NASA CONTRACTOR REPORT 177385

PLTTER User's Guide

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(NASA-CR-177385) PLTTER USER'S GUIDE (Informatics General Corp.) 64 p HC A04/MF A01

N86-13291

CSCL 01A

Unclas
G3/02 02939

CONTRACT NAS2- 11555

November 1985

NASA

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Prepared for
Ames Research Center
under Contract NAS2-11555

November 1985

National Aeronautics and
Space Administration

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SECTION 1

TERMINOLOGY AND DEFINITIONS

CDD - A CDDMS data base. A CDDMS data base is a special-purpose data base used to store wind tunnel data and results of aerodynamic analysis codes. CDDs are binary files and cannot be edited or printed directly.

CDDMS - A special-purpose data management and graphics system for storing and plotting wind tunnel data. Individual components of this system are described briefly in APPENDIX K.

CDDMS Plot Request Forms - Special forms designed to allow the plot data as well as the format of the desired plots to be requested precisely so that others may do the actual plotting.

Configuration Code - An integer code identifying which model configuration is appropriate for a given run:sequence. If configuration text is desired in plot legends, configuration code must be available in the sixth position of the run header. (See run header definition in this section.)

Configuration Table - A CDDMS table containing text which may be output in plot legends.

Defaults File - An optional file used in the Requests file system for specifying invariant plot options.

Derived data - (Also called Summary data.) A set of standard results computed from aerodynamic wind tunnel data.

DIP file - Device Independent Plot file. DIP files are the basic files needed to create Versatec plots. They may be converted to Dicomed format for making microfiche plots. DIP files cannot be edited.

Disregarded Data - Data points which are to be ignored by curve fairing operations. Such points are identified by disregarded data flags which are stored on the CDD. These flags may be adjusted by running the ARIES program or the TOGGLE program.

Force - Force data is stored on a CDD as one value per sequence for each force quantity. Forces are identified on a CDD by a unique 8-character name in the Force Names Table.

Force Names Table - Also called a Names Table. A CDDMS table containing the names of the force data on a CDD in the same order as the data is returned from the SWTS. Each force name may contain up to 8 characters. RUN, SEQ or SEQUENCE, REGION or REG or RGN are reserved names and can be requested on the legend card. They may not be used as Force names.

Frames File - An optional file used in the Requests file system for specifying plot options which vary from frame to frame. Each frame definition in a Frames file must begin with a $FRMID keyword.

Legend - Also called a plot legend. A tabulation of user-specified quantities identifying information about each curve on a given plot. Legends may contain force data, run number, sequence number, region numbers, and configuration text. All legends appear at the top of plot frames.

Map Table - A CDDMS table which establishes the correspondence between a pressure tap number and a scanivalve:port combination.

PDF - Plot Definition File. Contains extracted data to be plotted. PDFs may be edited.

Plot Code - Integer code identifying which plumbing configuration (for pressure data tubing) is appropriate for pressure data in this run:sequence. If pressure plots are desired, the plot code must be available in the first position of the CDD run header. (See run header definition in this section.)

PLTTER - A command file for creating plots of wind tunnel or theory data stored on a CDD. PLTTER invokes various CDDMS programs to allow desired plots to be specified, plot data to be extracted and sorted, and plots to be created. Most users start with a Requests file to create Versatec plots.

POUT - Also called POUT9. A special file used to control data extraction from the SWTS. A POUT must be created before the wind tunnel test data can be retrieved.

Pressure tap - A small orifice on a model surface at which a pressure is measured. Pressures are generally measured using a "port" on a "scanivalve" (scan).

PSF - Plot Specification File. PSFs are intermediate files created from Requests files using the PLTTER system. Quantities to be plotted are identified by "pointers" on the data base. PSFs contain run specifications to direct

data extraction from a CDDMS data base. PSFs may be edited.

Region - Also called a pressure region. A region identifies by number some subset of tap locations at which pressure and coordinate information are to be extracted for a given curve on a pressure plot.

Region Table - A CDDMS table which identifies pressure tap numbers for pressure data which is to be used for a given pressure plot. Pressure plots are requested for a specified numbered region.

Requests File - A plot Requests file identifies the data to be plotted from a CDD. Requests files may be used in conjunction with a Frames and/or Defaults file. A Requests file is made up of request blocks. A request block is made up of all plot options specified for a single request. Request blocks are delimited by $STATUS keywords.

Run Header - A special section of information stored with each run on a CDD. Run headers contain six quantities, some of which have special significance when plotting. Standard run header quantities are shown on the Data Retrieval Request forms in Appendix G. page 45.

Special Text - Any combination of Greek characters, mathematical symbols, or sub/superscripting in a text string.

SWTS - The Standardized Wind Tunnel System. A specialized data acquisition and storage system for wind tunnel data. Raw data and computed results are stored on Test Data Bases (TDBs). There is a special-purpose report generator within the SWTS which creates output which can be loaded onto a CDD by the LOADER program.

Tap Table - A CDDMS table containing coordinate information for pressure tap locations.

Wind Tunnel Test Data Retrieval Request Forms - Also called Data Retrieval Request Forms. Special-purpose forms for identifying all the data that is to be retrieved from the SWTS for storing on a CDD. Information provided on these forms is required to retrieve data, to create CDDMS Tables, and to initialize the CDD.

SECTION 2

INTRODUCTION TO THE PLTTER SYSTEM

FEATURES, PLOT OPTIONS, AND DEFAULTS

CDDMS is a comprehensive system for data basing and subsequent plotting of data acquired during wind tunnel tests or from computational flow analyses. The graphics capabilities of this system may be invoked by typing the command CDDMS followed by PLTTER at any terminal connected to the FAR or FAE VAX. (CDDMS needs to be typed only once during a given login session. Frequent users of PLTTER and other CDDMS programs may find it convenient to put the CDDMS command in their login command files.)

PLTTER is a system which creates plots of wind tunnel data which has been stored on a CDDMS data base. The user is prompted for all information necessary to create desired plots and is given the opportunity to begin and end at several stages along the way. For example, the user may wish to start with a Requests File and stop after creating a Plot Specification File for use with the ARIES program.

The PLTTER system features many capabilities which are especially useful when plotting wind tunnel data. Data from up to five CDDs may be displayed for comparison on the same plot. PLTTER offers a variety of page formats, different grid options and parametric curve fitting algorithms, and a powerful legend capability to identify relevant information about individual curves. One or more plots on a page can be suppressed if desired so that an established page format can be maintained. Force plot data may be sorted with respect to a third quantity. (E.g. CL and CD may be sorted with respect to ALPHA before being plotted.) Certain data points (sequences for force plots or tap locations for pressure plots) may be "disregarded" so that they are ignored by curve fairing operations. Special text, such as subscripts and Greek characters, is easily specified. Plots may be rotated 90 degrees to the "cinema" orientation. Final plot output may be standard Versatec plots, QMS Laser printer plots, or microfiche (from the Dicomed). This system also features a mechanism for requesting plots. By completing CDDMS Plot Request Forms, the user can have others do the plotting.

The basic features and options of the PLTTER system are highlighted on the sample plots shown in APPENDIX A. These plots also introduce basic graphics terminology necessary to make effective use of the PLTTER system.

The Requests file system allows plot-controlling information to be arranged in the way most appropriate for any application. All files must be created before running PLTTER.

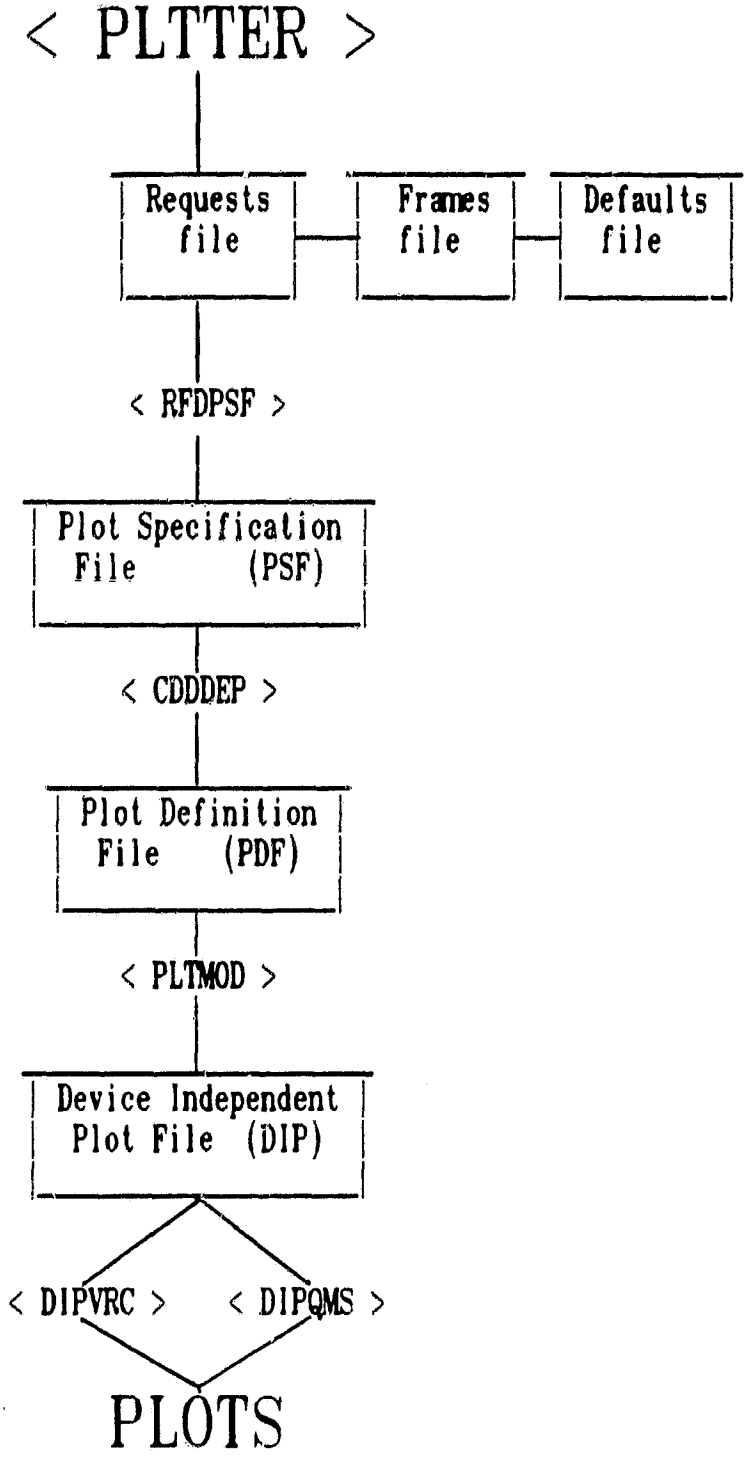
HELP is available for most menu-type prompts issued by PLTTER and its constituent programs by simply entering a question mark (?) in response to the prompt. In such cases, descriptions of possible user options are explained in greater detail.

Defaults are provided for nearly every plot option. Most defaults are clearly identified on the CDDMS Plot Request Forms (shown in APPENDIX H) on which they are preceded by an asterisk (*). Default titles and labels are blanks; default legends are empty. The default frame type is Force. Unless otherwise requested, Force data is sorted with respect to ALPHA before plotting. In fact, the only quantities which MUST BE specified (either in user files or on Plot Request Forms) and for which no defaults are provided are:

- The name(s) and type(s) of the CDDMS data base(s) from which to extract data for plotting.
- The names of the data to be plotted on the X and Y axes.
- The RUN(s) to be plotted.

The following diagram shows the relationship of the various files and programs which make up the PLTTER system. The user may choose to begin and end at any stage in this structure. In addition, individual components (programs) of the PLTTER system can be run by typing PROGRAM NAME, where PROGRAM NAME is the name of the individual program to be invoked.

The following diagram shows the various programs and files which make up the PLTTER system. Files are enclosed in boxes. Program names are shown in < angle brackets >.



BEFORE PLOTTING THE DATA

There are several steps necessary before plotting data with the PLTTER system. These are outlined briefly below.

- The user should understand the basic PLTTER system structure shown on the diagram on page 7 and be familiar with terminology and with the various file structures and plot options which are available.
- The user must have (reduced) wind tunnel test data (i.e. RESULTS) available in a Test Data Base (TDB) of the SWTS.
- The data that is to be retrieved and stored on a CDD for plotting must have been identified. The Wind Tunnel Test Data Retrieval Request Forms must be completed well in advance of the test. These forms contain all information necessary for initializing the data base, retrieving the data, and creating the CDDMS Tables needed for plotting various types of data.
- Before running any CDDMS programs, the user must type CDDMS. This defines those programs for the current login session. The user may find it easier to put the CDDMS command in the login command file.
- Support personnel must create a POINTERS input file based on the information specified on the Data Retrieval Request Forms and run the POINTERS program to create the input file for the SWTS reporting subsystem. This file directs data retrieval from the SWTS.
- Support personnel must run the SWTS report generating subsystem to extract desired data. The extracted (RUN.DAT) data file must be transferred to the FAR or FAE VAX.
- Support personnel must initialize the CDD by running the CDDINI program.
- Support personnel must run the LOADER program to load data (RUN.DAT file) onto the CDD.

- Support personnel must create necessary CDDMS Tables.

- Support personnel must run the TABLES program to load CDDMS Tables onto the CDD. If force data is to be plotted, they must load a Force Names Table. If pressure data is to be plotted, they must load Map, Tap, and Region Tables. If text is desired in plot legends, they must load a Configuration Table.

- If plots of Summary data are desired, the user (or support personnel) must run the DERIVD program first. DERIVD is discussed in greater detail in APPENDIX J.

- If the user wishes for someone else to do the plotting, CDDMS Plot Request Forms must be completed. To ensure fast turnaround, these forms must be completed well in advance of the need to see the plots.

SECTION 3

PLOTTING WIND TUNNEL DATA WITH PLTTER

FRAME TYPES

Three basic frame types are available - Force, Pressure, and Summary (i.e. F, P, and S).

Force plots represent two force quantities plotted one versus the other for a given run (or set of runs). Force data to be plotted must be identified by name (exactly as it appears in the Force Names Table). Each point on the resulting curve represents the values of the two force quantities for one sequence of the specified run(s).

Pressure plots represent a pressure quantity plotted versus the position of the corresponding tap (e.g. Cp vs. X/C) for a specified run:sequence combination. Pressure plots require a separate region to be specified for each of the upper and lower surfaces of a wing. Each point on the resulting curve represents pressure and location information for a single pressure tap for the specified run:sequence.

Summary plots show "derived" data generated by the DERIVD program. Derived data contains such quantities as slopes, intercepts, and maximum and mimimum values for various force quantities evaluated over an ALPHA or BETA range in a given run. Summary plots require the user first to have derived such Summary data from original force data by running the DERIVD program. (See APPENDIX J.) Each point on the resulting curve represents characteristics which have been derived for data from an entire run. Hence, Summary plots require the "ampersand" run specification syntax described next in this section so that data from more than one run may be shown on the same plot. Derived data also may be plotted against any force quantity on the CDD.

SPECIFYING RUNS TO BE PLOTTED

The following examples demonstrate valid CDDMS run specification syntaxes. A slash (/) is used to identify runs from a data base other than the default (1). The data base specified using the slash notation is honored only for the current run specification line. The default (1) is restored automatically at the beginning of each run specification line. A colon may be used after a run number to identify an individual sequence of that run (for plotting pressure data). The syntaxes shown below must be used to identify the runs or run:sequence combinations for which a given frame is desired.

RUN SYNTAX	DESCRIPTION
7	A single run from default Data Base (DB 1)
1:5/2	A single run:sequence from DB 2
5-15/3,17-20	Runs 5 thru 15 and 17 thru 20 from DB 3
1 2,3,5,7	Selected runs 1,3,5,7 from DB 2
4@9/5@11@17/1	Force comparison - Multiple runs per plot; runs 4@17 from DB 1; 9@11 from DB 5
8:5@2:7,3	Pressure comparison - Multiple run:sequences per plot; run 8:5 from DB 1; 2:7 from DB 3
5@7@9@15	For Summary, "@" only valid option: runs must all be from same DB
‹CR›	Exit

THE REQUESTS FILE SYSTEM

The Requests file system allows plot-related information to be specified only as often as that information is required to be changed in a given plotting session. It is based upon a hierarchy of three files which can be used to define various information needed to create desired plot frames. Information in the three files may be specified using keywords or the $OPTIONS namelist. The $OPTIONS namelist may appear in any of the three files. The (optional) Defaults file is intended to allow invariant quantities for a given set of plots to be specified only once. This file generally includes such information as selected grid type, curve fitting technique, curve symbol sequence, etc. Any of the options specified in the Defaults file may be modified at a higher level in the file hierarchy. The (optional) Frames file allows plot options which are frame-dependent to be defined. Frames files normally include such items as the names of data to be plotted on the X- and Y-axes and axis scaling information and labels. Options specified at the Frames file level in the hierarchy may be modified in the Requests file. The Requests file contains actual plot requests. It specifies the runs and frame definitions to be plotted and allows a final opportunity to modify plot options specified in the Defaults and/or Frames files.

One very natural arrangement for the information to be contained in each of the three files is to follow loosely the structure of the CDDMS Plot Request Forms. The structures of the Requests, Frames, and Defaults files (with examples) are provided in APPENDICES B, C, and D respectively.

Sample Requests, Frames, and Defaults files are available on the FAR VAX in FAE0:[FAECDD.DOC]:

SAMPLE.REQ
SAMPLE.FRM
SAMPLE.DEF

More extensive files are also available which show all possible options.

COMPLETE.REQ
COMPLETE.FRM
COMPLETE.DEF

These may be copied into the user's account as a start in using the Requests file system.

AN IMPORTANT NOTE ON HOUSEKEEPING

The PLTTER system involves the creation of many intermediate files. Of these, it is likely that the only ones which need to be kept for any period of time are Requests file(s), Frames file(s), and Defaults file(s).

PLTTER creates several other file types from these when it creates plots and these should be deleted as soon as they are no longer useful. File types created by PLTTER which should be deleted routinely include:

.PSFs (e.g., TESTDAT.PSF)
.PDFs (e.g., TESTDAT.PDF)
.DIPs (e.g., TESTDAT.DIP)
.QMSs (e.g., TESTDAT.QMS)

SECTION 4

PLOTTING DATA NOT ON A CDDMS DATA BASE

If data is not stored on a CDDMS data base, identical plotting capabilities (with the exception of multiple plots per frame) can be accessed by using the QMOD system, which is documented in Informatics General Corporation Technical Note #84-7104-306-21. QMOD is a powerful and very user-friendly system for creating report-quality plots from nearly any data source.

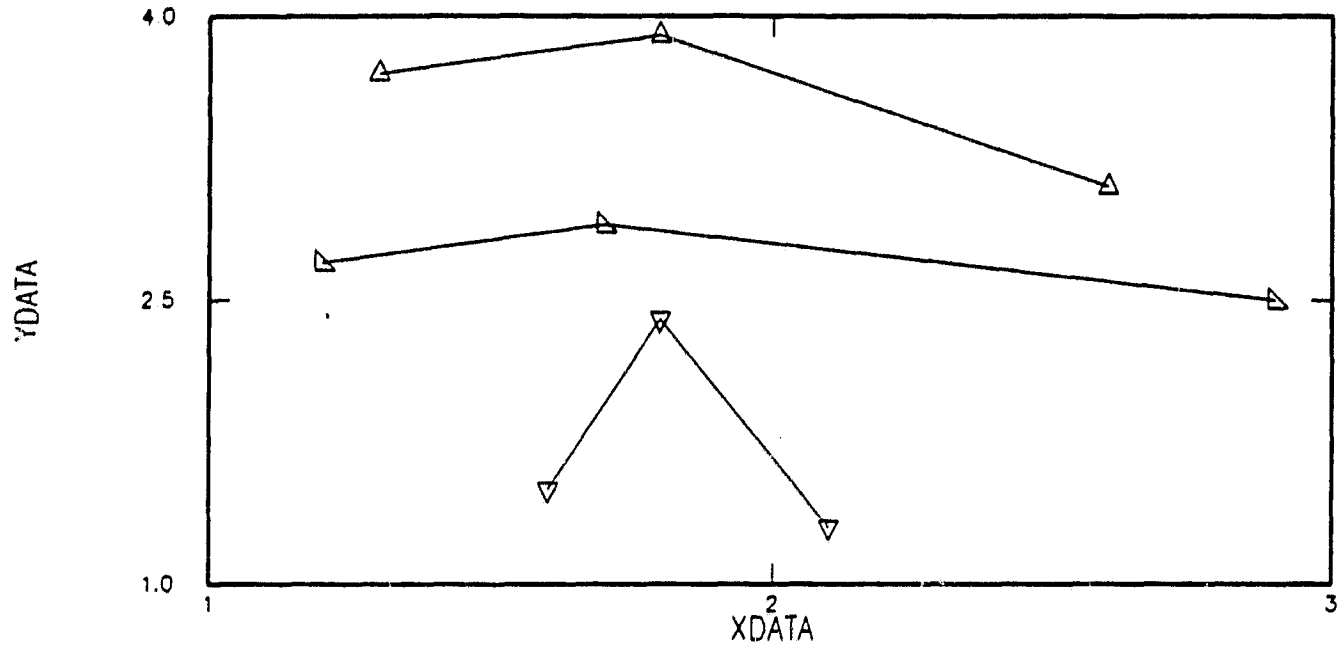
SECTION 5

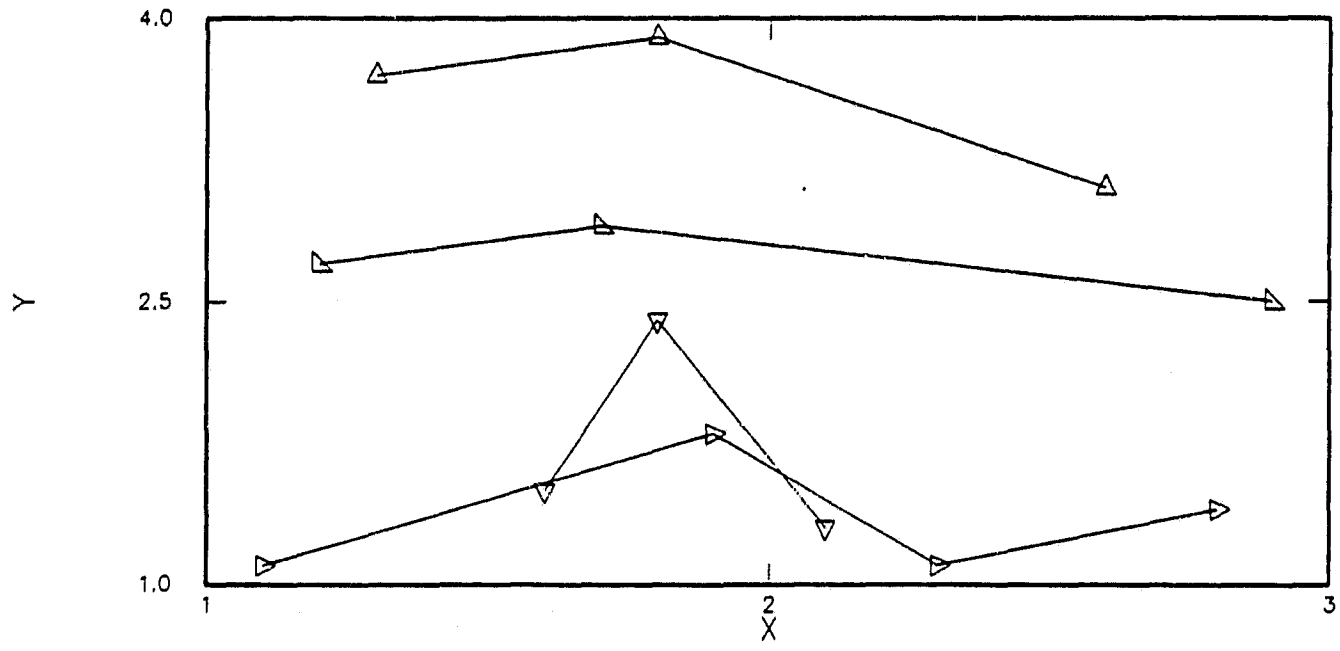
APPENDICES

APPENDIX A: SAMPLE PLOTS; INTRODUCTION TO GRAPHICS TERMINOLOGY

The following plots were created using PLTTER. They are intended as an introduction to graphics terminology used throughout this document and to the capabilities of the PLTTER graphics system. On the following pages, terminology which is being introduced is CAPITALIZED for emphasis.

A FRAME is a page of graphical output. This frame was generated in the COMIC orientation and contains two PLOTS. 3 and 4 CURVES shown.

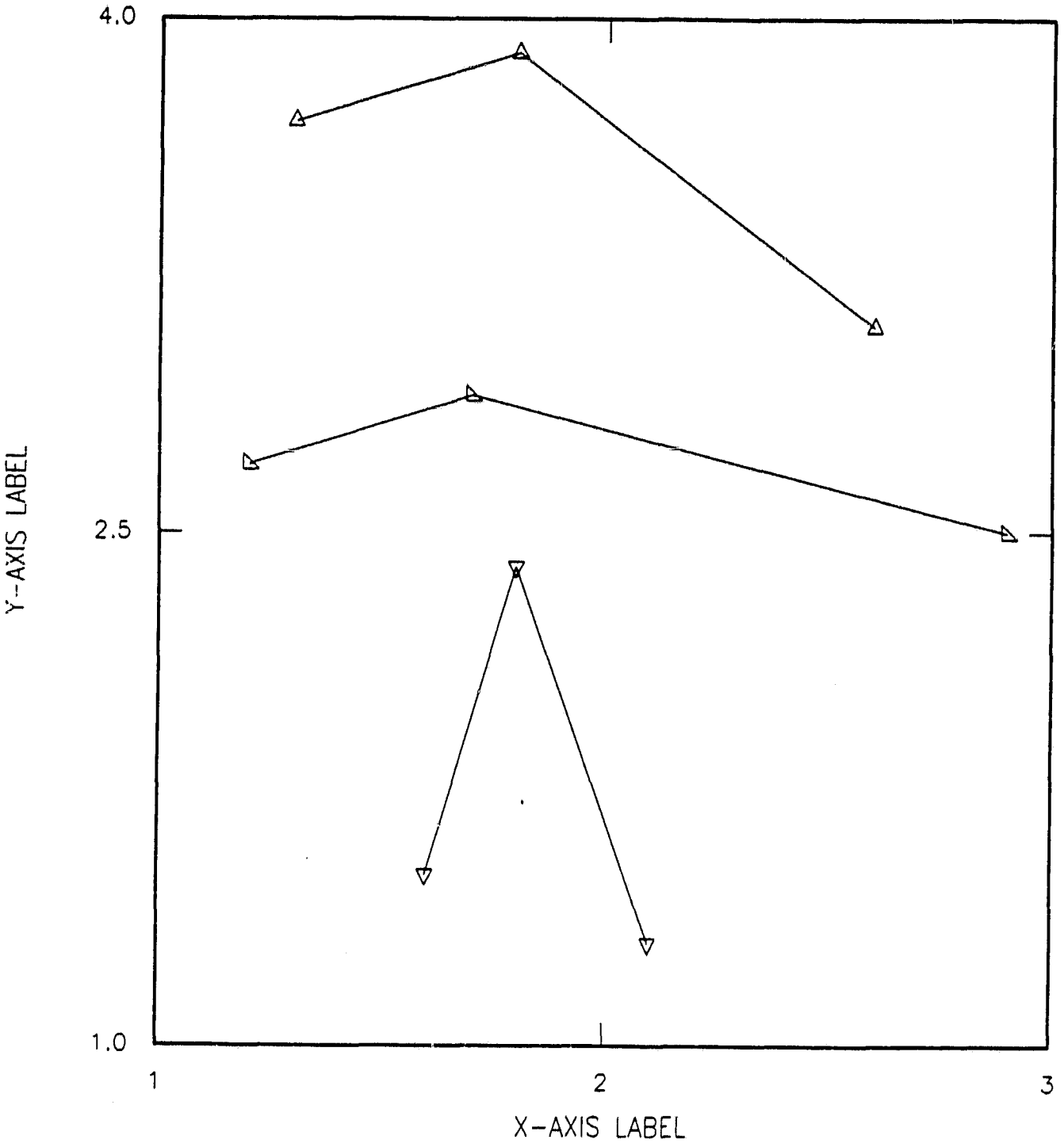




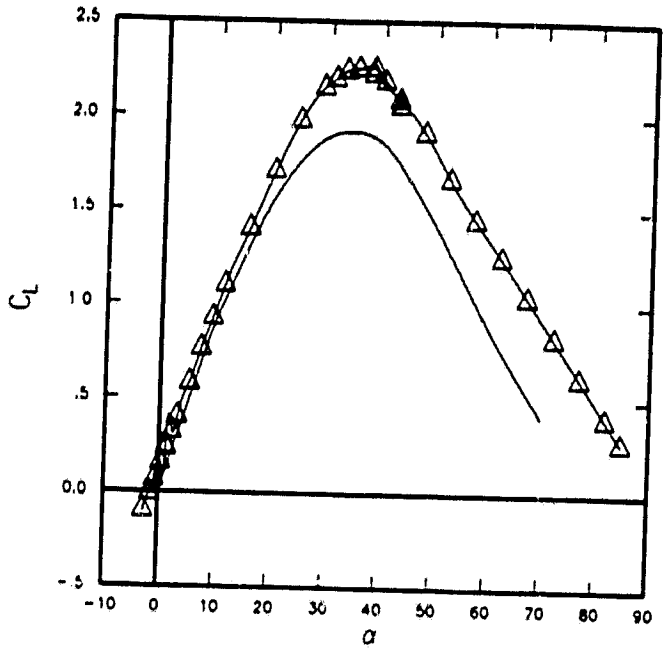
This frame has been rotated 90°; it is CINEMA orientation.
CURVE LABELS are used to identify the four possible LINE TYPES.

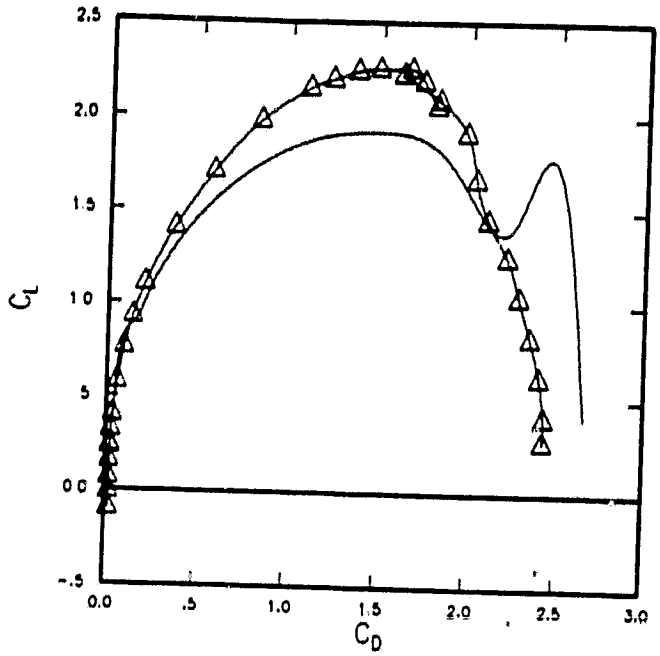
These two lines of text are FRAME TITLES, which may contain up to 70 characters each. The tabulated items below are a LEGEND.

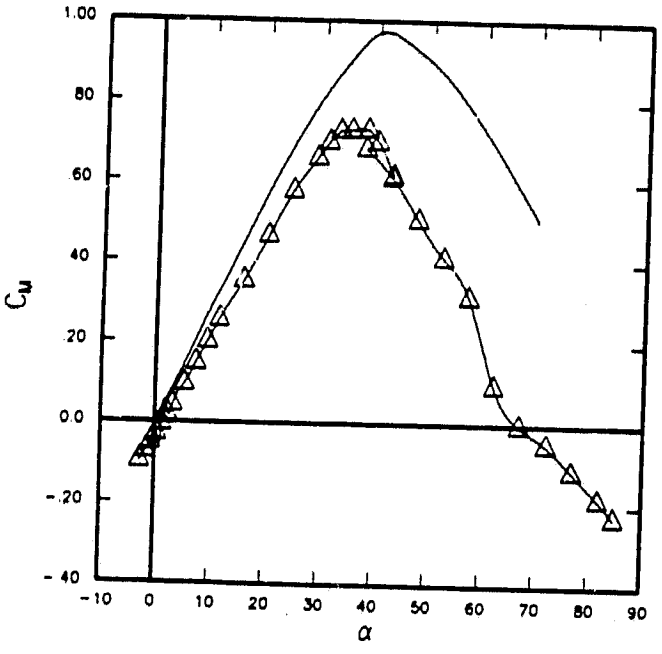
SYMBOL	CONFIGURATION	ALPHA	CL	CD	MACH	RN/L E-6
—△—	Canard off	2.16	.214	.025	.30	3.812
—▷—	Canard on	2.14	.234	.026	.30	3.796
—▽—	Nacelle on	2.21	.222	.025	.31	3.822

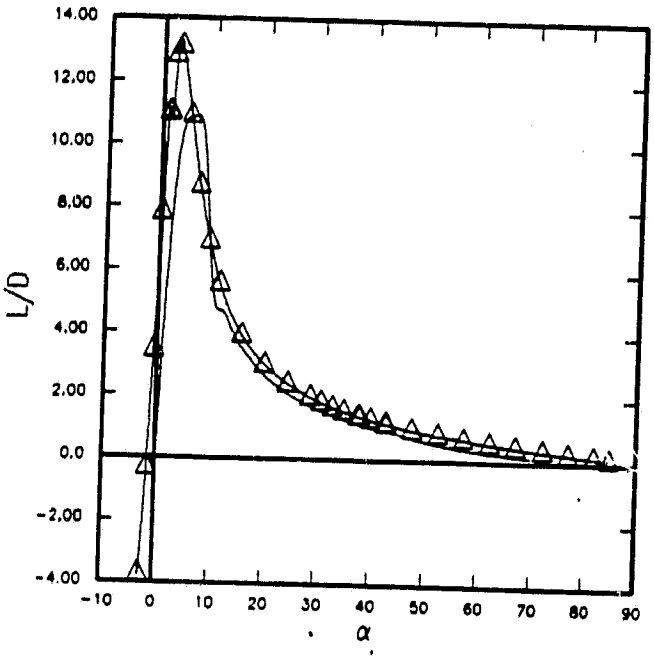


SYMBOL	CONFIGURATION	RUN	MACH
— △ —	Experimental	43	202
— △ —	Experimental	166	205
———	Theory	900	.200



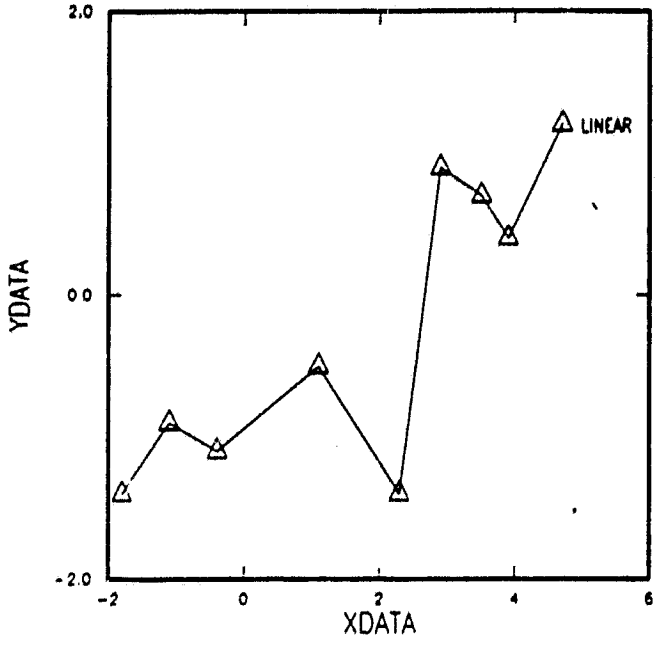


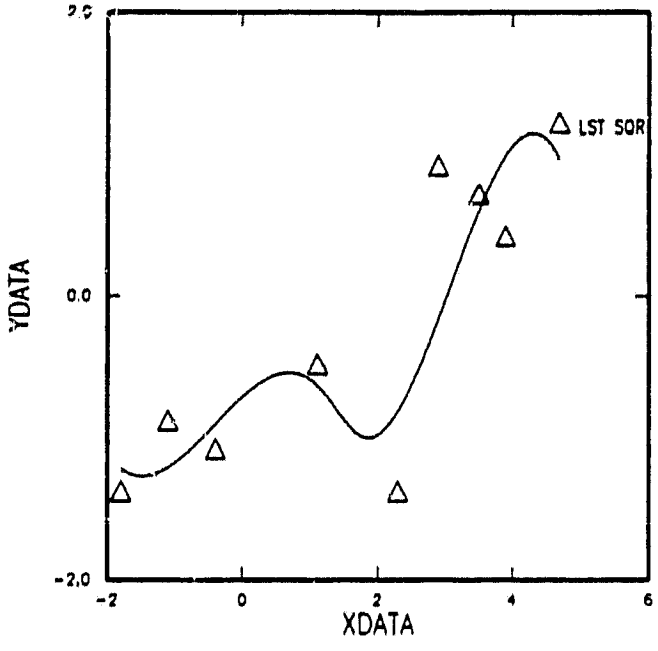


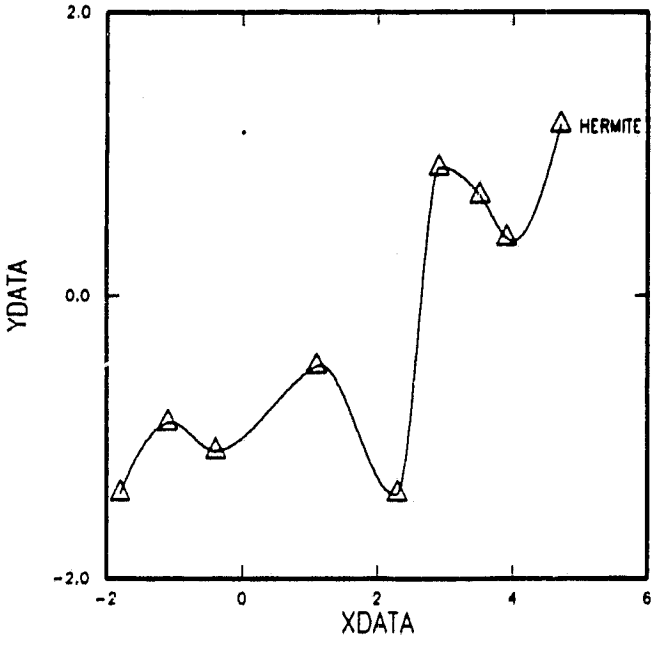


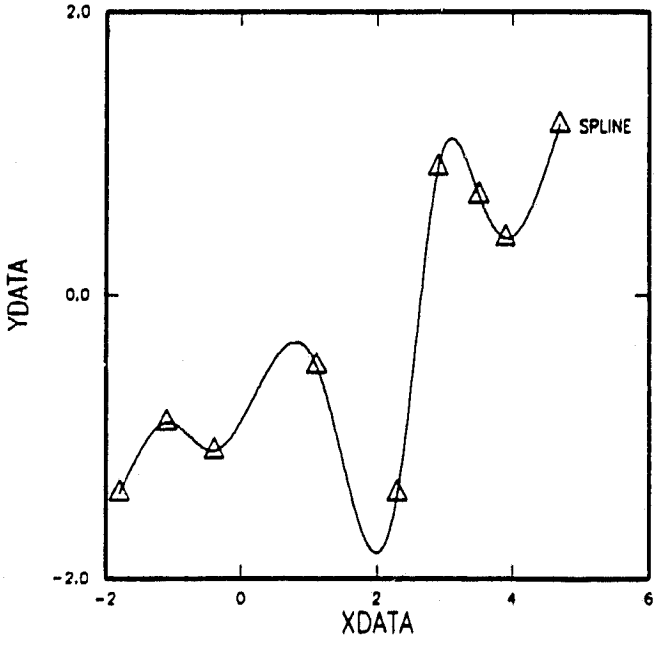
Axis labels may differ from plot to plot.
Frame titles may be placed at the bottom of the frame.

GRID TYPE 1 of six (no grid; ticks). CURVE FITTING methods: linear, 3rd order least squares, cubic Hermite, cubic spline.

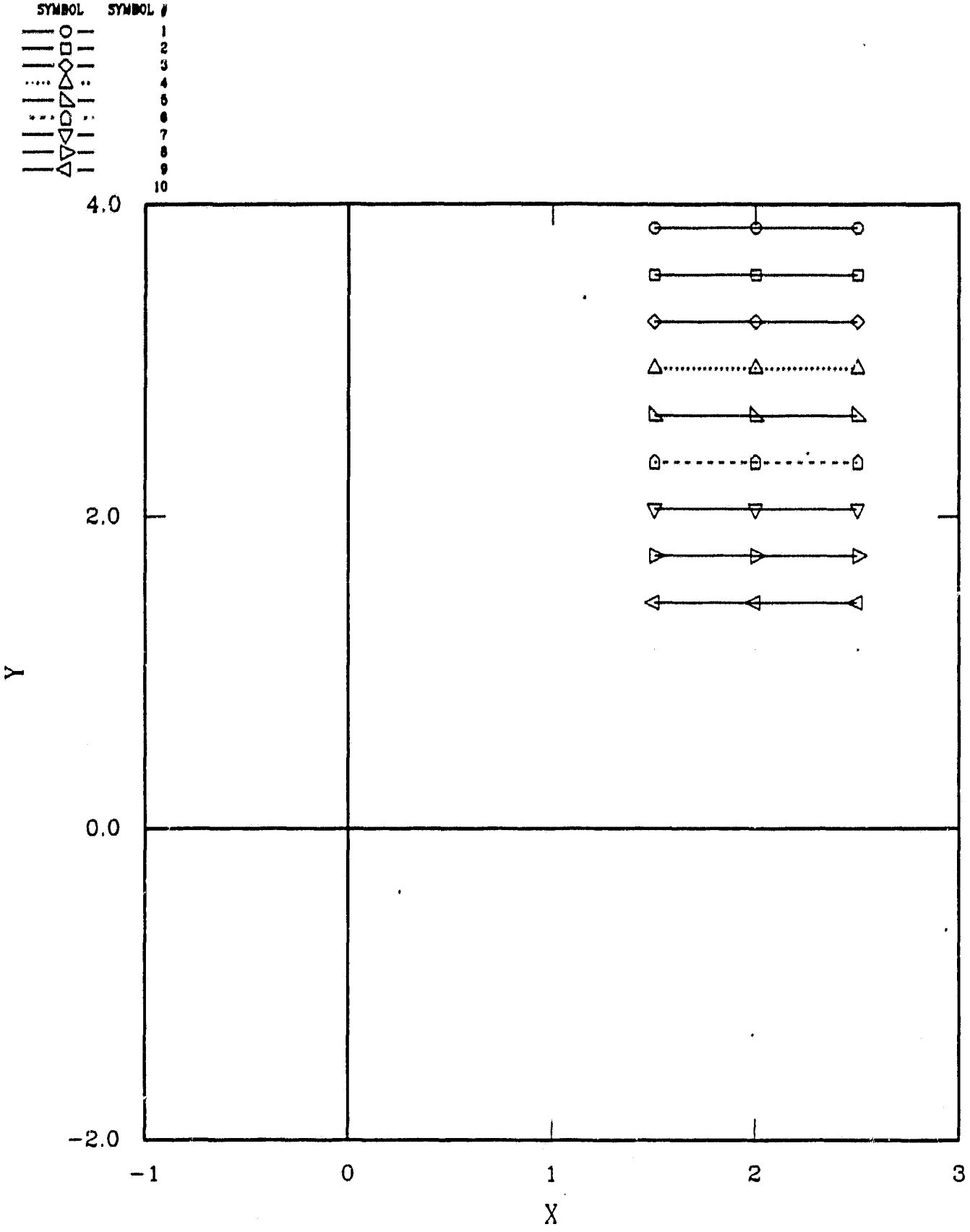






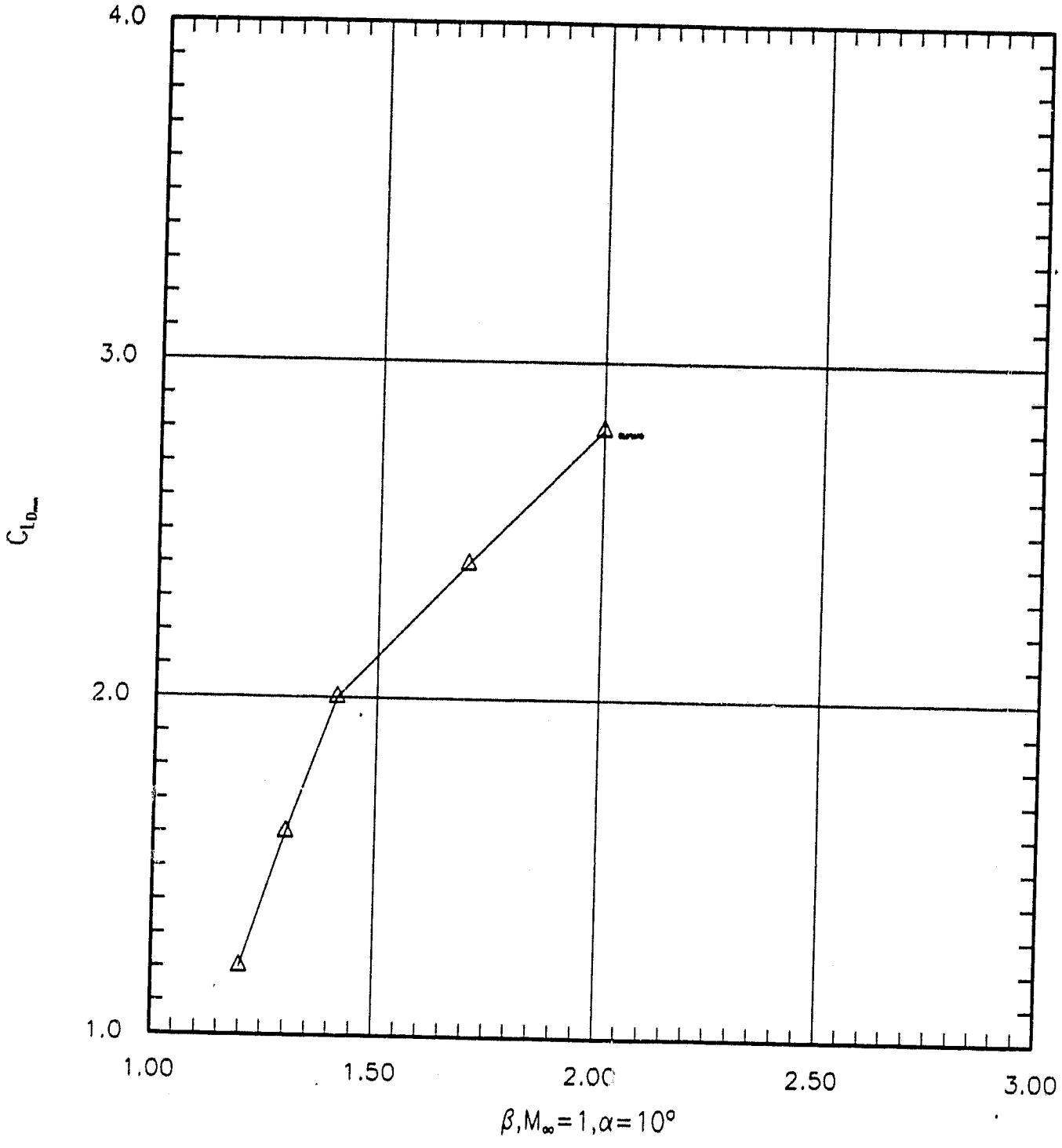


Grid type 2 (no grid; ticks; origin lines). Ten curve symbols are provided. This frame uses report-quality font.

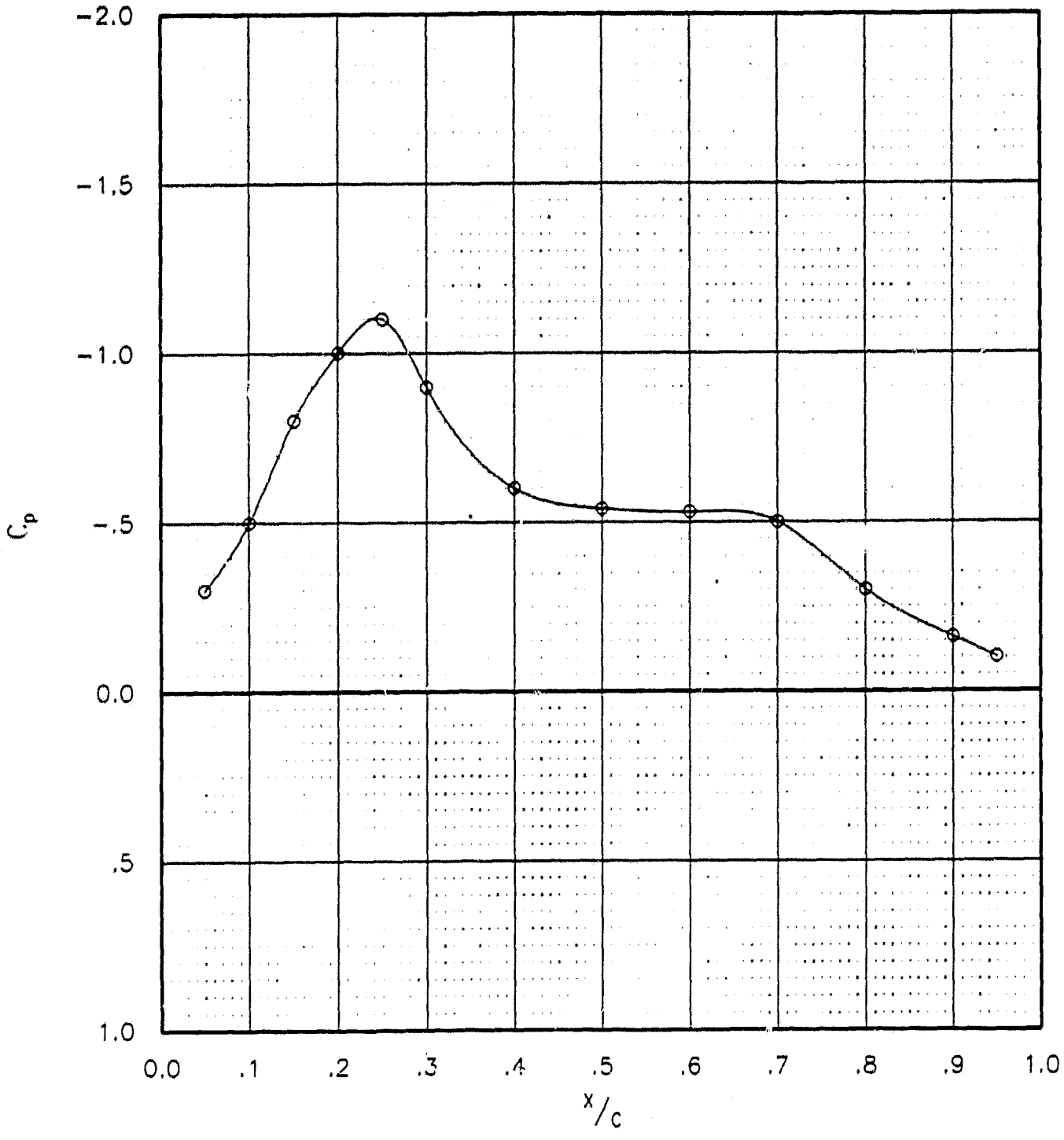


Grid type 3 (coarse grid; ticks) Any user-supplied text may contain Greek, math symbols, $^{super}{}_{1st2nd3rd}$ scripts.

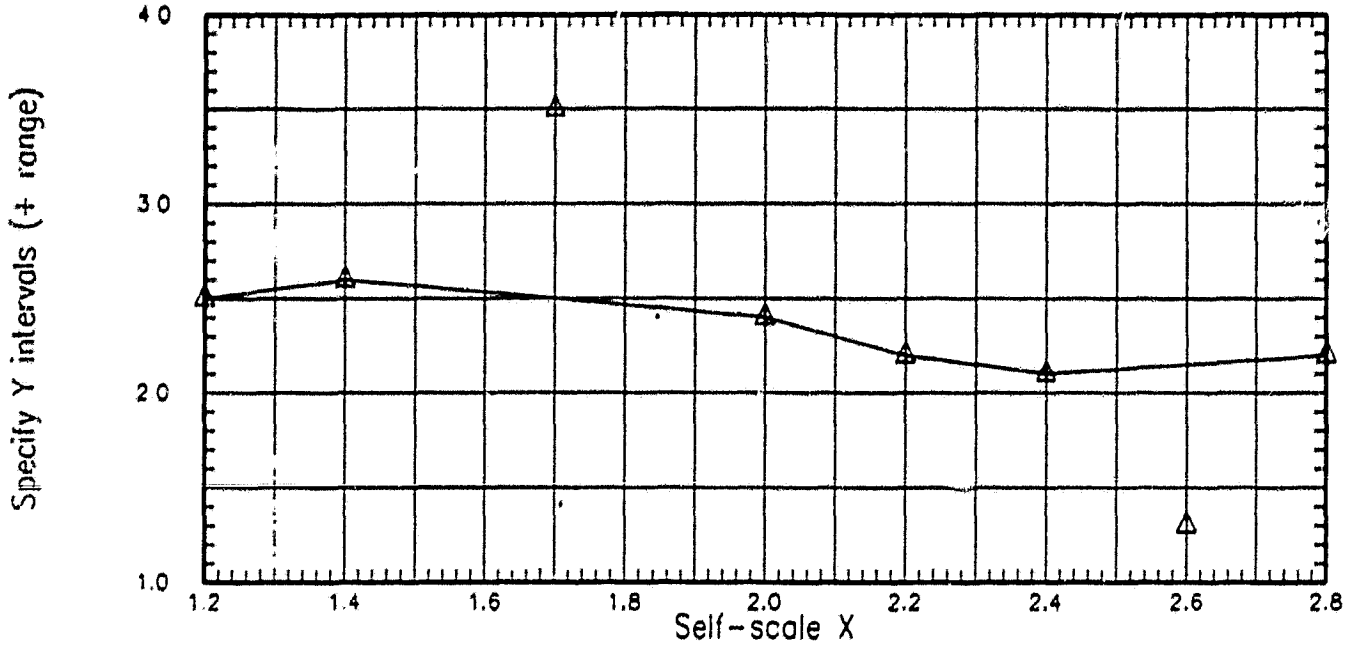
SYMBOL	CONFIGURATION	T_1
—△—	$Flops_{1A}$	540

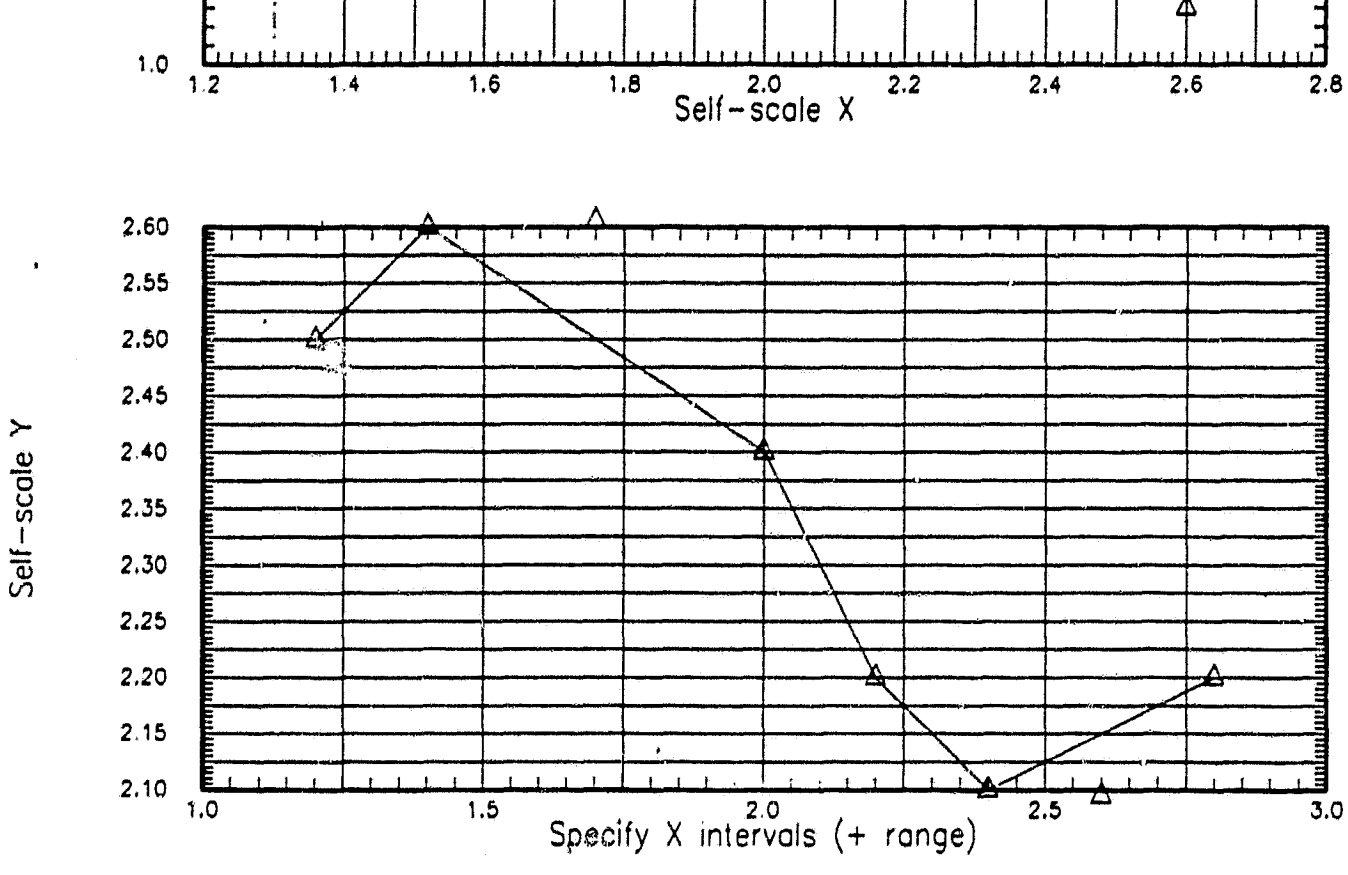


Grid type 4 (coarse grid; dots). Direction of either plot axis may be reversed. YBOT = 1. , YTOP = −2.



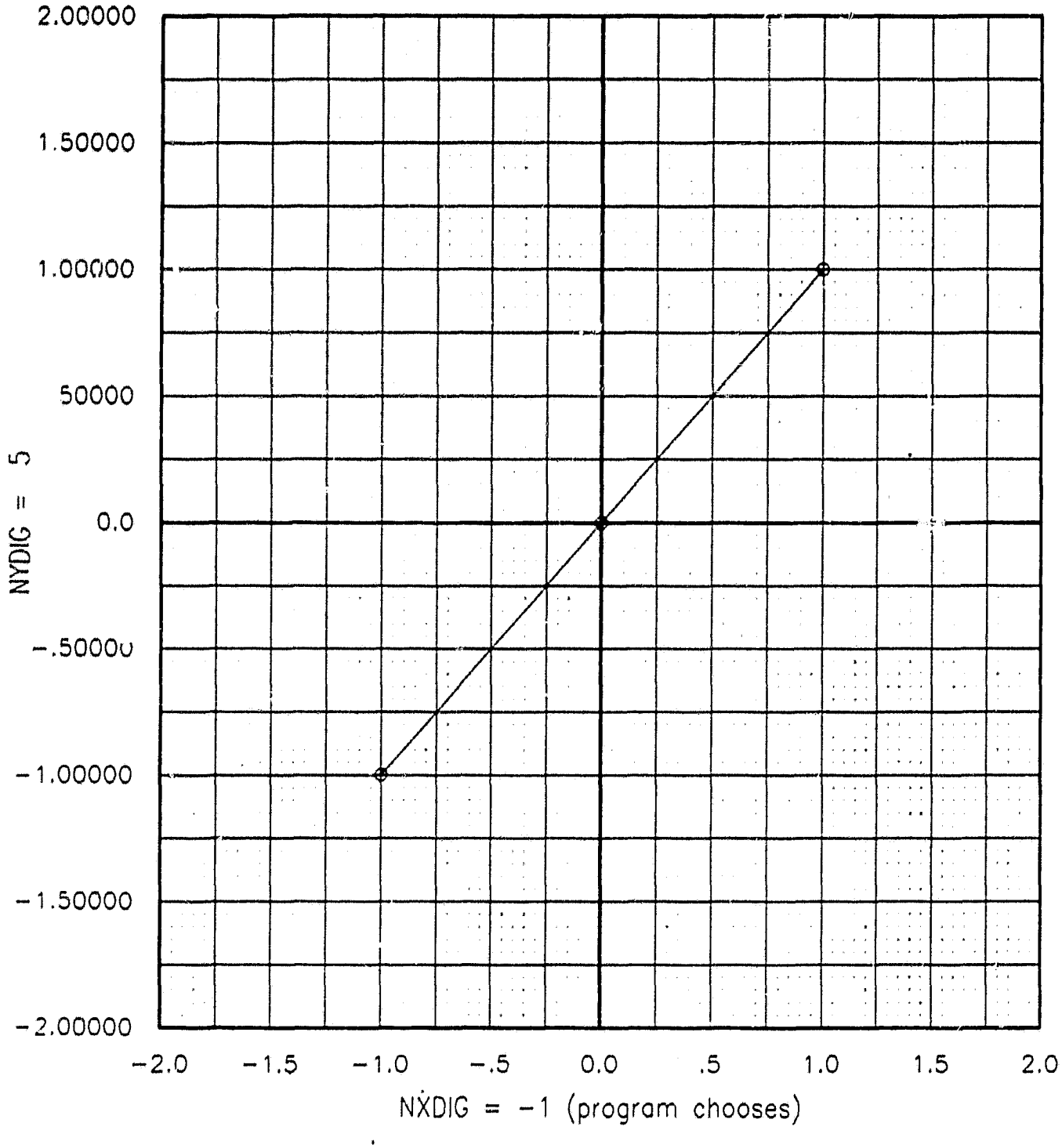
Grid type 5 (fine grid; ticks). Points may be DISREGARDED by curve fit. Axis scaling is user-controlled or self-scaled for either axis.



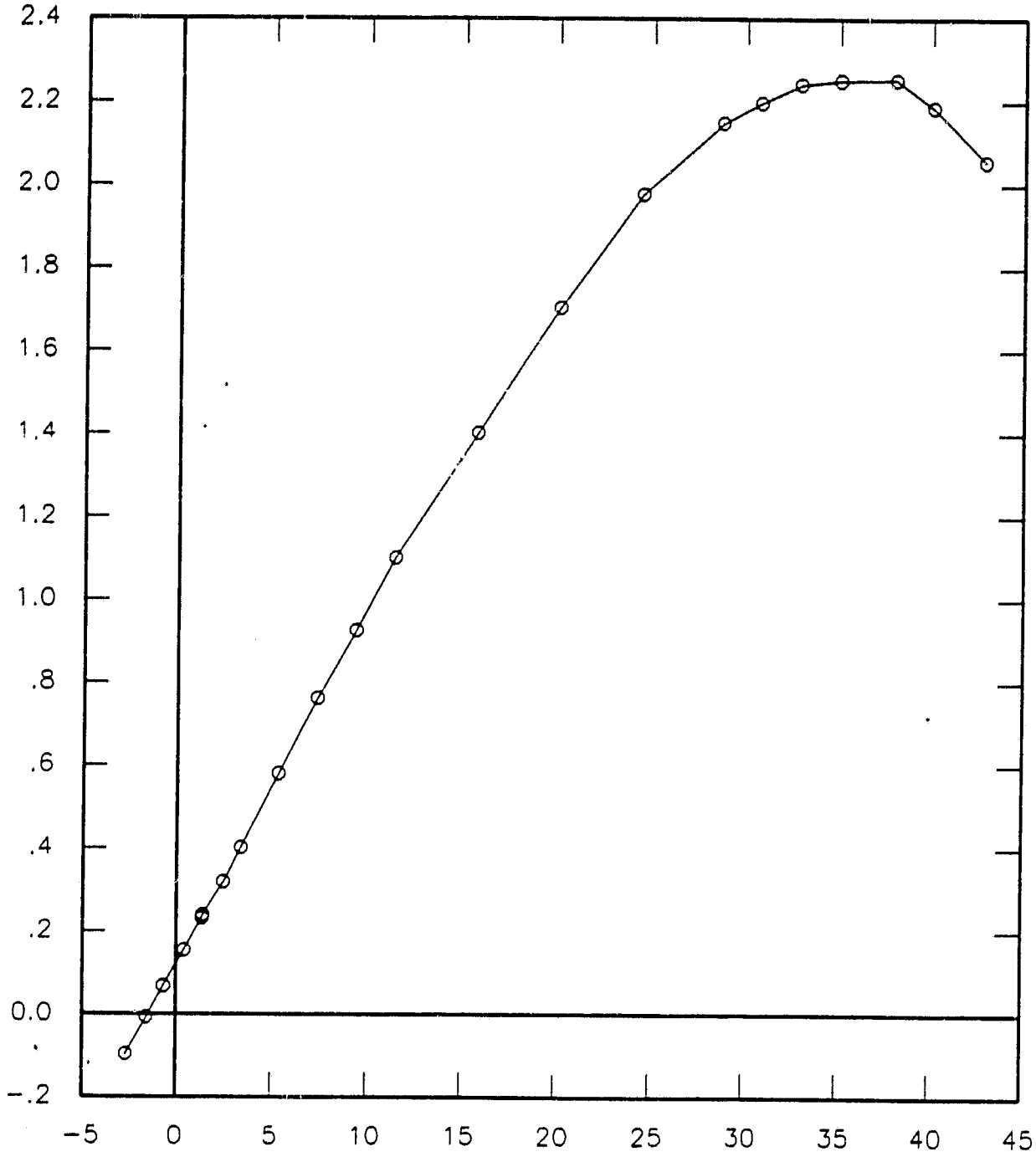


Grid type 6 (fine grid; dots). User controls number of DECIMAL DIGITS (digits to right of decimal point) in tick labels and in legend.

SYMBOL	0 DIGITS	1 DIGIT	2 DIGITS	3 DIGITS	4 DIGITS	5 DIGITS
—O—	11	10.9	10.92	10.918	10.9183	10.91827



This frame was generated with all standard defaults (except titles). Must specify data base name/type and data to plot.



APPENDIX B: REQUESTS FILE (STRUCTURE AND EXAMPLES)

This appendix shows the structure of the Requests file. Most plotting information specified using the Requests file system can be specified in two ways - by keyword and by namelist. The first section shows all namelist options. The second section shows all valid keyword record options.

The following variables can be specified in the $OPTIONS namelist. Note that the "$" must begin in column 2 for the beginning of the namelist, and that no namelist variable may begin in column 1. The namelist must be terminated with a $ ($END in the examples) which cannot appear in column 1. Entries noted as text must be enclosed in single quotation marks. Dimensions appear in parentheses after some variable names. Entries noted with a dimension of 4 are plot options and may be specified up to four times (e.g., IFIT=1,3,2). A dimension of 25 indicates that the option is a curve option. IDSYM and IDLINE have a dimension of 25; the symbol code and line type sequences are repeated after the first 25 curves.

NAMELIST VARIABLE	TYPE	DESCRIPTION
CLABEL(25)	text	curve label, up to 8 characters
COMMENT	text	any comment (does not appear on plot)
FRMTYP	text	type of data on frame, where P = Pressure F = Force S = Summary
IDLINE(25)	int	line code, where 0 = no line 1 = solid line 2 = dotted line 3 = dashed line (-1, -2, or -3) may be used to draw a curve with the corresponding positive line type but with its entry in the plot legend suppressed.
IDSPLY(4)	int	display points flag, where 1 = display only valid points 3 = display all points

NAMELIST VARIABLE	TYPE	DESCRIPTION
IDSRGD(4)	int	disregarded Force/Pressure flags, where 0 = do not use the Disregarded flags 1 = use the Disregarded flags array (must use ARIES or TOGGLE first to disregard points)
IDSYM(25)	int	plot symbol for curve, where 0 = no symbol 1 = eight-sided circle 2 = square 3 = diamond 4 = triangle, point up 5 = right triangle 6 = house 7 = triangle, point down 8 = triangle, point right 9 = triangle, point left 10 = dot (from -1 to -10) may be used to suppress any legend data for the appropriate curve)
IFIT(4)	int	curve fit option, where 0 = no fit (linear) 1 = least squares 2 = cubic Hermite 3 = interpolatory cubic spline
IGRID	int	type of grid on frame, where 1 = no grid; ticks at boundary 2 = same as grid 1 but with origin lines 3 = coarse grid; ticks 4 = coarse grid; dots 5 = fine grid; ticks 6 = fine grid; dots
IORIEN	int	page orientation, where 1 = Standard Versatec (COMIC) 2 = 90 degree rotation (CINEMA)
IPOS	int	position of titles on frame, where 1 = titles at top of frame 2 = titles at bottom of frame
NCRV(4)	int	number of curves for Force: number of different curves (XDATA, YDATA, $CRVINF) on this plot for Pressure: number of regions for this plot

NAMELIST VARIABLE	TYPE	DESCRIPTION
		for Summary: number of $RUNS records for this plot
		(NCRV(i)=0 can be used to suppress display of Plot (i) of the current frame. This allows the user to create, for instance, 6 plots in a 4-plots-per-frame format. This feature will maintain user-established formatting of plot frames in multiple plots per frame situations.)
NORM	int	normalization code (pressure), where 0 = no 1 = yes
NPLOTS	int	number of plots on current frame, where 1, 2, 3, or 4 plots are allowed
NXDIG(4)	int	number of decimal digits in X-axis tick labels -1 = program chooses number of digits 0 = integer >0 = number of decimal digits (maximum is 5)
NXINT(4)	int	number of desired x intervals, where >0 = number of intervals 0 = program scales axis, increasing left to right (XLEFT and XRIGHT ignored) -1 = program scales axis, decreasing left to right (XLEFT and XRIGHT ignored)
NYDIG(4)	int	number of decimal digits in Y-axis tick labels -1 = program chooses number of digits 0 = integer >0 = number of decimal digits (maximum is 5)
NYINT(4)	int	number of desired y intervals, where >0 = number of intervals 0 = program scales axis, increasing bottom to top (YBOT and YTOP ignored) -1 = program scales axis, decreasing bottom to top (YBOT and YTOP ignored)
RGN1(25)	int	region numbers for curves from data base #1
RGN2(25)	int	region numbers for curves from data base #2
RGN3(25)	int	region numbers for curves from data base #3
RGN4(25)	int	region numbers for curves from data base #4
RGN5(25)	int	region numbers for curves from data base #5

NAMELIST VARIABLE	TYPE	DESCRIPTION
SRTFLD(4)	text	name of the Force value by which to sort the Force data to be plotted (enter NOSORT if no sorting is desired).
XDATA(25)	text	for Force: name of data for x-array (up to 8 char) for Pressure: CP = CP along abscissa Otherwise, X along abscissa for Summary: name of data for x-array (up to 8 char)
XLABEL(4)	text	X-axis label, up to 30 characters
XLEFT(4) or XMIN(4)	real	value of X-axis at left edge (XLEFT MUST be greater than XRIGHT if decreasing left to right)
XRIGHT(4) or XMAX(4)	real	value of X-axis at right edge (XRIGHT MUST be less than XLEFT if decreasing left to right)
YBOT(4) or YMIN(4)	real	value of Y-axis at bottom (YBOT MUST be greater than YTOP if decreasing bottom to top)
YDATA(25)	text	for Force: name of data for y-array for Pressure: if Theory, pointer to column of pressures if Wind tunnel, pointer = 1 for Summary: name of data for y-array
YLABEL(4)	text	Y-axis label, up to 30 characters
YTOP(4) or YMAX(4)	real	value of Y-axis at top (YTOP MUST be less than YBOT if decreasing bottom to top)

The following variables can be specified on keyword records.

The following rules apply:

o The "$" must be in column 1 for all keywords.

- The data on the keyword record must begin in column 9.
- Text entries should not be enclosed in single quotation marks.
- The first seven keywords appear only in the Requests file and the first four must ALL appear in the order shown at the beginning of the Requests file.
- $FRMID must appear only in the Frames file and defines frame information until another $FRMID card appears.
- Optional keyword records may appear in any order.
- The system will count to keep track of to which curve and plot to apply certain information. On multiple-field keyword records, filling a field with "9999" tells the system not to override that field. For example, $CRVINF 9999,CD,9999 overrides the YDATA field without destroying the XDATA and CLABEL fields.

The lower case names of variables already defined above appear on the keyword record definition. Otherwise, descriptions appear.

Must appear at beginning of the Requests file in order shown:

KEYWORD	TYPE	DESCRIPTION
$DEFFIL	text	name of Defaults file (blank = no file)
$FRMFIL	text	name of Frames file (blank = no file)
$DBSETS		general data base information
NDBS	int	number of data bases (up to 5)
FONT	text	text quality, where Q = quick look R = report quality
$DBNAME		data base information (one card/data base)
DATSRC	text	data source, where WT = wind tunnel TH = theory
NAME	text	CDD data base filename

Must appear only in the Requests file:

KEYWORD	TYPE	DESCRIPTION
$STATUS	text	Controls whether or not plots are created for this request block, where 1 (or ON) = plot 0 (or OFF) = do not plot
$FRAMES	int	numbers of templates in Frames file to use. Specify from 0 to 20 Frame IDs. Frame ID must be 0, and the entire card may be omitted, if there is no Frames file.
$RUNS	text	Run number(s). Multiple RUNS cards may be used as necessary. See page 11 for a discussion of run specifications.

Must appear only in Frames file:

$FRMID	int	ID number of this frame in the Frames file. Frame IDs must be positive integers ‹32767.

May appear in any file in any order

$COMMENTcomment		
$TITLE1	text	Frame title 1, up to 70 characters
$TITLE2	text	Frame title 2, up to 70 characters
$LEGEND	text	legend control information
LEGLBL	text	LEGLBL is either the name of a Force value to be displayed in the Legend, or is the word CONFIGUR to indicate a Configuration code. RUN, SEQ (or SEQUENCE), REGION (or REG or RGN) may also be requested. Up to 10 legend fields may be specified. (Only 8 fit using COMIC orientation.)
NDIG	int	NDIG is the number of decimal digits to be displayed for data corresponding to each label, where 0 = integer -1 = text (for configuration) ›0 = number of decimal digits (maximum is 5)
$XAXIS	xleft,xright,nxint,nxdig,xlabel	

```
$XLABEL xlabel
$YAXIS  ybot,ytop,nyint,nydig,ylabel
$YLABEL ylabel
$CRVINF xdata,ydata,clabel
$CLABEL clabel
```

A sample Requests file follows. This file was used, in conjunction with the Frames file in Appendix C and the Defaults file in Appendix D, to create the plots shown in Appendix D.

```
$DEFFIL FAE0:[FAECDD.DOC]EXAMPLE.DEF
$FRMFIL FAE0:[FAECDD.DOC]EXAMPLE.FRM
$DBSETS 2,Q
$DBNAME WT,FAE0:[FAECDD.F8]F8FAEVAX.CDD
$DBNAME WT,FAE0:[FAECDD.F8]F8TSS.CDD

$status ON
$FRAMES 1
$title2 CP vs X/C at 70% span on right wing
 $OPTIONS RGN1 = 10,11, $END
$RUNS   43:11

$STATUS ON
$FRAMES 4
$TITLE1 FIGURE 12.     LONGITUDINAL & LATERAL/DIR STABILITY
$TITLE2                MACH EFFECTS:SWEEP COMPARISON
 $OPTIONS IPOS=2, NCRV=4, IDSRGD=0, $END
$LEGEND CONFIGUR,-1,Q,0,SWEEP,0,FLAP,1,FLAPERON,1,AILERON,1
$COMMENT This is a Summary plot; note the 4 $CRVINF cards,
$COMMENT one for each $RUNS card
$CRVINF MACH,LDMAX
$CRVINF MACH,LDMAX
$CRVINF MACH,LDMAX
$CRVINF MACH,LDMAX
$RUNS   79&80&81&82&83
$RUNS   222&223&224&228&232
$RUNS   330&327&325&324
$RUNS   295&294&293&290&289&286

$STATUS ON
$FRAMES 6
$TITLE1 FIGURE 23.     VENTRAL STRAKE EFFECTS
 $OPTIONS IPOS=2, $END
$LEGEND CONFIGUR,-1,MACH,3,Q,0,SWEEP,0,BETA,2,RUN,0
$RUNS   191&182&79&84

$STATUS OFF
$FRAMES 5,3
$TITLE1 FIGURE 14.     LONGITUDINAL & LATERAL/DIR STABILITY
$TITLE2                SIDESLIP POLARS:MACH COMPARISON
 $OPTIONS IPOS=2, $END
$LEGEND CONFIGUR,-1,MACH,3,Q,0,SWEEP,0,ALPHA,2,RUN,0
$RUNS   88&93&99
```

APPENDIX C: FRAMES FILE (STRUCTURE AND EXAMPLES)

The (optional) Frames file contains information defining one or more frame templates. Each such template must begin with a $FRMID keyword. This may be followed by the $OPTIONS namelist (as shown in APPENDIX B) and/or by other keywords not restricted to the Requests file. (See APPENDIX B for further details.)
This sample Frames file was used to create the plots in Appendix D.

```
$FRMID  1
 $OPTIONS FRMTYP='P', NCRV=2, XMIN=0., XMAX=1.,
 XLABEL='+s"X""/"-s"C"', YLABEL= '"C"-s"p"', NYINT=6,
 NXINT=10, NXDIG=2, YTOP=-.60, YBOT=0.60, NYDIG=2, $END
$LEGEND CONFIGUR,-1,MACH,2,SWEEP,1,ALPHA,2,RUN,0,SEQ,0,RGN,0

$FRMID  3
 $OPTIONS SRTFLD='BETA', $END
$XAXIS  -12.,10.,11,1,G"b"
$YAXIS  -.35,.35,14,2,"C"-s"Y"
$CRVINF BETA,CY

$FRMID  4
 $OPTIONS FRMTYP='S', SRTFLD='NOSORT', $END
$XAXIS  .5,1.5,0,1,MACH
$YAXIS  0.,20.,10,1,"L/D"-S"MAX"
$CRVINF MACH,LDMAX

$FRMID  5
 $OPTIONS SRTFLD='BETA', $END
$XAXIS  -12.,10.,11,1,G"b"
$YAXIS  -.1,.9,10,2,"C"-S"L"
$CRVINF BETA,CL

$FRMID  6
 $OPTIONS NPLOTS=4, IORIEN=1, NCRV(2)=0, $END
$COMMENT NCRV(2)=0 means that the 2nd plot is to be suppressed.
$COMMENT Must have $XAXIS, $YAXIS cards to keep correct count
$XAXIS  -6.,26.,16,0,G"a"
$YAXIS  -.4,1.6,10,1,"C"-s"L"
$CRVINF ALPHA,CL
$XAXIS  -6.,26.,16,0,G"a"
$YAXIS  0.0,.8,8,2,"C" -s"D"
$COMMENT Missing $CRVINF card.  Must not be specified.
$XAXIS  -6.,26.,16,0,G"a"
$YAXIS  -.35,.05,8,2,"C"-s"Y"
$CRVINF ALPHA,CY
$XAXIS  -.4,1.6,10,2,"C"-s"L"
$YAXIS  -8.,24.,8,1,L/D
$CRVINF CL,L/D
```

APPENDIX D: DEFAULTS FILE (STRUCTURE AND EXAMPLES)

The (optional) Defaults file contains user-selected plot options which are of a global nature for a given plotting session. They need only be specified once. Any option specified in the Defaults file may be modified for a given frame and/or request in the Frames and/or Requests file. The Defaults file may contain the $OPTIONS namelist (See APPENDIX B) plus any keywords not restricted to the Frames or Requests files.

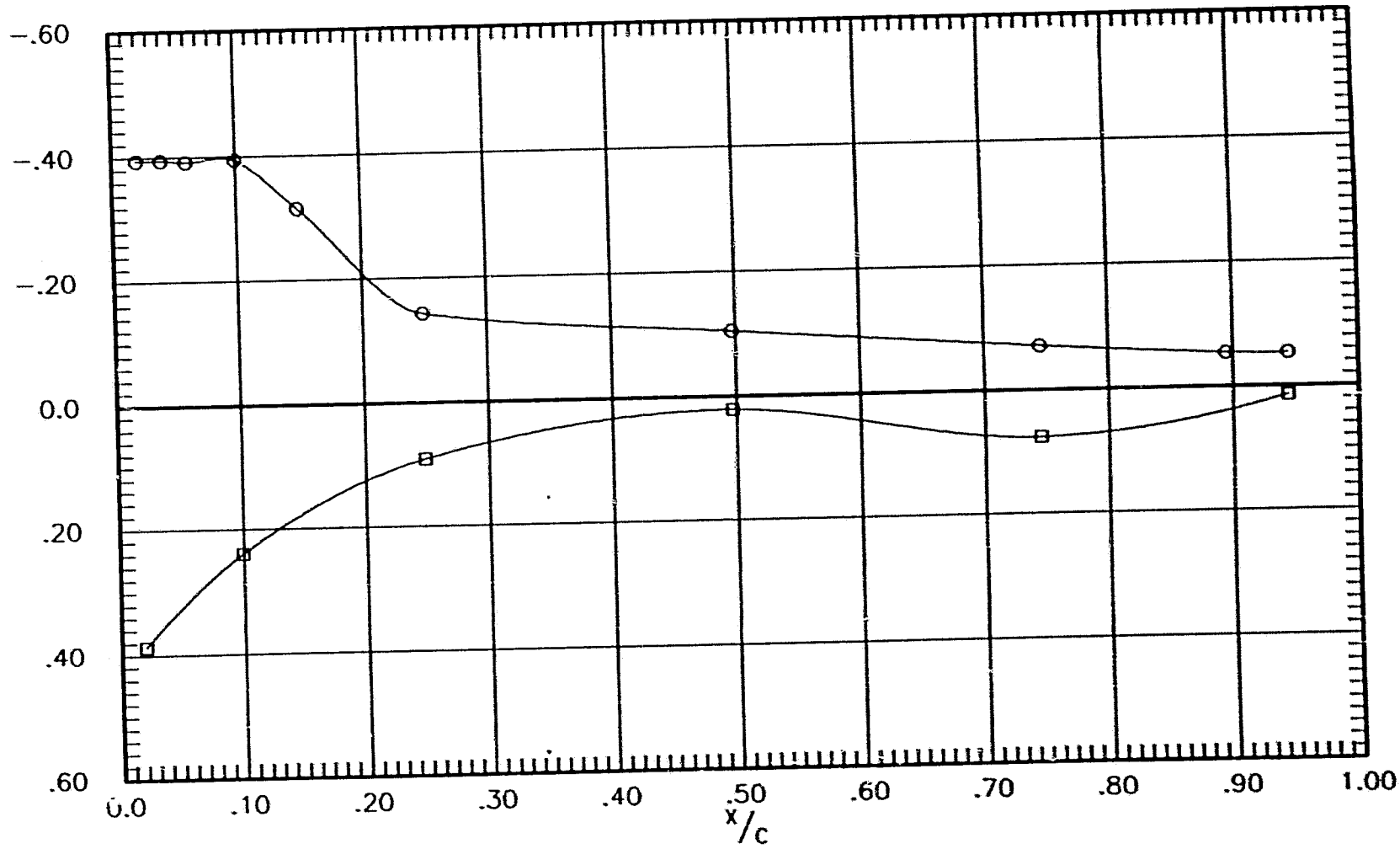
This sample Defaults file was used to create the following plots.

```
 $OPTIONS IGRID=3, IFIT=2, IORIEN=2, IPOS=2, NORM=1,
          IDSRGD=1,1,1,1, IDSPLY=3,3,3,3,  $END
$TITLE1 Examples of 3 types of plots, Pressure, Summary, Force
$LEGEND CONFIGUR,-1,MACH,2,Q,0,RN,2,SWEEP,1,ALPHA,2,CL,2,RUN,0
```

In the above example, note that plot option IFIT is specified for the first plot (of up to four) but IDSPLY and IDSRGD are specified for all four plots.

Note also that the legend specified in the Defaults file above does not appear in any of the following plots. This is so because the legend information specified in the Frames file for the first plot, and in the Requests file for the second and third plots, overrides it. Other plotting controls have also been overridden.

SYMBOL	CONFIGURATION	MACH	SWEEP	ALPHA	RUN	SEQ	RGN
—O—	BWA1S1 BODY WING FWD UNIV.	1.40	65.0	6.50	43	11	10
—□—	BWA1S1 BODY WING FWD UNIV.	1.40	65.0	6.50	43	11	11



Examples of 3 types of plots, Pressure, Summary, Force
CP vs X/C at 70% span on right wing

SYMBOL	CONFIGURATION		Q	SWEEP	FLAP	FLAPERON	AILERON
—○—	BWA1S1HV1	SWEEP=65	800	65	0.0	0.0	0.0
—□—	BWA4S1gH	SWEEP=45	701	45	0.0	0.0	0.0
—◇—	BWA5S1gHV1	SWEEP=30	749	30	0.0	0.0	0.0
—△—	BWA6S1gHV1	SWEEP=0	701	0	0.0	0.0	0.0

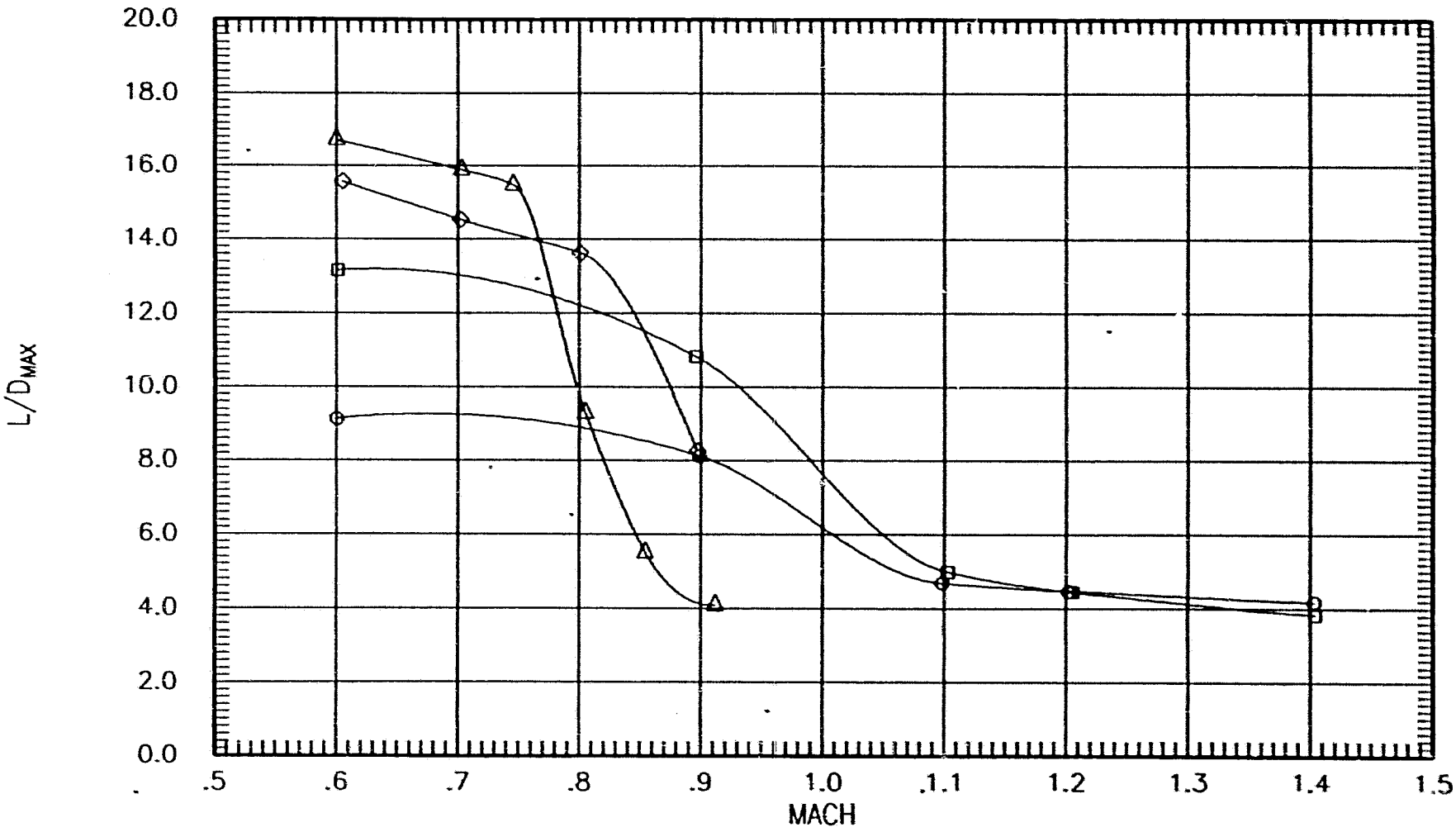
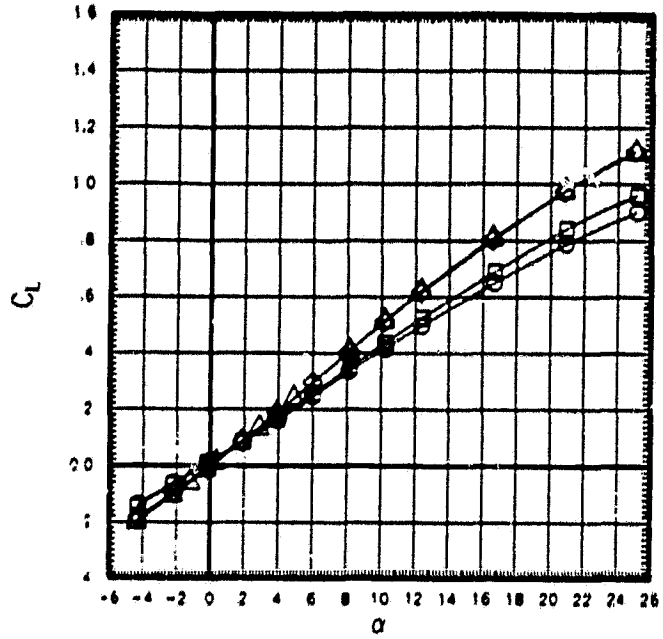
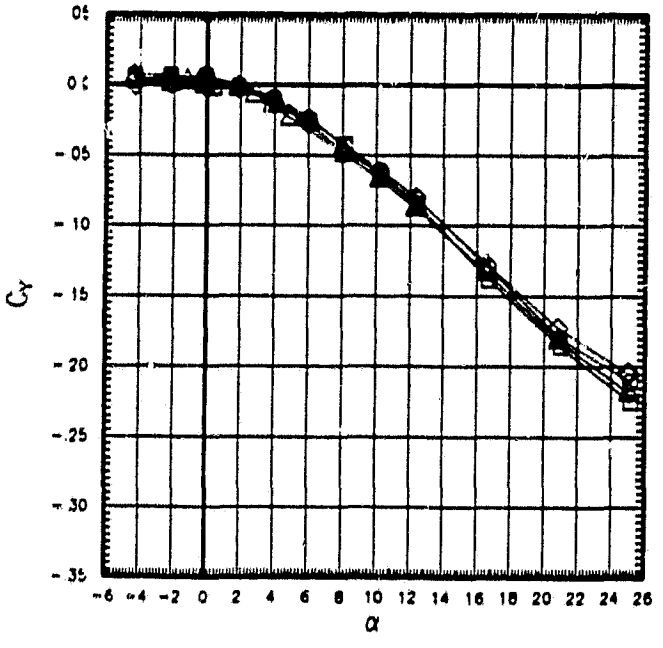


FIGURE 12. LONGITUDINAL & LATERAL/DIR STABILITY
MACH EFFECTS:SWEEP COMPARISON

SYMBOL	CONFIGURATION		MACH	Q	SWEEP	BETA	RUN
—○—	BWA1S1V1	SWEEP=65	1.394	800	65	-.43	191
—□—	BWA1S1V1V2	SWEEP=65	1.401	799	65	-.34	182
—◇—	BWA1S1HV1	SWEEP=65	1.399	801	65	-.43	79
—△—	BWA1S1HV1V2	SWEEP=65	1.396	797	65	-.30	84





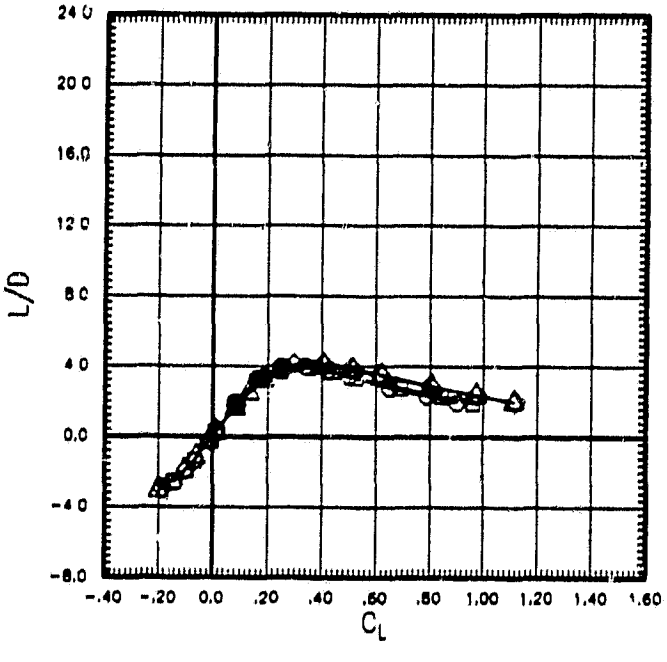


FIGURE 23. VENTRAL STRAKE EFFECTS

APPENDIX E: GUIDELINES FOR USING THE REQUESTS FILE SYSTEM

When using the CDDMS graphics system with a Requests file, the following points are noteworthy:

- Final plots represent plot options which have been updated in the following manner:
  - Options specified in the Requests file supersede
  - Options in the Frames file which supersede
  - Options in the Defaults file which supersede
  - Standard program defaults.

- A value assigned to a plot option at a lower level in the hierarchy (described above) can be preserved by assigning it a value of 9999. For example, $CRVINF 9999,9999,newlabel assigns a new curve label without modifying previously defined values for XDATA and YDATA.

- Frames and Defaults files are optional. All plot-relevant information may be specified in the Requests file. If either the Frames or Defaults file is missing from the hierarchy, the corresponding keyword must be present in the Requests file, but with no filename specified.

- Blank lines may appear anywhere within the Requests, Frames, and Defaults files.

- All keywords may be specified in either upper or lower case. They must be spelled correctly and begin in column 1 or an error condition will result.

- The first records of the Requests file must be (in the order specified):

  $DEFFIL
  $FRMFIL
  $DBSETS
  $DBNAME (one for each data base)

- The $STATUS keyword must be the first record in a request block in the Requests file. Plots are created only for those request blocks with $STATUS ON (or lower case 'on') or $STATUS 1. The default status of a given request block (in the event that an invalid option is specified on the $STATUS

keyword) is OFF.

- The $DEFFIL, $FRMFIL, $DBSETS, $DBNAME, $STATUS, $FRAMES, and $RUNS keywords may appear only within the Requests file.

- The $FRMID keyword must be the first record of a frame definition block in the Frames file. Frame IDs must be greater than 0 and specified in ascending order in the Frames file. The $FRMID keyword may appear only in the Frames file.

- Unexpected results may occur if frame types are mixed in a given request block of the Requests file. This is because the RUN specifications differ for the three valid frame types (F, P, and S).

- A maximum of 20 frame IDs may be specified on the $FRAMES keyword in the Requests file.

- At most 25 curves may be defined for a given frame. However, using the ampersand (&) run syntax (see page 11), more than 25 curves may be drawn on one plot.

- Only the last $FRAMES card in any request block of the Requests file will be honored.

- Options specified using keywords are applied to the current curve in the immediate file. For example, the first $CRVINF keyword is applied to the first curve on the first plot. An exception to this rule is that if $CRVLBL keywords are specified, they are applied to the most recently defined $CRVINF card if no curve label was specified for that curve. A similar arrangement applies to axis labels when none are specified on $XAXIS or $YAXIS keywords.

APPENDIX F: CREATING SPECIAL TEXT ON PLOTS

All text to be output on plots can contain special text such as Greek letters, mathematical notation, or sub or superscripting, by using the following conventions:

double quotes around the text
g means the following text is to be in Greek
m means the following text is to use math font
f‹num› means the following text is to use font #num
u means the following text is to be underlined
b means backup to current position after following text
-s means the following text is to be a subscript
-2s means the following text is to be a second-level subscript
-3s means the following text is to be a third-level subscript
+s means the following text is to be a superscript

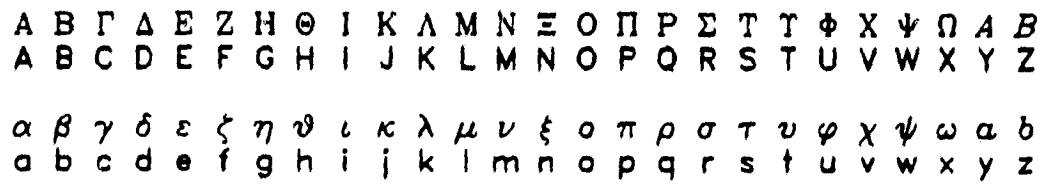
For example, g"a" means to output the Greek letter a; "C"-s"p" means to output the letter C with the subscript of p; and "C"-s"1"-2sg"a" means to output the letter C with the subscript of 1 and the second level subscript of Greek a. The string m"v" outputs the symbol for mathematical integration. The string f2"Cursive" outputs the word Cursive using font 2. The string bu+s" 1 "-s" 2 " forms the quotient 1/2. To use sub/superscripting, mathematical symbols, or Greek characters within a line of text, be sure to put double quotes around all text:

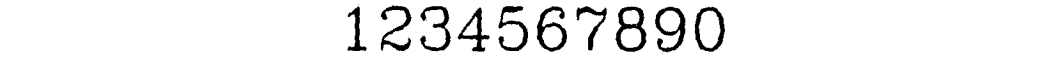
"This equation is E"-s"t""=Mc"+s"2".

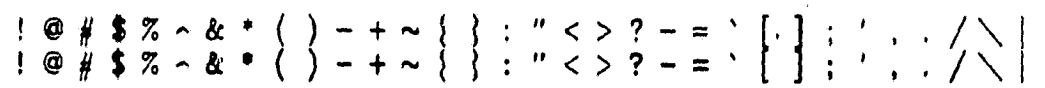
Special text commands may be either UPPER or lower case.

The next page provides a complete listing of Greek characters and mathematical symbols which may be output using the system just described.

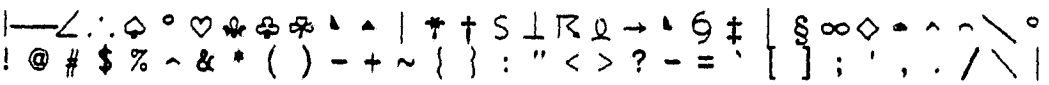
GREEK CHARACTERS







MATHEMATICAL SYMBOLS



APPENDIX G: DATA RETRIEVAL REQUEST FORMS

The following forms must be used to identify data to be retrieved from the Standardized Wind Tunnel System for storing on a CDD. Information provided on these forms also is required to create the CDDMS Tables and to initialize the CDD.

DATA RETRIEVAL REQUEST FORM
~ GENERAL INFO. ~

Test # _____
Date _____

1) Requester's name _____ Rm. _____ Ext. _____ Branch _____

2) Test # _____ Test Title _____

Requested data base name _____

3) Planned starting date _____ Planned completion date _____

4) Expected maximum number of: runs _____ sequences/run _____

5) Unless otherwise requested, the following values will be extracted for placement in run headers. Please specify any substitutions in the spaces provided to the right, using the variable names developed by the wind tunnel programmers.

NOTE: The plot code identifies which Map Table is to be used from the CDD when plotting pressure data. The configuration code identifies the test model configuration used. It is vital that both these quantities be entered properly by the wind tunnel data processors. Map Tables are identified by consecutive integers starting at 1. Mach number must be in the second position if Summary data is to be plotted.

1) PLOT_CODE _____
2) MACH _____
3) RN _____
4) PT _____
5) TTR _____
6) CONF _____

6) # of forces _____ # of extra values to be loaded at force recompute _____

7) For pressures: (total # of scanivalves for all pressure blocks)

# of scanivalves _____ # of ports _____ # of region definitions _____

8) Identify the pressure data to be retrieved. Be sure to identify pressures using names which appear in the RESULTS file. List the desired ranges for pressure data: (e.g., scanivalves 2-4, ports 2-14). This section can be omitted if no pressures are to be retrieved.

Cp name	scanivalves	ports

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DATA RETRIEVAL REQUEST FORM
~ FORCES ~

Test # _____
Date _____

9) Requested forces: In the space provided, identify the numbers (pointers) corresponding to the force values to be retrieved as shown in the Definition of Results for your test as prepared by the SWTS programmers. Also specify the name with which you wish to identify each stored force value on your CDD data base.
Each name may contain up to eight characters and must be unique for this data base. Embedded blanks are allowed. If additional sheets are needed, please write over the #1 in the top left position of the form below with the proper starting value (41 for the first additional page, 81 for the second, etc.).

POINTER	CDD NAME	POINTER	CDD NAME
1		21	
2		22	
3		23	
4		24	
5		25	
6		26	
7		27	
8		28	
9		29	
10		30	
11		31	
12		32	
13		33	
14		34	
15		35	
16		36	
17		37	
18		38	
19		39	
20		40	

DATA RETRIEVAL REQUEST FORM
~ CONFIGURATIONS ~

Test # _____
Date _____

10) In the space provided, specify the integer configuration code recorded in the RESULTS file for each model configuration used. Beside each configuration code, enter the text with which you wish to describe that model configuration. Each configuration text may contain up to 30 characters. If additional sheets are required, write over the #1 that appears at the top left position of the form below with the proper starting value (i.e., 21 for the first additional page, 41 for the second, etc.).

#	CONFIGURATION CODE	CONFIGURATION TEXT 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		

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DATA RETRIEVAL REQUEST FORM
~ PLUMBING CONFIGURATION ~

Test # _____
Date _____

11A) This form must be completed if pressure plots are desired. List tap coordinates for all model configurations used in your test. Only those coordinates against which pressures will be plotted need be supplied, although, if all three coordinates are known for each tap, please list them as they may be useful later for other graphics applications. If pressure contour plotting is anticipated, both coordinates on which data is to be contoured must be provided. DO NOT NORMALIZE COORDINATES, as this renders them useless for contouring and other graphics software.

If additional sheets are needed, please write over the #1 in the top left position of the form below with the proper starting value (i.e. 51 for the first additional page, 101 for the second, etc.).

PLUMBING CONFIGURATION # ___

TITLE _____

TAP #	SCAN #	PORT #	X	Y	Z	TAP #	SCAN #	PORT #	X	Y	Z
1						26					
2						27					
3						28					
4						29					
5						30					
6						31					
7						32					
8						33					
9						34					
10						35					
11						36					
12						37					
13						38					
14						39					
15						40					
16						41					
17						42					
18						43					
19						44					
20						45					
21						46					
22						47					
23						48					
24						49					
25						50					

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DATA RETRIEVAL REQUEST FORM
~ SUPPLEMENTAL PLUMBING CONFIGURATIONS ~

Test # _____
Date _____

(1B) This form must be filled out if more than one PLOT CODE value has been recorded with your data. Only those taps which have been routed to a different scanivalve/port combination than that already specified in some other plumbing configuration sheet need to be identified here. Use additional sheets if necessary.

PLUMBING CONFIGURATION # _____

TITLE _____

The MAP/TAP information for this plumbing configuration is identical to that of plumbing configuration # _____ with exceptions as specified below:

TAP #	SCAN #	PORT #	TAP #	SCAN #	PORT #	TAP #	SCAN #	PORT #	TAP #	SCAN #	PORT #

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DATA RETRIEVAL REQUEST FORM
~ REGION INFO. ~

Test # ____________
Date ____________

12) This form must be completed if pressure plots are desired. Identify those taps to be included in each desired region for pressure plotting. Use additional sheets if necessary.

REGION # ______ # of taps ______ Plot pressure -vs- (circle one) X Y Z

Region title ____________________

Normalization: X0__________ Y0__________ Z0__________ Norm. length__________

List taps to be included in this region ____________________

____

____

REGION # ______ # of taps ______ Plot pressure -vs- (circle one) X Y Z

Region title ____________________

Normalization: X0__________ Y0__________ Z0__________ Norm. length__________

List taps to be included in this region ____________________

____

____

REGION # ______ # of taps ______ Plot pressure -vs- (circle one) X Y Z

Region title ____________________

Normalization: X0__________ Y0__________ Z0__________ Norm. length__________

List taps to be included in this region ____________________

____

____

REGION # ______ # of taps ______ Plot pressure -vs- (circle one) X Y Z

Region title ____________________

Normalization: X0__________ Y0__________ Z0__________ Norm. length__________

List taps to be included in this region ____________________

____

____

REGION # ______ # of taps ______ Plot pressure -vs- (circle one) X Y Z

Region title ____________________

Normalization: X0__________ Y0__________ Z0__________ Norm. length__________

List taps to be included in this region ____________________

____

____

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DATA RETRIEVAL REQUEST FORM
~ REQUESTED RUNS ~

Test # _____
Date _____

13) In the space provided, identify the run numbers for all runs that are to be retrieved from the Wind Tunnel System for your test.

Examples:	RUN(S)	DESCRIPTION
	n	Retrieve run n
	n-m	Retrieve runs n through m

RUN(S)	RUN(S)	RUN(S)

APPENDIX H: CDDMS PLOT REQUEST FORMS

The following forms must be used to request the data to be plotted and to indicate the format of the desired plots.

CDDMS PLOT REQUEST FORM A
~ INVARIANTS and SELECTED DEFAULTS ~

Test # _____
Date _____

*NOTE: All plot options which are standard defaults are preceded by an *.

1) REQUESTER'S NAME: _____ RM. _____ EXT: _____ BRANCH _____

2) OUTPUT DESIRED: Fiche with hardcopy / Fiche without hardcopy / * Versatec / Laser
(Circle one) 24X 48X / 24X 48X

3) CHARACTER FONT: (Circle one) * Quick-look / Report-quality

4) DATA BASE(s):

DB #	CDD FILENAME (or W. T. Test #)	SOURCE (Circle one)
* 1)	_____	Force & Pressure / Force / Theory
2)	_____	Force & Pressure / Force / Theory
3)	_____	Force & Pressure / Force / Theory
4)	_____	Force & Pressure / Force / Theory
5)	_____	Force & Pressure / Force / Theory

5) PLOTTING DEFAULTS: Check one item in each category. All defaults assigned here may be temporarily overridden in the "SPECIAL INSTRUCTIONS" section of FORMS B and C.

A) GRID TYPE

1	☐	No grid; ticks
* 2	☐	No grid; ticks; origin lines
3	☐	Grid with ticks
4	☐	Grid with dots
5	☐	Type 3, but with intermediate grid lines
6	☐	Type 4, but with intermediate grid lines

B) CURVE FIT

* 0	☐	Linear
1	☐	Least squares
2	☐	Cubic Hermite
3	☐	Cubic spline

C) LINE TYPE

0	☐	No line
* 1	☐	Solid line
2	☐	Dashed line
3	☐	Dotted line

D) POSITION OF PLOT TITLES

* 1	☐	Top of plot frame
2	☐	Bottom of plot frame

E) PLOT ORIENTATION ON FRAME

* 1	☐	Regular Versatec (COMIC)
2	☐	Rotated 90 degrees (CINEMA)

F) NORMALIZATION OF ABSCISSAS (for pressure plots only)

* 0	☐	Do NOT normalize
1	☐	Normalize

G) DO YOU (GENERALLY) WISH TO ELIMINATE DATA POINTS FROM CONSIDERATION DURING CURVE FAIRING OPERATIONS?

* 0	☐	No
1	☐	Yes

H) IF YOU ANSWERED "YES" TO 5(G), DO YOU WISH TO DISPLAY VALID POINTS ONLY?

V	☐	Yes
* A	☐	No

I) REQUESTED CURVE SYMBOL SEQUENCE: Specify sequence from 0 - 10, where:

0	No curve symbol appears	6	House
1	Circle (approximated by octagon)	7	Triangle, point down
2	Square	8	Triangle, point right
3	Diamond	9	Triangle, point left
4	Triangle, point up	10	Dot
5	Right triangle		

REQUESTED SYMBOL SEQUENCE: _____
NOTE: Default symbol sequence is: 1,2,3,4,5,6,7,8,9,10, 1-10, 1-5

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CDDMS PLOT REQUEST FORM B
~ FRAME DEFINITION ~

Test # _____
Date _____

NOTES: An appropriate number of decimal digits with which to label tick marks for a given axis will be calculated if no entry is made in the corresponding space. If XLEFT and XRIGHT (or YBOT and YTOP) are specified, NXINT (or NYINT) also MUST be provided. If self-scaling is desired for an axis which is to have its direction reversed, specify -1 for the corresponding number of intervals on that axis (NXINT or NYINT). Axis labels may contain up to 30 characters. In addition to overriding plotting defaults set on FORM A, the SPECIAL INSTRUCTIONS section on this form must specify any desired curve labels. If your plot request is for single plots per frame, APPENDIX I of the PLTTER User's Guide describes a more compact scheme for filling out this form.

FRAME ID #____ FRAME TYPE (circle one) Force / Pressure / Summary If Force frame, sort data on: _____

PLOT #	X-axis data	Y-axis data	X-axis label	Y-axis label	RGN # / DB #	XLEFT / YBOT	XRIGHT / YTOP	NXINT / NYINT	NXDIG / NYDIG
1									
2									
3									
4									

SPECIAL INSTRUCTIONS: _____

FRAME ID #____ FRAME TYPE (circle one) Force / Pressure / Summary If Force frame, sort data on: _____

PLOT #	X-axis data	Y-axis data	X-axis label	Y-axis label	RGN # / DB #	XLEFT / YBOT	XRIGHT / YTOP	NXINT / NYINT	NXDIG / NYDIG
1									
2									
3									
4									

SPECIAL INSTRUCTIONS: _____

CDDMS PLOT REQUEST FORM C
~ PLOT REQUEST ~

Test # _____
Date _____

NOTES: Each plot title may contain up to 70 characters. If a particular line type sequence is desired for individual curves in comparison plots (i.e. ampersand run notation), specify the line type sequence in the SPECIAL INSTRUCTIONS sections provided below. See FORM A for available line types and FORM B for FRAME IDs.

TITLE1: _____

TITLE2: _____

FRAME IDs	RUNS : SEQUENCES (enter DB # if other than default)	SPECIAL INSTRUCTIONS

LEGEND ENTRIES: List up to 10 force names (or CONFIGUR, RUN, SEQ, REG) to be tabulated in legend. Follow each name by the number of decimal digits to be displayed in that column (-1 for configuration) e.g., CONFIGUR,-1,MACH,2,ALPHA,0,BETA,0,CL,5,RUN,0,SEQ,0

TITLE1: _____

TITLE2: _____

FRAME IDs	RUNS : SEQUENCES (enter DB # if other than default)	SPECIAL INSTRUCTIONS

LEGEND ENTRIES: (See above for details.)

TITLE1: _____

TITLE2: _____

FRAME IDs	RUNS : SEQUENCES (enter DB # if other than default)	SPECIAL INSTRUCTIONS

LEGEND ENTRIES: (See above for details.)

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APPENDIX I: INSTRUCTIONS FOR COMPLETING PLOT REQUEST FORMS

CDDMS Plot Request Forms provide a means of specifying precisely the data and plot format to be used to generate desired plots. Although every effort has been made to provide clear, direct questions on the three separate forms of the CDDMS Plot Request Forms, this appendix has been prepared to provide further clarification. In the following pages, elements of the Plot Request Forms which may require further explanation are identified either by number or textually.

FORM A:

2) Microfiche output from the Dicomed can be 24X or 48X. Because of plotting's impact on system resources, neither Versatec nor Laser printer output is recommended for large plotting jobs of 50 or more frames.

3) One of two fonts may be requested to be used for creating all text on plots. Because the report-quality font creates much larger plot files, its use should be restricted to instances where the requester is reasonably certain that the requested plots are acceptable for publication in every detail.

5E) The terms "CINEMA" and "COMIC" can easily be remembered by relating them each to fanfold Versatec paper. COMICs (as in newspapers), are printed to be read with the fold, or page boundary, in a vertical orientation. CINEMA, or film orientation, is such that the page boundary of each frame is horizontal when the picture is viewed.

5F) If normalized abscissas (X/C) are desired for certain pressure plots, be sure that the required normalization information has been supplied in the appropriate Region definition on the data base.

5G) Certain data may be not used in, or disregarded by curve fairing activities. This is done by assigning "Disregarded Force (or Pressure) Flags" while running the ARIES program or the TOGGLE program and then by requesting that the disregard flags be acknowledged during plotting. If many plots are being requested, but data points are to be eliminated on only a few such plots, answer "NO" here and use the SPECIAL INSTRUCTIONS section of FORM B or C to designate that certain data are to be

ignored during curve fairing operations. The words "DISREGARDED DATA" will suffice for this purpose.

5H) Disregarded data points may either be displayed on or omitted from plots. In either case, they are NEVER used for curve fairing.

FORM B:

AN ALTERNATIVE METHOD FOR FILLING OUT FORM B

FORM B is used to create a frame "template" for each desired frame type. Space is provided to designate the data, axis labels, and axis scalings for up to four plots on each frame. This request format is clearly inefficient in its space utilization when the more standard application of a single plot per frame is requested. To help to compensate for this four-plots-per-frame bias, FORM B may be restructured by crossing out the "PLOT #" entries and writing in unique frame identifiers in their place. The rows of the form intended for four plots of one frame can be used to define four separate frames instead. This allows definition of up to eight frames on a single sheet of FORM B instead of two as would be the case otherwise.

Each frame may contain up to four sets of plot axes. For each desired plot on the frame, identify by name the data to be plotted on the X- and Y-axes. For pressure plots, specify X (or X/C) and CP. For force plots, the names specified must match exactly a force name loaded into the Force Names Table on the CDD. Force names may contain any ASCII character except a comma, which is used later to delimit force names from other values. For theory data, where there may be more than one pressure type value at each "tap", identify the desired value by subscripting CP, such as CP(3).

RGN #/DB #) One or more region numbers must be specified for pressure plots. In addition, if more than one data base is used, the data base for which the regions are specified must also be identified.

The last four columns of this form are optional, with defaults supplied as described below. XLEFT, XRIGHT, and NXINT are the values of the left and right limits of the X-axis and the number of intervals to be used to scale the X-axis, with a similar system used for scaling the Y-axis. If one or more of these three columns is left blank on the request form, the corresponding axis will be "self-scaled". This involves the scanning of all data to appear on the plot for minimum and maximum and "rounding to the outside" to obtain a more aesthetic range and increment.

The column marked NXDIG/NYDIG provides a means of specifying the number of decimal digits to be used to label plot axes tick labels. If left blank or a value of -1 is requested for either, an appropriate number of decimal digits will be calculated with which to label graduations on the corresponding axis.

The SPECIAL INSTRUCTIONS section of FORM B can be used to override temporarily any of the plot-related defaults set on FORM A. Any modification to FORM A-specified defaults will be recognized only for the current FRAME definition.

FORM C:

FORM C is the actual "request" portion of the CDDMS Plot Request Forms system and each FORM C provides for three plot requests.

SPECIAL INSTRUCTIONS) The special instructions section of FORM C allows plotting options for a particular request of a given set of frames to be overridden. In addition, for comparison plots of pressure data from more than one data base, the SPECIAL INSTRUCTIONS section should be used to specify the regions to be used for pressure data from any data base other than data base #1.

APPENDIX J: DERIVED DATA FOR SUMMARY PLOTS

Plots of Summary data may be created only after the DERIVD program has been run. DERIVD prompts for such information as the name of the CDD, the model's aerodynamic center (in percent chord), choice of curve fit to be used to approximate certain slopes and intercepts, and the run numbers for which derived results are desired.

The following list identifies the names which must be used to identify Summary data for plotting. A brief description of each derived quantity is also provided.

Variable	Description
ACL0	Angle of attack at CL=0
CLA0	Lift coefficient at ALPHA=0
CLALFA	Lift curve slope at ALPHA=0
CLMAX	Maximum lift coefficient
ACLMAX	ALPHA at maximum lift coefficient
CDMIN	Minimum drag coefficient
CLCDMN	CL at CDMIN
ACDMIN	ALPHA at minimum drag
CDCL0	Drag coefficient at CL=0
CDALFA	Drag curve slope at ALPHA=0
LDMAX	Maximum lift/drag ratio
CLLDMX	CL at LDMAX
ALDMAX	Angle of attack at LDMAX
CDLDMX	CD at LDMAX
CMCL0	Pitching moment coefficient at CL=0
CLCM0	CL at CM=0
CMCL	CM vs. CL slope at ALPHA=0
AC	Aerodynamic center (XCG-CMCL)
CMALFA	Pitching moment slope at ALPHA=0
CLBETA	Rolling moment slope at BETA=0
CYBETA	Side force slope at BETA=0
CNBETA	Yawing moment slope at BETA=0

APPENDIX K: FOR MORE INFORMATION

The CDDMS system contains many programs. PLTTER is a command file which invokes several of these. In addition, there are CDDMS programs which initialize data bases, load data onto data bases, create color contour plots of pressure data on CDDs, modify the status of data by adjusting disregarded data flags on CDDs, and dump CDD contents. Additional documentation is available for many of these systems. The list which follows indicates the names of various CDDMS programs and provides a brief description. Also included are several of the systems used to display results.

NAME	DESCRIPTION
ARIES	An interactive system for editing the "disregard" status of force and pressure data on a CDD. Allows the user to see the data plotted and to change selectively the status of data points. A valid PSF is needed to run ARIES.
ASKEW	A system for plotting Cp data from oblique wing models. ASKEW creates plots using CONPLT (see below) or PLOTCP (a program which creates standard Cp vs. X/C plots plus perspective (carpet) plots showing Cp curves suspended over the planform geometry).
CDDDEP	Extracts (and sorts) from a CDD the data specified in a PSF and creates a PDF for plotting.
CONPLT	Creates color (and Versatec) contour plots of pressure data on a CDD. Also handles data from other sources.
DERIVD	Derives aerodynamic Summary data from wind tunnel results.
DIPD48	Converts a DIP file to a D48 format for use by the Dicomed. (Be sure to use UPPER CASE when answering DIPD48 prompts.)
DIPQMS	Converts a DIP file into QMS format for plotting on a QMS LASER printer.
DIPTEK	Displays a DIP file on a Tektronix or Tektronix emulator "green screen".

DIPVRC Converts a DIP file into VRC format for plotting on a Versatec.

DMPALL Dumps selected information from a CDD.

FIXHDR Modifies the value of plot code or configuration code which has been stored in the run header of a CDD.

PLTMOD Creates DIP files for plotting from information specified in Plot Definition Files.

POINTERS Creates the POUT9.DAT file needed to retrieve results from the SWTS for loading onto a CDD.

QMOD Provides PLTTER graphics capabilities to those not having their data on a CDDMS data base.

RELOAD Reloads computed data onto a CDD. Used in conjunction with XTRACT.

RFDPSF Converts Requests, Frames, and Defaults files to a PSF.

SEQOUT Extracts and creates a file containing force data for selected run:sequences.

SHADE Creates 3-D shaded surface displays of pressure data mapped to a paneled (PAN AIR) definition of the model surface.

TABLES Loads CDDMS Tables.

TOGGLE Toggles the "disregard" status of force or pressure data on a CDD.

TOTFRC Integrates experimental pressure data to provide a very crude approximation of total lift and drag forces.

VECCON A merging of the VECTOR and CONPLT systems which creates color contours of velocity data stored on a CDD.

VECTOR A system for creating color velocity vector and flow angle plots of velocity data (stored as force data) on a CDD.

XTRACT Extracts data from a CDD for computations and reloading. Used in conjunction with RELOAD.

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
NASA CR- 177385		

4. Title and Subtitle	5. Report Date
PLTTER User's Guide	November 1985
	6. Performing Organization Code

7. Author(s)	8. Performing Organization Report No.
Alice Barlow, Dexter Hermstad, and Jeff Trosin	TN# 85-7104-306-23
	10. Work Unit No. K1707

9. Performing Organization Name and Address	11. Contract or Grant No.
Informatics General Corporation 1121 San Antonio Avenue Palo Alto, CA 94303-4380	NAS2-11555
	13. Type of Report and Period Covered
	Contractor Report

12. Sponsoring Agency Name and Address	14. Sponsoring Agency Code
National Aeronautics and Space Administration Washington, D.C. 20546	999-53-02

15. Supplementary Notes

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16. Abstract

This report provides information on the PLTTER graphics system, which is part of CDDMS. CDDMS is a comprehensive system for data basing and subsequent plotting of data acquired during wind tunnel tests or from computational flow analyses. The report includes Data Retrieval Request Forms, Plot Request Forms, and information on how to use them.

PLTTER is a system which creates report-quality plots of data which has been stored on a CDDMS data base. The Requests file system allows plot-controlling information to be arranged in the way most appropriate for any application. The PLTTER system features many capabilities which are especially useful when plotting wind tunnel data. PLTTER offers a variety of page formats, different grid options and parametric curve fitting algorithms, and a powerful legend capability to identify relevant information about individual curves. One or more plots on a page can be suppressed if desired so that an established page format can be maintained. Final plot output may be standard Versatec plots, QMS Laser printer plots, or microfiche (from the Dicomed).

17. Key Words (Suggested by Author(s))	18. Distribution Statement
Aerodynamics; data base; wind tunnel test; experiment; plotting; SWTS	UNCLASSIFIED STAR Category: 02

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price*
Unclassified	Unclassified	61	

*For sale by the National Technical Information Service, Springfield, Virginia 22161