardware device due to its speed and fan-fold capability. You can also use the metafile translator to split the metafile into smaller files to allow processing on other devices.

NOTE: NASTRAN punch file data can be plotted in PicSure by using the PLOT XY DATA processor.

TRANSLATOR option 3: MATRIXx

The MATRIXx translator converts MATRIXx laser files into vector metafiles. The MATRIXx default output name is MATLASER.DAT which is created using the HC (HARDCOPY) command in MATRIXx. This file can be translated into a DI-3000 metafile and then plotted on the production devices.

NOTE: Data contained in a MATRIXx formatted data file (as opposed to a laser output file) can be plotted using the PLOT XY DATA processor. Bode plots can also be created using the PLOT XY DATA processor.

When the MATRIXx translator is selected, the following default parameters are set and displayed:

```
MATRIX-X PARAMETERS:
1. ORIENTATION          PORTRAIT
2. STARTING FRAME          1
3. ENDING FRAME           99
4. X-SCALE FACTOR         1.0
5. Y-SCALE FACTOR         1.0
6. FONT                    1
7. EXIT/NO CHANGE [ ]
```

ORIENTATION toggles between portrait (8.5 inches wide by 11 inches long) and landscape (11 inches wide by 8.5 inches wide). Default is portrait.

STARTING FRAME refers to the number of the first frame to be processed. Default is 1.

ENDING FRAME refers to the number of the last frame to be processed. Default is 99.

X-SCALE FACTOR is a real number which represents the scale factor by which all x-coordinates will be multiplied. Default is 1.0.

Y-SCALE FACTOR is a real number which represents the scale factor by which all y-coordinates will be multiplied. Default is 1.0. It is the user's responsibility to maintain proper aspect ratio.

FONT is an integer DI-3000 font number which represents the font to be used for text. Default is 1.

After all parameter values have been set, select 7: EXIT/NO CHANGE to exit this menu.

ITEM 4: DATA TYPE

The value of DATA TYPE toggles between vector and raster, indicating the type of metafile being processed. Changes made to data type cause the value of PLOTTER and other related plotting menu items to change.

ITEM 5: PLOTTER

PLOTTER lets you select an available production device based on the type of data (vector/raster) in your metafile. If DATA TYPE is vector, the following list of devices is displayed:

```
VECTOR PLOTTERS:
1.  PLOT.ZCAL,11          (11IN CALCOMP)
2.  PLOT.ZCAL,34          (34IN CALCOMP)
3.  PLOT.CEL,4            (4X5 NEGATIVE)
4.  PLOT.CEL,8            (8X10 VIEWGRAPH)
5.  PLOT.CEL,16           (16MM FILM)
6.  PLOT.CEL,35           (35MM SLIDE)
7.  PLOT.ZVER,39          (39IN VERSATEC)
8.  PLOT.ZVER,A           (8X8 VERSATEC)
9.  PLOT.ZVER,B           (10X10 VERSATEC)
10. PLOT.ZLASER
11. EXIT/NO CHANGE [ ]

ENTER SELECTION: (1-11, H, M, Q, V)
```

If DATA TYPE is raster, the following list of devices is displayed:

```
RASTER PLOTTERS:
1.  PLOT.CELRAS,4         (4X5 NEGATIVE)
2.  PLOT.CELRAS,8         (8X10 VIEWGRAPH)
3.  PLOT.CELRAS,16        (16MM FILM)
4.  PLOT.CELRAS,35        (35MM SLIDE)
5.  PLOT.VERRAS,39        (39IN VERSATEC)
6.  PLOT.VERRAS,A         (8X8 VERSATEC)
7.  PLOT.VERRAS,B         (10X10 VERSATEC)
8.  EXIT/NO CHANGE [ ]
```

ENTER SELECTION: (1-8, H, M, Q, V)

After the plotter has been selected, menu items PLOT CARD PARAMETERS, CONTINUATION CARDS, and METAFILE COMMANDS are updated to reflect the default settings for the chosen plotter. See reference 15 for specific information on each of the available devices.

ITEM 6: PLOT CARD PARAMETERS

PLOT CARD PARAMETERS can be set to NO, DEFAULT, or YES. If the current status is YES or DEFAULT, a list of available parameters and their current values will be displayed prior to the display of the sub-menu:

CURRENT PLOT CARD PARAMETERS: (YES, NO, or DEFAULT)

PLOT CARD PARAMETERS :
1. DEFAULT VALUES
2. CHANGE VALUES
3. NO VALUES
4. EXIT/NO CHANGE [ ]

ENTER SELECTION (1-4, M, H, Q, V)

DEFAULT VALUES will set all parameters to the IMAT defaults according to the values of DATA TYPE and PLOTTER.

CHANGE VALUES will cause a list of allowable parameters and their current values to be displayed. For example, if DATA TYPE is vector and PLOTTER is ZCAL,11, the following information and menu will be displayed. After you have set all values, select 'EXIT' to return to the previous menu.

PLOT CARD PARAMETERS:
1. HEIGHT   11.00
2. WIDTH   11.00
3. X0   0.00
4. Y0   0.00
5. XM   1.00
6. YM   1.00
7. RVAX   NO
8. PAGE   11.00
9. EXIT/NO CHANGE   [ ]

ENTER SELECTION: (1-9, M, H, Q, V)

NO VALUES will set all plot card parameters to null. In this case, ACD defaults will apply (See reference 14).

ITEM 7: CONTINUATION CARDS

CONTINUATION CARDS allows you to place operator instructions in the NOS job deck. The following menu will be displayed:

CURRENT CONTINUATION CARDS: NO

CONTINUATION CARDS:
1. DEFAULT VALUES
2. CHANGE VALUES
3. NO VALUES
4. EXIT/NO CHANGE [ ]

ENTER SELECTION: (1-4, H, M, Q, V)

The first line displays the current status of the continuation cards. Possible status values include NO, DEFAULT, and YES. If the current status is YES or DEFAULT, a list of current continuation cards will be displayed prior to the CONTINUATION CARDS menu.

DEFAULT VALUES will set continuation cards to default values appropriate for the current plotter.

CHANGE VALUES will prompt you for continuation cards. Enter a <CR> after every continuation card and also at end on a blank line when done.

NO VALUES should be selected if no continuation cards are desired.

EXIT/NO CHANGE returns you to the previous menu.

ITEM 8: METAFILE COMMANDS

METAFILE COMMANDS allows you to specify metafile commands for the current plotter. For example, the following menu will be displayed if the value of METAFILE COMMANDS is set to DEFAULT:

(Note that when the batch plotting job is executed on NOS, your permanent NOS metafile will be copied to a local file called "DIMETA.")

CURRENT METAFILE COMMANDS: DEFAULT

S MF 1 DIMETA
D P FROM FIRST TO LAST
QUIT

METAFILE COMMANDS:
1. DEFAULT METAFILE COMMANDS
2. USER SUPPLIED METAFILE COMMANDS
3. EXIT/NO CHANGE [ ]

ENTER SELECTION: (1-3, H, M, Q, V)

The first line displays the current status of the metafile commands. Possible status values include DEFAULT, YES, and N/A. If metafile commands are required for the current plotter, the default status is 'DEFAULT'. If metafile commands are not accepted by the current plotter then the status is 'N/A' and you will not be allowed to change the current values of the metafile commands.

DEFAULT METAFILE COMMANDS will set up the minimum metafile commands required to run the current plotter, and all frames on the local metafile, DIMETA, will be plotted.

USER SUPPLIED METAFILE COMMANDS will let you enter your own metafile commands. The following instructions will be displayed:

ENTER METAFILE COMMANDS,
UP TO 40 LINES 80 CHARACTERS PER LINE,
ENTER A <CR> TO EXIT.

NOTE: The metafile will be called DIMETA in the NOS job stream. Therefore you must be sure to include the command "SET MF 1 DIMETA".

EXIT/NO CHANGE returns you to the previous menu.

ITEM 9: NOS USER ID

NOS USER ID is your NOS user name to be placed in the NOS job deck.

ITEM 10: NOS CHARGE

A valid NOS CHARGE number is also needed in the NOS job deck for processing.

ITEM 11: NOS MACHINE

NOS MACHINE specifies the NOS machine (A,Y, or Z) to which the NOS job deck will be FLINKed for processing. The A-machine is the batch machine and is recommended for its quick batch turnaround time.

ITEM 12: NOS DELIVERY

NOS DELIVERY information is required so that completed plots can be delivered to the proper "Green Tub" destination.

ITEM 13: NOS METAFILE NAME

NOS METAFILE NAME is a valid NOS permanent file name (maximum of 7 characters) to be given to the metafile when it is FLINKed to NOS.

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ITEM 14: NOS DAYFILE NAME

NOS DAYFILE NAME is a valid NOS file name to which the NOS dayfile information will be written. The NOS dayfile will be FLINKed to your VAX login directory. The file which is FLINKed to VAX will be the same as the NOS dayfile name with file extension ".LOG".

AFTER YOU HAVE COMPLETED SELECTION OF ALL MENU ITEMS, TYPE "D" (FOR "DONE") TO INITIATE PROCESSING. You will be prompted to enter and verify your NOS and VAX passwords, before the processor starts the batch job.

PLOT XY DATA

The PLOT XY DATA processors create publication-quality XY plots using PVI's PicSure program. You do not need to know how to use PicSure, unless you want to modify the plot interactively. PicSure is automatically executed in batch mode to produce a file called POSTS.DAT, which can be submitted to any Postscript-compatible laser printer to obtain the final plot. The processor accepts MATRIXx (formatted data files), MSC/NASTRAN (punch file format), or free-formatted data. The first submenu allows you to specify the type of data:

```
PLOT XY DATA:  DATA TYPE MENU
1. MATRIXX VECTOR/MATRIX
2. MATRIXX BODE
3. MSC/NASTRAN PUNCH
4. FREE-FORMATTED
5. EXIT TO PREVIOUS MENU [DEFAULT]

ENTER SELECTION: (1-5, H, M, Q, V)
```

PLOT XY DATA: MATRIXX VECTOR/MATRIX

MATRIXX VECTOR/MATRIX allows you to generate XY plots from MATRIXx formatted data files. The following sequence of instructions will be displayed for this option:

ENTER THE NAME OF THE FILE CONTAINING THE MATRIXX DATA:

Enter the name of the file which contains the MATRIXx formatted data. A <CR> returns you to the PLOT TYPE MENU.

The processor will display a list of the variables found in the data file. You will then be requested to select one independent dataset and up to seven dependent datasets from the list. The format of the variable list is as follows:

VARIABLES IN MATRIXX FILE:

	VARIABLE	ROWS	COLUMNS
1	VARIABLE 1	#	#
2	VARIABLE 2	#	#
. . .			
n	VARIABLE n	#	#

SELECT VARIABLE FOR INDEPENDENT DATASET:

SELECT VARIABLE FOR DEPENDENT DATASET # 1:

SELECT VARIABLE FOR DEPENDENT DATASET # 2 [NONE]:

NOTE: Dependent and independent variables must have the same dimensions.

Following each prompt, enter the number of the variable you wish to select . Enter a <CR> when you have completed your selections. At least one independent and one dependent dataset must be chosen to create a plot. If the variable chosen is a matrix, (i.e. COLUMNS>1) then you will be instructed to select which column is to be used as independent or dependent dataset:

VARIABLE SELECTED HAS COLUMNS: 1 - k
SELECT A COLUMN FOR INDEPENDENT DATASET:

or

VARIABLE SELECTED HAS COLUMNS: 1 - k
SELECT A COLUMN FOR DEPENDENT DATASET # n [NONE]:

Select the column(s) desired and enter a <CR> when done. You will then be prompted to enter text for your plot through the following sequence of prompts:

ENTER A TITLE FOR THIS GRAPH:

ENTER A SUBTITLE FOR THIS GRAPH [NONE]:

ENTER A LABEL FOR THE X-AXIS:

ENTER A LABEL FOR THE Y-AXIS:

After this information has been entered the following message is displayed listing files that will be created. Please read it carefully.

****
THIS PROCESSOR WILL CREATE THE FOLLOWING FILES:

PICSURE COMMAND FILE =>   PIC.CMD

DATA FILES   =>   VARIABLE NAME FROM DATA FILE WITH
                      ENDING OF _I.DAT, _D.DAT, OR _D#.DAT
****

SAVE THESE FILES TO RUN PICSURE INTERACTIVELY LATER (Y/[N]):

If you enter "Y", the files will be saved in the current directory. The processor displays the following message containing instructions for obtaining your final plot:

<<<   SUBMITTING A BATCH JOB TO CREATE FILE: "POSTS.DAT" >>>

<<<   ** YOU NEED TO SEND THIS FILE TO A LASER PRINTER TO   >>>
<<<   OBTAIN YOUR PLOT AFTER THE BATCH JOB IS COMPLETED.>>>

PLOT XY DATA: MATRIXX BODE

MATRIXX BODE allows you to create a Bode plot from phase and/or magnitude data. Bode plots are generated through the following sequence:

ENTER THE NAME OF THE FILE CONTAINING THE MATRIXX DATA:

Enter the name of the file containing the phase-magnitude plot data. Following this prompt will be a list of the data elements contained in the MATRIXx data file. The format of the data list is as follows:

VARIABLES IN MATRIXX FILE:

VARIABLE	ROWS	COLUMNS
1 VARIABLE 1	#	#
2 VARIABLE 2	#	#
. . .		
n VARIABLE n	#	#

SELECT VARIABLE FOR INDEPENDENT DATASET:

SELECT VARIABLE FOR DEPENDENT DATASET # 1:

SELECT VARIABLE FOR DEPENDENT DATASET # 2 [NONE]:

NOTE: Dependent and independent variables must have the same dimensions.

Enter the number of the MATRIXx variable you wish to select for the dependent and independent variable(s). Enter a <CR> when you have completed your selections. At least one independent and one dependent variable must be chosen. A maximum of two dependent variables (one for magnitude, and one for phase) may be chosen for the Bode plot format. If the variable is a matrix, (i.e., COLUMNS>1) then you will be asked to select the column(s) which are to be used as the independent or dependent variables:

VARIABLE HAS COLUMNS: 1 - k
SELECT A COLUMN FOR INDEPENDENT DATASET:

or

VARIABLE HAS COLUMNS: 1 - k
SELECT A COLUMN FOR DEPENDENT DATASET #1:

Select column(s) and enter a <CR> when done. You will then be prompted to enter text for your graph through the following sequence:

ENTER A TITLE FOR THIS GRAPH:

ENTER A SUBTITLE FOR THIS GRAPH [NONE]:

ENTER A LABEL FOR THE X-AXIS:

ENTER A LABEL FOR THE Y-AXIS:

Or, if two dependent datasets are chosen, you will be prompted for two y-axis labels:

ENTER A Y-AXIS LABEL FOR DEPENDENT DATASET #1:

ENTER A Y-AXIS LABEL FOR DEPENDENT DATASET #2:

When this sequence has been completed one of the following messages will be displayed. Please read the note carefully. For a single Bode plot (phase or magnitude only) the following message will be displayed:

```
************************************************************
THIS PROCESSOR WILL CREATE THE FOLLOWING FILES:

    PICSURE COMMAND FILE =>        PIC.CMD

    TITLE CHART FILE      =>  PIC_TITLE.CHT
    TOP CHART FILE        =>  PIC_TOP.CHT

    DATA FILES    =>        VARIABLE NAME FROM DATA FILE WITH
                            ENDING OF .DAT
************************************************************
```

SAVE THESE FILES TO RUN PICSURE INTERACTIVELY LATER (Y/[N]):

For double Bode plots (phase and magnitude) the following message will be displayed:

```
************************************************************
THIS PROCESSOR WILL CREATE THE FOLLOWING FILES:

    PICSURE COMMAND FILE =>        PIC.CMD

    TITLE CHART FILE      =>  PIC_TITLE.CHT
    TOP CHART FILE        =>  PIC_TOP.CHT
    BOTTOM CHART FILE     =>  PIC_BOT.CHT

    DATA FILES    =>        VARIABLE NAME FROM DATA FILE WITH
                            ENDING OF .DAT
************************************************************
```

SAVE THESE FILES TO RUN PICSURE INTERACTIVELY LATER (Y/[N]):

If you enter "Y", the files will be saved in the current directory. The processor displays the following message containing instructions for obtaining your final plot:

<<< SUBMITTING A BATCH JOB TO CREATE FILE: "POSTS.DAT" >>>

<<< ** YOU NEED TO SEND THIS FILE TO A LASER PRINTER TO >>>
<<< OBTAIN YOUR PLOT AFTER THE BATCH JOB IS COMPLETED.>>>

PLOT XY DATA: MSC/NASTRAN PUNCH

MSC/NASTRAN PUNCH allows you to process MSC/NASTRAN data which was output to a PUNCH file using the XYPUNCH command. The command file for this format is generated through the following sequence of commands:

ENTER THE NAME OF THE FILE CONTAINING NASTRAN PUNCH DATA:

Enter the name of the PUNCH file. The processor reads the file to extract the variables. There is a maximum of fifty variables allowed. If this limit is exceeded you will receive the following prompt:

EXCEEDED VARIABLE LIMIT, ONLY THE FIRST 50 VARIABLES ARE ACCESSIBLE.

ENTER <CR> TO CONTINUE

The data variables retrieved will be listed 17 variables at a time in the following format:

XY PLOT DATA VARIABLES IN MSC/NASTRAN FILE:

	CURVE TYPE	NODE OR ELEMENT	ITEM CODE
1	$LOAD	6	3
2	$LOAD	102	3
3	$ACCE	11008	3
4	$ACCE	11008	4
5	$ACCE	11008	5
.		.	.
n	$ACCE	######	#

(Note: The numbers in column labeled "ITEM CODE" refer to the Item Codes listed in Vol. II, Section 4.3.3 of the MSC/NASTRAN User's Manual.)

You will be prompted to enter the number of the variable you wish to have plotted:

ENTER SELECTION: (1 - n, H, M, Q, V)

You will then be prompted to enter an increment value which will be used to select every Nth data value from the file. (Note: PicSure has a limit of 10,000 data points for each dataset (variable).)

ENTER VALUE FOR N (1-10) TO PLOT EVERY NTH POINT
OR PRESS <CR> TO PLOT EVERY POINT:

Entering a carriage return will result in all values being plotted. Next you will be prompted to enter text for your graph:

ENTER A TITLE FOR THIS GRAPH:

ENTER A SUBTITLE FOR THIS GRAPH [NONE]:

ENTER A LABEL FOR THE X-AXIS:

ENTER A LABEL FOR THE Y-AXIS:

Enter a text string for each prompt. After this information has been entered the following message is displayed listing files that will be created.

```
********************************************************
THIS PROCESSOR WILL CREATE THE FOLLOWING FILES:

    PICSURE COMMAND FILE =>        PIC.CMD
    DATA FILES     =>       VARIABLE NAME FROM DATA FILE WITH
                            ENDING OF _X.DAT OR _Y.DAT
********************************************************
```

SAVE THESE FILES TO RUN PICSURE INTERACTIVELY LATER (Y/[N]):

If you enter "Y", the files will be saved in the current directory. The processor displays the following message containing instructions for obtaining your final plot:

<<< SUBMITTING A BATCH JOB TO CREATE FILE: "POSTS.DAT" >>>

<<< ** YOU NEED TO SEND THIS FILE TO A LASER PRINTER TO >>>
<<< OBTAIN YOUR PLOT AFTER THE BATCH JOB IS COMPLETED.>>>

PLOT XY DATA: FREE-FORMATTED

FREE-FORMATTED allows you to plot data contained in files which consist of one data value per line. Each variable must be contained in a separate file. The PicSure command file for this format is generated through the following sequence of commands:

ENTER A TITLE FOR THIS GRAPH:

ENTER A SUBTITLE FOR THIS GRAPH [NONE]:

ENTER A LABEL FOR THE X-AXIS:

ENTER A LABEL FOR THE Y-AXIS:

Enter a text string for each response. A <CR> alone for the subtitle results in no subtitle for the graph. Next you will be prompted to enter the name of the file containing the independent dataset.

ENTER NAME OF FILE CONTAINING INDEPENDENT (X-AXIS) DATASET:

At the next prompt, enter the name of the file containing the dependent dataset. This will be followed by the name to be given to the dataset within PicSure.

ENTER NAME OF FILE CONTAINING DEPENDENT (Y-AXIS) DATASET #n:

ENTER A LABEL FOR DEPENDENT DATASET #n [NONE]:

These last two instructions will be repeated until a carriage return <CR> is entered for the dependent file name or seven dependent file names have been given. At this point the following message is displayed, listing the file that will be created.

****

THIS PROCESSOR WILL CREATE PICSURE COMMAND FILE => PIC.CMD

****

SAVE THESE FILES TO RUN PICSURE INTERACTIVELY LATER (Y/[N]):

If you enter "Y", the file will be saved in the current directory. The processor displays the following message containing instructions for obtaining your final plot:

<<< SUBMITTING A BATCH JOB TO CREATE FILE: "POSTS.DAT" >>>

<<< ** YOU NEED TO SEND THIS FILE TO A LASER PRINTER TO >>>
<<< OBTAIN YOUR PLOT AFTER THE BATCH JOB IS COMPLETED.>>>

COMBINE NASTRAN MODE PLOTS

COMBINE NASTRAN MODE PLOTS draws up to four different views of a structure in a single frame. The primary purpose of the processor is to provide MSC/NASTRAN users with a means of displaying vibration mode shapes in a three- or four-views-per-frame format. The processor initiates a batch job which reads an existing metafile (created by converting a NASTRAN plot file) and creates a new metafile containing the combined plots.

You will first be prompted for the name of an existing metafile containing the mode shape plots in a single-view-per-page format.

ENTER METAFILE NAME (PRESS <CR> TO QUIT):

The processor will then ask you to specify the number of views that you want to include in each frame.

ENTER NUMBER OF VIEWS (2/3/4):

You must also tell the program the starting and ending picture numbers to use for creating each view. For example, if your file contains a total of 30 pictures showing 10 modes in three views, then you could specify a starting picture number of 1 for view 1, 11 for view 2, and 21 for view 3. Ending Numbers would be 10 for view 1, 20 for view 2, and 30 for view 3. The program prompts you based on the number of views you selected:

ENTER STARTING PICTURE NUMBER FOR VIEW 1:

ENTER ENDING PICTURE NUMBER FOR VIEW 1:

ENTER STARTING PICTURE NUMBER FOR VIEW 2:

ENTER ENDING PICTURE NUMBER FOR VIEW 2:

--- etc. ---

The TEXT CHOICE submenu allows you to select the manner in which the text (title information) is displayed on the composite pictures:

TEXT CHOICE:
1. SINGLE TEXT AT BOTTOM [DEFAULT]
2. TEXT FOR EACH VIEW
3. NO TEXT

ENTER SELECTION: (1-3, H, M, Q, V)

A message will appear informing you that a job has been started on the system batch queue. You can use the VAX "SHOW

QUEUE" command to monitor the progress of the job. After the job has finished you will have a new metafile containing the combined-view pictures. The metafile will be named "xxxxNEW.MFL", where "xxxx.MFL" is the name of your original metafile.

EXECUTE PICSURE

EXECUTE PICSURE allows you to use Precision Visuals' PicSure software to generate charts and graphs interactively.

At the beginning of execution, PicSure will display a menu of the available graphics devices and then prompt you to enter your graphics device type. Enter the code for the graphics terminal you are using. The following devices are examples of devices which may be supported:

CODE	TERMINAL
405	TEK 4105
407	TEK 4107/4109
415	TEK 4115/4125
240	VT240
T14	TEK 4014
PST	POSTSCRIPT
750	HP 7550A

Text, line, bar, and pie charts may be created in PicSure using English-like commands. If you have never used PicSure, you can enter the command HELP TUTORIALS for an on-line tutorial session. For information on a specific command, type HELP or HELP XXXX where XXXX is the command for which you want an explanation. For more information on PicSure, see the PicSure USER'S GUIDE available from the Operations Control Office (OCO).

Enter QUIT to exit from PicSure and return to the IMAT GRAPHICS MENU.

EXECUTE PV DRAW

EXECUTE PV DRAW allows you to use Precision Visuals' DRAW program to generate charts and graphs interactively or edit existing metafile pictures. The program is not very user-friendly, however it is included in the graphics menu to provide unique capabilities, such as adding text and titles to an existing metafile picture. At the beginning of execution, PV DRAW will display a menu of the available graphics devices and then prompt you to enter your graphics device type. The following is a list of devices which may be supported:

CODE	TERMINAL
405	TEK 4105
407	TEK 4107/4109
408	TEK 4205/4207/4208/4209
411	TEK 4111
415	TEK 4115/4125
429	TEK 4129
240	VT240
340	DEC VT 340
PST	POSTSCRIPT
750	HP 7550A

Enter QUIT to exit from PV DRAW and return to the IMAT EXECUTIVE. For more information on PV DRAW, see the PV DRAW USER'S GUIDE.

APPENDIX A: DI-3000 METAFILE PRIMER

The Precision Visuals DI-3000 metafile system is relatively easy to use, if you understand a few basic concepts and commands. The intent of this discussion is to provide a brief description of some of these concepts.

Metafile Translator Description

A DI-3000 metafile is an ASCII file which contains a coded sequence of commands to draw vectors and text. The file is composed of a series of frames called pictures, which are referenced by their sequential position in the file. You can view the file with a standard text editor, however, it is not readily intelligible, because it consists of only a series of integers and spaces. The easiest way to access a metafile is through a program called the DI-3000 metafile translator, which can be used to display (on a graphics terminal), plot (on a hardcopy device), or modify the contents of a metafile. The metafile translator can access several subprograms called device drivers which translate a generic set of commands to device dependent commands. Therefore graphics users need to learn only a single set of commands to be able to display, modify or create a hardcopy of a metafile on any supported device. The DISPLAY METAFILE menu selection in the IMAT GRAPHICS MENU allows you to execute the metafile translator with a variety of device drivers. The processor gives you a choice of vector (DI-3000) or raster metafiles. This primer applies to DI-3000 vector metafiles, however, some commands used by the Raster Metafile Translator work in a similar manner. The following section discusses some of the basic commands used to display or modify pictures contained in a DI-3000 metafile. For more detailed information see reference 16.

Metafile Translator Commands

All of the commands described in this section can be abbreviated (see examples). The minimum letters required for the short form are underlined. Default settings are shown and optional settings are enclosed in brackets []. The symbol "#" represents a user-selected integer value.

SET METAFILE # filename

> Opens a metafile for processing. Up to 5 metafiles may be opened concurrently.

SET DEVICE 0 OFF [ON]

SET DEVICE 1 ON [OFF]

> Selects display device(s) for output. DEVICE 1 (e.g., your graphics terminal) is on by default. If DEVICE 0 is turned on, output is directed to a local file called METAFILE.DAT.

SET WINDOW # (Left Right Bottom Top)

> Defines the portion of the picture to be displayed. Left, Right, Bottom, and Top are specified in world coordinates. Valid world coordinates may take on any value, however, the default window is (-1 1 -1 1). A maximum of 10 windows may be defined concurrently.
>
> This command is analogous to a combined pan and zoom operation on a graphics terminal, i.e., for a selected picture, all graphical information contained within the boundaries of a specified rectangle is selected for the current display.
>
> Examples:
>
> S W 1 (-2 2 -2 2)   reduces image dimensions by
>   50% (assuming default viewport)
>
> S W 3 (-.5 .5 -.5 .5)   doubles image dimensions
>   (assuming default viewport)

SET VIEWPORT # (Left Right Bottom Top)

> This command defines, in non-dimensional coordinates, the portion of the display device in which an image is to be drawn. Valid coordinates range from -1.0 to 1.0. Default viewport is (-1 1 -1 1) which is equivalent to the full display area of the device.
>
> Viewport size can also affect scaling. For example, if a picture is drawn using a WINDOW defined by (-.5 .5 -.5 .5) and a VIEWPORT defined by (-1 1 -1 1), then the image dimensions will be doubled. However, if the same WINDOW setting is used with a VIEWPORT defined by (-.5 .5 -.5 .5), then the dimensions will remain unchanged, because the window fits exactly into the viewport.
>
> Examples
>
> S V 2 (-1.0 0.0 0.0 1.0)   displays picture in upper left
>   corner of device
>
> S V 5 (-.5 .5 -.5 .5)   displays picture in center of
>   device using 25% of available
>   display area

DRAW   picture specification [NOEJECT]

> Draws (displays) a picture according to the picture-specification settings. Common picture specifications are listed below:

PICTURE	id or #	see examples below for use of "#" and "id"

METAFILE   #

WINDOW   #

VIEWPORT   #

CLIPPING   ON [OFF]

CLIPPING eliminates from view (but not from the original file) all portions of a picture which lie outside a given viewport.

NOEJECT causes the device to display the next picture without advancing a frame (on hardcopy devices) or erasing the screen (on display terminals).

Examples:

D P 1	draws picture 1 of the default metafile using the default picture specifications
D P FROM FIRST TO LAST	draws all pictures in the default metafile in sequence
D P 2 W 1 V 2 MF 3 NOEJECT	draws picture 2 of metafile 3 using window 1 and viewport 2. Next picture will be overwritten on this picture.

QUIT or EXIT

Exits metafile translator.

Batch Mode

The metafile translator can be run in batch mode if a passive device driver is used. For example, on the IMAT VAX graphics computer, the Postscript driver could be used to execute the translator in batch mode. This is the method used by the COMBINE NASTRAN MODE PLOTS processor, i.e., the Postscript driver is called, device 0 is turned on, and a series of window and draw commands are executed to combine 2, 3 or 4 pictures at a time into a single output picture.

Conversion to Postscript

Postscript is a graphics programming language which describes text, graphics, and scanned images to raster output devices such as personal laser printers. Any DI-3000 metafile can be converted to Postscript format by executing the metafile translator with the Postscript device driver. In this mode no pictures are drawn to the output device (screen). Instead, they are written in Postscript language to a file called POSTS.DAT, which can then be sent to any compatible device (e.g., a PS Jet laser printer). Postscript files can be edited with any text editor, and several parameters, such as line width, color, and text font can be modified.

Examples

The DI-3000 Metafile Translators allow you to direct picture output to a file instead of a display screen or hardcopy device. This feature provides the capability to use a metafile translator to create a new metafile from the contents of one or more existing metafiles. The examples that follow illustrate the procedure. (Note that if you are performing metafile operations in batch mode, you must use a passive-device translator, e.g., Postscript.)

<u>Example 1</u>: Use the metafile translator to divide a large file into smaller metafiles

Assume that a metafile, MFOLD.MFL, contains 100 pictures, and you want to create a new smaller metafile, MFNEW.MFL, containing only pictures 1 through 3.

1. Choose "DISPLAY METAFILE" from the IMAT GRAPHICS MENU and select the Postscript device driver.

2. At the "M>" prompt enter the following sequence:

   (Note: Text following an * is an optional comment)

```
M> SET DEVICE 1 OFF        * Turn off Postscript output
M> SET DEVICE 0 ON         * Open "METAFILE.DAT"
M> S MF 1 MFOLD.MFL        * Open existing metafile
M> D P FROM 1 TO 3         * Write pictures 1 - 3
M> QUIT                    * Exit from translator
```

3. Rename the new metafile:

   RENAME METAFILE.DAT MFNEW.MFL

<u>Example 2</u>: "COMBINE NASTRAN MODE PLOTS" processor.

The following VAX Digital Command Language (DCL) command file is an example of a file which is written by the "COMBINE NASTRAN MODE PLOTS" processor and submitted to the batch queue on the IMAT graphics computer. The original metafile, which was converted from a NASTRAN plot file, contained 27 pictures. Pictures 1 - 9 show modes 1 - 9 in View 1, pictures 10 - 18 show modes 1 - 9 in View 2, and pictures 19 - 27 show modes 1 - 9 in View 3. The command file shown below could be used to create a new metafile in which each picture shows one mode in three different views. Note that only the first three modes are processed in this example. The first line of the file sets the default directory for batch execution. The second line executes the metafile translator using the Postscript device driver.

NOTE: The intent of this example is to illustrate the use of several translator features, including multiple windows, multiple viewports and batch processing. It may also serve as an example for users who wish to manipulate a large number of pictures in a similar manner. If you wish to simply combine several mode shape plots, you can use the COMBINE MODE SHAPE PLOTS PROCESSOR, which will perform all of these steps automatically for you.

<u>Notes:</u> 1. Text following a "$" is a DCL (system) command
          2. Text following a "$!" is a DCL comment line
          3. Text following a "*" is an optional metafile translator comment

```
$! Set default directory
$SET DEF [current directory]
$! Invoke metafile translator to write postscript pictures
$METAPST
SET DEVICE 1 OFF            * Disable Postscript output to file POSTS.DAT
SET DEVICE 0 ON             * Open METAFILE.DAT for output
DEFAULT CLIP ON             * Clip pictures outside of viewport boundaries
SET MF 1 myfile.MFL         * Open a single existing metafile four times
SET MF 2 myfile.MFL         *     to create four separate pointers.  This
SET MF 3 myfile.MFL         *     technique speeds processing
SET MF 4 myfile.MFL
S W 1 (-1.1 1.1 -.8 .8)     * Window 1 selects graphics only
S W 2 (-1.1 1.1 -1.1 -.75)  * Window 2 selects text at bottom of plot
S V 5 (-.99 .99 -.99 -.675) * Viewport 5 places text at bottom of picture
S V 1 (-.99 0.0 .1575 .8775)* Viewport 1 places View 1 at upper left
S V 2 (0.0 .99 .1575 .8775) * Viewport 2 places View 2 at upper right
S V 3 (-.495 .495 -.675 .045)* Viewport 3 places View 3 at lower center
D P   1 MF 1 W 1 V 1 N      * Draw Picture 1 (Mode 1, View 1), Noeject
D P  10 MF 2 W 1 V 2 N      * Draw Picture 10 (Mode 1, View 2)
D P  19 MF 3 W 1 V 3 N      * Draw Picture 19 (Mode 1, View 3)
D P   1 MF 4 W 2 V 5        * Draw Text for Mode 1
D P   2 MF 1 W 1 V 1 N      * Draw Mode 2, View 1
D P  11 MF 2 W 1 V 2 N      * Draw Mode 2, View 2
```

```
D P  20 MF 3 W 1 V 3 N          * Draw Mode 2, View 3
D P   2 MF 4 W 2 V 5            * Draw Text for Mode 2
D P   3 MF 1 W 1 V 1 N          *
D P  12 MF 2 W 1 V 2 N          * etc......
D P  21 MF 3 W 1 V 3 N
D P   3 MF 4 W 2 V 5
QUIT                            * Exit translator
$! Rename METAFILE.DAT
$RENAME METAFILE.DAT myfileNEW.MFL
$! Delete file POSTS.DAT which is not needed
$DELETE POSTS.DAT.
$EXIT
```

After the processor writes the file, it submits a batch job as follows:

SUBMIT/NOPRINT/NOTIFY myfile.COM

APPENDIX B: IMAT-SUPPORTED GRAPHICS HARDWARE

The following sections briefly describe available vector and raster devices for both interactive display and hardcopy output.

1. INTERACTIVE DEVICES

The following is a list of IMAT-supported interactive devices.

A. VECTOR DEVICES

IMAT- and PVI-supported interactive vector devices include the following:

DEVICE NAME	CODE
TEK 4105 graphics terminal	405
TEK 4107/4109 " "	407
TEK 4014 " "	T14
TEK 4115/4125 " "	415
VT 240 terminal	240
HP 7550A plotter	750
POSTSCRIPT *	PST

* POSTSCRIPT is a virtual device, i.e., output is not displayed, but is written to a file called POSTS.DAT.

B. RASTER DEVICES

IMAT- and Raster Metafile(RM)-supported interactive raster devices include the following:

TEK 4107/4109
TEK 4125
AED767
DICOMED
DUMMY
SCODL
SUN *
SUNMONO *

* SUN, and SUNMONO are virtual devices.

2. HARDCOPY DEVICES

The following is a list of IMAT- and RM-supported batch and/or off-line devices. Consult reference 14 for more information.

A. VECTOR PLOTTERS

The following vector plotters are supported by the IMAT software:

CALCOMP 11inch
CALCOMP 34inch
CELCO, 4
CELCO, 8
CELCO, 16
CELCO, 35
VERSATEC, 39inch
VERSATEC, A
VERSATEC, B

The plotters are described in detail in the following paragraphs.

The Calcomp Plotter

The Calcomp is a high speed, two-axis plotter. It plots according to digital incremental signals with a resolution of .0005 inches in each direction. The plotter is used for vector data only. Plot instructions and metafile commands must be included. This plotter also has several different paper types available.

The PLOT. command statements are:

COMMAND	PLOT SIZE
PLOT.ZCAL,11	CALCOMP 11" PAPER
PLOT.ZCAL,34	CALCOMP 34" PAPER

The following plot card parameters are available:

PARAMETER	DEFINITION	DEFAULT
HEIGHT	FRAME SIZE, VERTICAL	11.0 inches
WIDTH	FRAME SIZE, HORIZONTAL	11.0 inches
XO	X-OFFSET	0.0 inches
YO	Y-OFFSET	0.0 inches
RVAX	REVERSE AXES (ROTATE 90 deg)	----
PAGE	PAGE SPACING CONTROL	11.0 inches

Example:

PLOT.ZCAL,11 (HEIGHT=11.0, WIDTH=11.0)

The following continuation cards are required:

1. PEN TYPE (0.2 0.3 0.4 0.5 0.6 or 0.8mm)
2. INK COLOR (black, blue, red, or green)
3. PAPER TYPE (00, 01, or 02).

For further information on the Calcomp plotter see "ACD Production Plotter Device Driver Guide" available from OCO (x46562).

The Celco Film Recorder

The Celco is a high-resolution color film recorder capable of processing raster and vector data to generate color or black and white 16mm films, 35mm slides, 4 x 5 negatives or 8 x 10 viewgraphs. The PLOT. command on NOS transfers DI-3000 metafiles to a VAX which drives the Celco. The Celco operator will run the following set of metafile commands:

```
S MF 1 DIMETA
D P FROM FIRST TO LAST
QUIT
```

Note that ALL pictures on local metafile DIMETA will be processed.

The PLOT. commands for the Celco are as follows:

COMMAND	FILM FORMAT	RESOLUTION
PLOT.CEL,16	16MM MOVIES	1402 x 1024
PLOT.CEL,35	35MM SLIDES	4096 x 2732
PLOT.CEL,8	8 x 10 VIEWGRAPHS	5120 x 4096
PLOT.CEL,4	4 x 5 NEGATIVES	5120 x 4096

The following plot card parameters are available:

PARAMETER	DEFINITION	DEFAULT
COPY = N	FRAME REPLICATIONS	1

Example:

PLOT.CEL,16(COPY=5)

Continuation cards are allowable and are recommended for informing the Celco operator about processing resolution size.

examples:

CONT. // RESOLUTION = 512 X 512 //
CONT. // TEST CASE //

For further information on the Celco see the "User's Guide For the DI-3000 CELCO Device Driver", available from OCO (x46562).

The Versatec Plotters

ECP-42

The Versatec ECP-42 plotter can handle raster and vector data (for raster information see Raster plotters). The Versatec is a 42-inch electrostatic plotter with black and white or color capabilities and a resolution of 40,000 points per square inch (200 points per linear inch). The plotter has a range of 256 colors and it performs a hardware polygon fill. The Versatec can handle a maximum of 600 vertices per polygon, but only 202 vertices are allowed when filling a polygon using hardware fill. The default height and width of the Versatec is 39 inches, but the maximum width is 13 feet (the charge is computed per linear foot). Therefore, if you have a series of pictures to be plotted together, it is recommended that you stack them vertically using the metafile translator.

VERSACOLOR

The Versatec VERSACOLOR is a thermal plotter capable of plotting in monochrome or in color. There are seven line colors, 256 predefined area colors, and two paper sizes (A - 8 x 8 and B - 10 x 10) available.

The PLOT. commands for the Versatec plotters are:

COMMAND	PAPERSIZE	DEFAULT HEIGHT	DEFAULT WIDTH
PLOT.ZVER,39	39" paper	39.0	39.0
PLOT.ZVER,A	A PAPER	8.0	8.0
PLOT.ZVER,B	B PAPER	10.0	10.0

Available plot card parameters:

PARAMETER	DEFINITION
HEIGHT	FRAME SIZE VERTICAL
WIDTH	FRAME SIZE HORIZONTAL
PW1-PW8	DEFINE PEN WIDTHS (DEFAULT 2)

Note: Continuation cards are allowable.

Example:

PLOT.ZVER,39 (HEIGHT=40, WIDTH=45)

NOTE: Opaque paper is the default output media for the thermal plotters. Clear film media can be requested on a continuation card (thermal plotters only).

For further information on Versatec Drivers see ZVERDDG/UN=PVINFO on NOS, the Versatec ECP-42 Device Driver Guide from OCO (x46562), or reference 14.

The Laser Plotter

An IBM 3800-6 laser printer capable of plotting DI-3000 metafiles is available in ACD. The Laser printer has a maximum plotting area of 7.5" x 13.87", and a resolution of 240 x 240 dots per square inch.

The PLOT. control statement is:

PLOT.LASER

Available plot card parameters are:

PARAMETER	DEFINITION	DEFAULTS
HEIGHT	FRAME SIZE VERTICAL	7.5 inches
WIDTH	FRAME SIZE HORIZONTAL	7.5 inches
XO	X-OFFSET	0.0 inches
YO	Y-OFFSET	0.0 inches
RVAX	ROTATE 90 DEGREES	---

Note: There are no continuation cards available.

Example:

PLOT.LASER (XO=0.5, YO=0.5, RVAX)

B. RASTER PLOTTERS

The following is a list of Raster Metafile(RM)-supported hardcopy output devices:

IBM
DICOMED
POSTSCRIPT (DEVICES)
VERSATEC, 39
VERSATEC, A
VERSATEC, B
CELCO (4,8,16, AND 35)

NOTE: The raster metafile format is accepted directly by the Celco plotter. All other raster devices require you to run the raster metafile translator with the desired device, and convert the raster metafile format into device specific format. This conversion is performed automatically by the IMAT software.

Celco

The Celco film recorder is capable of handling raster data with a resolution of 512, 1024, 2048, or 4096. For further information see Vector Plotters: Celco.

The PLOT. command statements are:

COMMAND	OUTPUT
PLOT.CELRAS,16	16MM MOVIE
PLOT.CELRAS,35	35MM SLIDES
PLOT.CELRAS,8	8 x 10 VIEWGRAPHS
PLOT.CELRAS,4	4 x 5 NEGATIVES

Note: No available plot card parameters.

Continuation cards are recommended to specify number of copies and resolution as well as any additional information to be given to the plot operator.

```
COPY = n
RESOLUTION = (512 to 4096)
```

Example:

```
PLOT.CELRAS,35
CONT.// COPY=2//
CONT.// RESOLUTION=4096X4096//
```

For further information see RASDDG/UN=PVINFO on NOS.

Versatec

The Versatec ECP-42 plotter handles raster data with a maximum resolution of 8000 x 8000 pixels and eight colors. For further information see Vector Plotters, Versatec.

The Versatec Versacolor plotter handles raster data having a maximum resolution of 2432 x 2432 (A-size), or 3124 x 3124 (B-size). For further information see Vector Plotter, Versacolor.

The PLOT. commands are:

COMMAND	SIZE
PLOT.VERRAS,39	39
PLOT.VERRAS,A	A
PLOT.VERRAS,B	B

Note: No plot card parameters available, however, continuation cards are available.

Example:

PLOT.VERRAS,39

APPENDIX C: IMAT-SUPPORTED COMMERCIAL SOFTWARE

The following section describes the commercial software packages that are involved in the IMAT graphics system.

I-DEAS

I-DEAS is Structural Dynamics Research Corporation's (SDRC) graphics based Computer Aided Design (CAD), Computer Aided Manufacturing (CAM), and Computer Aided Engineering (CAE) software, which consists of several integrated "families" of codes. The I-DEAS families which are available on the IMAT VAXcluster are described in the following sections.

SOLID MODELING

The Solid Modeling family is a set of codes used to create complex solid objects. Two or more objects can be combined using simple boolean operations. Physical properties of completed objects can be easily obtained, and finished geometry can be transferred to finite element preprocessors for mesh generation. A rigid body mechanism analysis is also available.

FINITE ELEMENT MODELING

The Finite Element Modeling family features an interactive graphics pre- and post-processor which can be used on a variety of graphics terminals to create finite element models, and translators which can create data files for input to commercial finite element codes such as MSC/NASTRAN. Analysis results can be displayed in various formats, including deformed structure plots, color stress contours, and XY plots.

SYSTEM DYNAMICS ANALYSIS

The System Dynamic Analysis family provides the capability to analyze complex mechanical systems. Dynamic performance can be evaluated in the frequency or time domain using modal, finite element, or test data to assemble components.

TEST

The Test family offers many capabilities required for modal testing and analysis, including time history processing, spectrum generation, modal identification, and mathematical model correlation.

MSC/NASTRAN

MSC/NASTRAN is a version of the NASTRAN general-purpose structural analysis program that has been developed and is maintained by the MacNeal-Schwendler Corporation. The MSC/NASTRAN code has an open architecture that allows researchers to modify structured solution sequences to solve non-standard static and dynamic structural analysis problems using the finite element method.

MATRIXx

MATRIXx is a programmable set of matrix subroutines which perform design and analysis functions for either classical or modern control problems. SYSTEM_BUILD, an optional capability of MATRIXx, provides an interactive graphics tool for building, modeling, and editing computer simulation models. Complex linear or non-linear systems can be assembled from basic building blocks. Simulation can be performed using a variety of integration algorithms and results can be displayed graphically. MATRIXx is marketed by Integrated Systems Incorporated.

PRECISION VISUALS, INCORPORATED SOFTWARE

Precision Visuals, Incorporated (PVI) software packages are versatile graphics software tools which allow user flexibility and control as well as machine and device independence. The PVI software which is available on the IMAT VAXcluster is described in the following sections.

DI-3000

DI-3000 is a library of over 200 two- and three-dimensional graphics subroutines which can be called by a FORTRAN program. DI-3000 is device and machine independent. Tailored interfaces for over 70 graphics devices allow application programs that are written for a "virtual graphics device" to automatically utilize the full features of any supported display terminal. DI-3000's full color features include 3D viewing, window clipping, depth clipping, and graphics-quality text.

PICSURE

PicSure is an interactive graphics system for producing professional quality charts and graphs using a sequence of English-like commands. PicSure has the capability to produce on-line graphics, bar charts, pie charts, and text charts. PicSure is designed for both the novice and experienced user with default values for charts or allowable attribute settings for user tailoring of charts. PicSure can also be executed from a command file and is machine and device independent.

DRAW

DRAW is a general purpose interactive illustration editor which allows users to create, store, retrieve, and revise DI-3000 vector metafiles. Possible illustrations include logic diagrams, training aids, engineering drawings, floor plans, presentation graphics, and forms.

METAFILE SYSTEM

The PVI metafile system provides a method of storing vector graphics information in a device and machine independent display file, or metafile. The PVI metafile is a sequence of vector pictures, where each picture is equivalent to one frame. These metafiles are created by using the metafile driver with DI-3000, or by creating a metafile via capabilities within PicSure and PV Draw, or by using locally developed libraries MFINT5 and MFLIB5 which create PVI metafiles without using DI-3000 and the metafile driver. A PVI metafile can be stored, sent to the ACD production devices, or interactively displayed. Display is possible with the PVI metafile translator, which also allows window and viewport changes, (zoom, pan) and combination of several metafiles into one metafile or several pictures into one frame.

RASTER METAFILE SYSTEM

The Raster Metafile (RM) system, developed at NASA Langley Research Center, provides a generic raster image format and tools for processing raster images. RM images are machine and device independent and may be interactively displayed, modified, or converted to an alternate format using the RM translator (RMT).

APPENDIX D: DEFINITION OF TERMS

command line:

a metafile translator command and its parameters

device driver:

a group of subroutines in object-code format which is loaded with an executable program and required libraries to convert device independent commands into device dependent commands. (e.g., TEK 4105, VT 240, or POSTSCRIPT)

device independence:

the ability of a graphics file to be displayed or plotted on any device (see device driver)

frame:

plotting area between media advances on a hardcopy device, or, on an interactive graphics device, the information displayed between screen erases

machine independence:

the ability of a graphics file to be used without modification or translation on any computer

metafile device driver:

virtual graphics device driver used to build a metafile. It is initialized and selected by a DI-3000 graphics program.

metafile:

a graphics file containing pictures stored in a machine- and device-independent format

metafile translator:

a command-driven interactive or batch program used to display and manipulate metafiles

picture:

a single image in a graphics file

pixel:

the basic unit of an image displayed on a graphics terminal (or raster hardcopy device)

raster data:

intensity or color table description of picture elements (pixels) used to create shaded or continuous tone pictures.

vector data:

positioning (move, draw) and non-positioning (color, style, etc.) commands used to describe a picture composed of line segments, polygons, and/or text

APPENDIX D: DEFINITION OF TERMS

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15. Supplementary Notes

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16. Abstract

The Integrated Multidisciplinary Analysis Tool (IMAT) consists of a menu-driven executive system coupled with a relational database which links commercial structures, structural dynamics and control codes. The IMAT graphics system, a key element of the software, provides a common interface for storing, retrieving, and displaying graphical information. The IMAT Graphics Manual shows users of commercial analysis codes (MATRIXx, MSC/NASTRAN and I-DEAS) how to use the IMAT graphics system to obtain high-quality graphical output using familiar plotting procedures. The manual explains the key features of the IMAT graphics system, illustrates their use with simple step-by-step examples, and provides a reference for users who wish to take advantage of the flexibility of the software to customize their own applications.

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