

CAD D1

062-5977-01

CAD D1 contains programs to help you design an infinite variety of structures or draft complicated layouts. You could incorporate the transformation algorithm into your own programs. One program will even predict the performance of any sail craft you may have on your drawing board. The individual abstracts describe each program.

Title/

Previous Abstract

4052/4 Drafting Program

52/07-9538/0

Telephone Cable Layout

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Drafting Digitizer

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POINT Mode Digitize

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3-D Transformation Using Homogeneous

Coordinates

51/00-9527/0

Performance Prediction of Sailcraft

51/00-1606/0

Program 1

Title: **4052/4 Drafting Program**

Author: Connie Breithaupt

Tektronix, Inc.

Rockville, MD

Memory Requirement: 64K

Peripherals: 4052 Graphic System, Opt. 24

4907 File Manager

4952 Joystick, Opt. 2

or

4054 Graphic System, Opt. 24

4907 File Manager

Optional-4662/4663 Plotter

4956 Tablet

Statements 2321

Files: 2 Program

7 Data (examples)

Requires data files

The program allows a drawing to be defined by creating, modifying, and/or deleting its elements. The elements may be arrows, circles, lines, text, cross-hatching, and sub-drawings. The created drawing is called a Picture Data Base (PDB) and is stored on the 4907 File Manager. Each PDB may contain 100 different layers of display. For example, Layer 1 (the default layer) may show the PDB outline, Layer 2 the dimensions, Layer 3 the linework, etc. A frequently used symbol may be created as a PDB-and then used as a Sub-PDB in other PDB's.

Program commands include:

CHANGE

Grid points

Layer Number

Dash line font

Height of text

END

COMPRESS

DISPLAY

All of current PDB

ERASE

Arrow(s)

Circle(s)

Line(s)

Sub-PDB(s)

Text

Cross-hatchings(s)

INSERT

Arrow-horizontal

Arrow-vertical

Circle

Line

Sub-PDB

Text

Cross-hatching

LIST

Parameters-selectable

PDB-contents

PAGE

Down

Left

Right

Up

PAUSE

RESTART

SAVE

SELECT

Angle-text

Arrowhead size

Dash code

Figure (Sub-PDB)

Grid interval

Grid off

Grid on

Height-text

Input device address

Non-italic text

Italic text

Tolerance range

Translation-amount

Window

Cross-hatching-

angle, line

displacement

Layer number

Output device address

TRANSLATE

Line-copies n times,

increment, direction

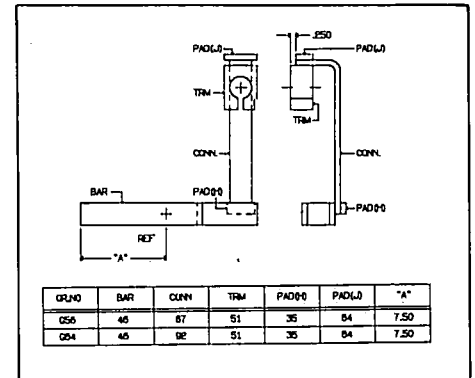
ZOOM

All

Down

Up

Window



TEXT FEATURES

DIFFERENT SIZES

ITALICS

ANGLED

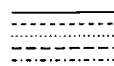
CROSS HATCHING



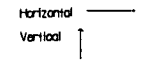
CIRCLES



DASH LINES



DIMENSION ARROWS



OTHER DRAFTING FEATURES

Insert rotated and scaled sub-PDB's

Translate lines

Change line dash and text height

Select and activate grid

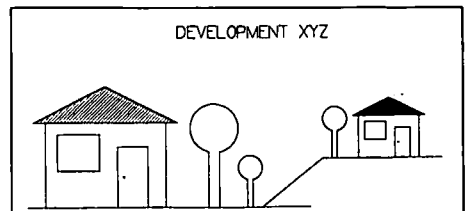
Zoom, window, and page PDB

100 different layers

Erasure of all inserted entities

Save PDB with selected name

Output PDB to plotter



Program 2

Title: **Telephone Cable Layout**

Author: Len Olson

Tektronix, Inc.

Rockville, MD

Memory Requirement: 32K 4051

Peripherals: 4907 File Manager

4956 Graphic Tablet

4663 Plotter

4641 Printer

Files: 48 Program

Statements: 4500

A unique package allows the user to 1) draft telephone cable staking sheets, and 2) inventory parts for the resulting cable network.

However, the basic idea of this software (a skeleton basic road to which are added symbols, text, side roads, etc.) could be extended in a straightforward way to any layout or utility type problem. For example, a factory layout which would have a basic column grid replacing the basic road, an office layout, airplane seating layout, TV cable or any utility layout, etc.

The staking sheets are composed and edited by adding or deleting discrete elements rather than inserting or deleting moves and draws within objects. A Basic Road Library and Symbol Library constructed by the user provide a reservoir of standard road segments and constant symbols. Meter location details, variable symbols, cable layout and annotations complete the staking sheet elements.

The graphic input may come from the 4956 Tablet or the 4663 Plotter. Graphic output may be sent to the 4050 Series graphic screen or 4663 Plotter. The user may choose one of four colors for each element. The parts inventory list is sent to the 4641 Printer.

Four programs help the user do the job. The **Digitizer Program** initiates the 4956 Tablet and helps the user construct the Basic Road Library and Symbol Library. The Basic Road Library is a collection of basic roads digitized in centerline format (alternating arcs using three points) and straight line segments. The program calculates the curb lines and rights-of-way lines which are stored along with the road sections in the Library. The Symbol Library contains digitized and named relocatable symbols or subpictures. They are stored as sequences of relative moves and draws. The basic road segments or symbols may be deleted as well as added to their respective libraries.

Once the two Libraries are set up, through 48 commands the user interacts with the **Edit Program** to compose, edit and display staking sheets. The user chooses a basic road

section and locates it on the plotter screen. The program will prompt for meter-location information.

side roads

meter location of intersection of center lines

intersection angle

whether road is above only, below only, or both

symbols

meter location

"Y" location

symbol name

angle w.r.t. center line

pedestals

meter location

pedestal symbol type

location relative to right-of-way lines

variable symbols

start and end (fences, etc.)

The above four types of entries may be deleted or moved.

The compass symbol with orientation is displayed, and curb lines for side roads are drawn. Editing, moving, adding or deleting any element may be done at this point.

Cable layout and nonsymmetric landmarks such as rivers are digitized from the 4956. When annotation is keyed in, the information is complete. A final editing may be done and the plot completed on the 4663 along with the title block. Partially completed staking sheets may be edited also.

Each job has a Master Parts List and a Master Cable List. The **Information Entry Program** allows the user to add part names, cable type, and construction units. Information for individual staking sheets such as Designation Standards, Meter Reading of Pedestals, and construction units and lengths of cables may be input also.

The **Summary Report Program** generates a report of the part names and quantities, the cable types and lengths, for all sheet numbers or a given sheet number of a given job. Output may be to the graphic screen or the 4641 Printer.

Program 3

Title: **Drafting Digitizer**

Author: Tom Sutherlin
Cameron University
Lawton, OK

Memory Requirement: 16K

Peripherals: 4662 Plotter

Optional — 4956 Tablet

Statements: 407

Files: 2 Program

The program consists of two files; the menu and the digitizer.

The menu is designed to be plotted on the 4662 Plotter. This is then placed on the 4956 Tablet to be used by the digitizer. The menu allows a blank area for sketching and digitizing with the basic symbols shown.

The digitizer allows the user to transform sketches into a finished drawing using the basic symbols selected from the menu. Input is from the 4956 Tablet, but may be easily modified to allow input from the 4662 Plotter. The User-Definable Keys are used to select the screen or the plotter for output.

200 X and Y coordinates may be input. For machines with more than 16K memory the program may be modified to accept additional X,Y coordinates.

Menu selections include:

Line — input points A and B, a line will be drawn between the two points

Hidden Line — same as Line, but draws a dashed line

Center Line — input points A and B, a dash .15 inches long will be drawn at the center distance of the line

Circle — input point A (center) and B (right of center), used as radius to compute and draw circle

Hidden Circle — same as Circle, but draws dashed circle

Partial Arc — input points A, B, and C, calculates distance between A and B for radius, length is angle calculated between AB and BC

Partial Hidden Arc — same as Partial Arc, but draws a dashed line arc

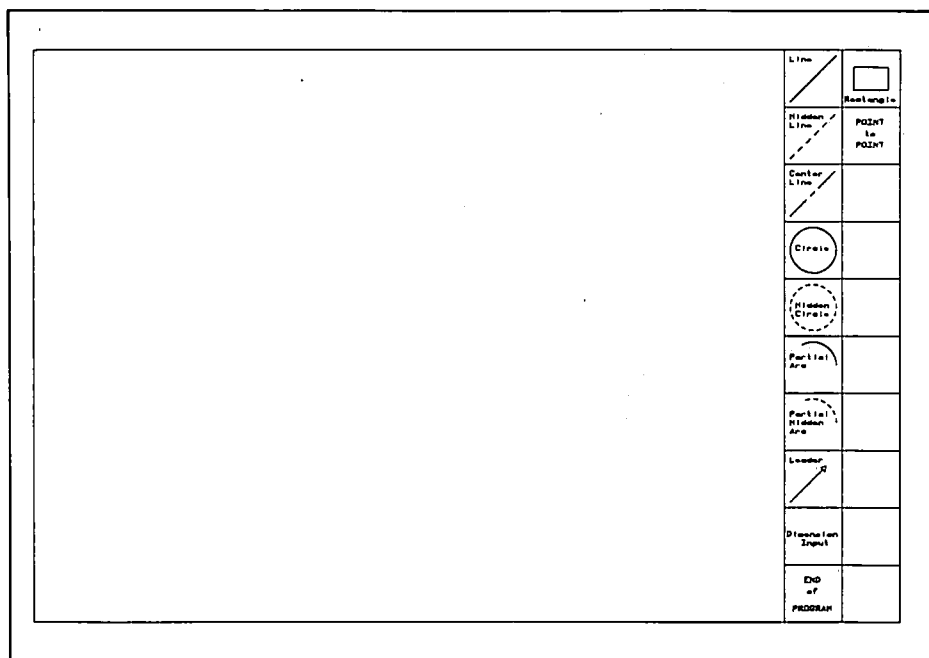
Leader — input points A and B, draws arrowhead at point A .07 inches wide and .1 inches long with line to B

Dimension Input — input points A and B (to the right), enter dimension from the keyboard (up to 16 alphanumeric characters) data is output in a horizontal position

End of Program — flashed "PROGRAM TERMINATED" on the screen and ends digitizing input

Rectangle — input points A (lower left corner) and B (upper right corner), calculates the length of the horizontal and vertical sides

Point-To-Point — input points A, B, C, D . . . , will draw straight line segments to connect the points, points may be at any position



Program 4

Title: **POINT Mode Digitize**

Author: Craig Bulmer
Tektronix, Inc.
Chicago, IL

Memory Requirement: 32K (64K Optimum)

Peripherals: 4956 Tablet
Optional-4662/4663 Plotter
4907 File Manager

Statements: 355

Files: 1 Program

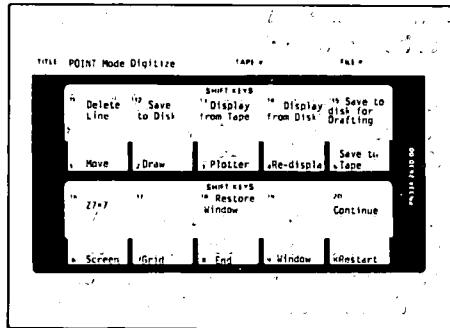
Requires pre-marked data files

This program allows you to digitize a drawing on the 4956 Tablet in POINT mode using the Writing Pen. The data format on disk is compatible for use with "4052/4 Drafting Program".

User-Definable Keys invoke the routines. As you are digitizing, the drawing is reproduced on the 4050 Screen. Lines may be deleted from your drawing. The

completed drawing may be re-displayed, or continued. The drawing may be saved to tape or disk and recalled from either.

A grid structure coupled with a ZOOM windowing routine helps you choose your window.



Program 5

Title: **3-D Transformation Using Homogeneous Coordinates**

Author: George E. Heckler
Department of Chemistry
Idaho State University
Pocatello, ID

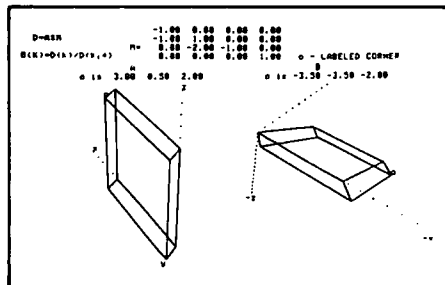
Memory Requirement: 23K

Statements: 339

Files: 1 Program

The program displays two straight sided 3-D figures on the screen. On the left is the original figure; the points at the corners of the original are transformed by a 4 x 4 matrix and displayed on the right. The transforming matrix, and coordinates of illustrative points, are also displayed. The matrix multiplication uses homogeneous coordinates.

The figure is changed in data statements.



Program 6

Title: **Performance Prediction of Sailcraft**

Author: Alex Gares

University of South Florida
Tampa, FL

Memory Requirement: 32K

Peripherals: Optional—4641 Printer
4662 Plotter

Statements: 589

Files: 1 Program

The program allows the user to predict the speed of any sailing craft with respect to the wind velocity and angel to the true or apparent wind direction Polar diagrams are generated of the ratios of:

- Boat speed to true wind speed
- Boat speed to apparent wind speed
- Velocity made good to windward to true wind speed

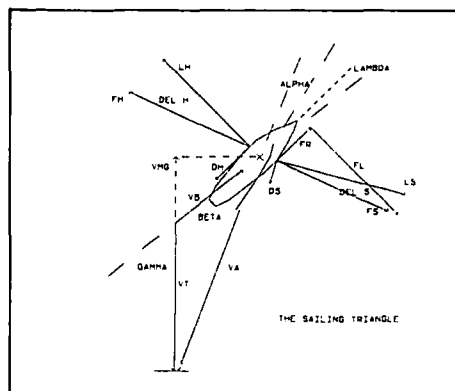
The program permits the sailboat designer, handicapper or performance sailor to evaluate fully the effect of the various significant parameters on sailing craft velocities at all angles to the apparent and true wind and generate polar plots.

A test routine for a catamaran is included in the program to demonstrate the output. Also included in the program is a picture of the vectors involved.

User Prompted Input:

- Sail area in FT²
- Sail lift coefficient
- Sail drag coefficient
- Waterline length in FT
- Waterline length from bow to widest beam in FT
- Displacement in LBS
- Prismatic coefficient
- Hull drag force at 3.16 knots in LBS
- True wind velocity in knots
- Angle between true wind and boat velocity in degrees

The program is a result of a senior level engineering research project and stems from a study of over 20 references in the field.



TEST CASE FOR A CATAMARAN HULL
THE FOLLOWING VALUES WILL BE USED FOR THE TEST CASE
SAIL AREA=1425 FT²
SAIL LIFT COEFFICIENT=1.8
SAIL DRAG COEFFICIENT=0.2
WATERLINE LENGTH=35 FT.
WATERLINE LENGTH FROM BOW TO WIDEST BEAM =19 FT
DISPLACEMENT =23881 LBS.
PRISMATIC COEFFICIENT =0.75
HULL DRAG AT 3.16 KNOTS =61 LBS.
TRUE WIND VELOCITY =15 KNOTS
HIT 1 FOR COMPLETE POLAR DIAGRAMS, HIT 2 IF NOT.

