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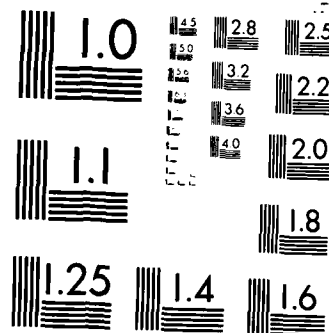
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TASC GRAPHICS SOFTWARE PACKAGE
REFERENCE MANUAL

Michael R. Tang

The Analytic Sciences Corporation
One Jacob Way
Reading, Massachusetts 01867

Final Report
14 May 1980 - 31 December 1982

DECEMBER 1982

~~1 November 1984~~

Approved for public release; distribution unlimited

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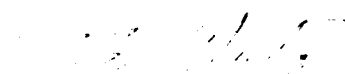
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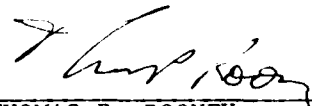
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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The Interactive TASC Graphics Software Package (TGSP), developed at TASC, is based on NCAR Graphics Software. The basic NCAR Graphics Software has been extensively modified to allow for interactive color graphics. Many enhancements have also been made to meet the needs of the Weapons Support System (WSS). This document contains a general description of all the modifications and enhancements which are contained in the TGSP. TGSP is used extensively in the applications software generated for the Weapons Support System.		

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TABLE OF CONTENTS

	<u>Page No.</u>
1. GENERAL	1-1
2. TGSP MODIFICATIONS	2-1
2.1 Interactive TGSP	2-1
2.2 TGSP Enhancements	2-1
2.2.1 Multi-Color Functions	2-2
2.2.2 Added Capabilities	2-3
3. USER INTERFACE	3-1
4. SUMMARY	4-1
REFERENCES	R-1
ERRATA	1

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1.

GENERAL

The interactive TASC Graphics Software Package (TGSP), developed at TASC, is based on NCAR Graphics Software (see Ref. 1). The basic NCAR Graphics Software has been extensively modified to allow for interactive color graphics. Many enhancements have also been made to meet the needs of the Weapons Support System (WSS). The following document contains a general description of all of the modifications and enhancements which are contained in the TGSP.

TGSP is used extensively in the applications software generated for the Weapon Support System (Ref. 2-5).

2.

TGSP MODIFICATIONS

Two major areas of extensions were made to the NCAR Graphics Software in developing TGSP. First, extensions were made to make the TGSP interactive. Second, extensions were made to allow TGSP to use color graphics.

2.1 INTERACTIVE TGSP

NCAR was designed to be a general plot package for use with many different plotting devices. It is designed to accept high level commands and generate an intermediate set of commands called metacode and to then use device specific routines to convert metacode to device dependent instructions to form a plot. The metacode translator was originally designed by NCAR to run in a "batch" type environment. Extensive modifications and enhancements were made to all of the metacode translation routines to make TGSP interactive. As a result, the driving routine was changed from MCTRN to WRITEB. The program WRITEB was also modified to call the routine MCTRN when the internal buffer was full.

2.2 TGSP ENHANCEMENTS

Enhancements were incorporated in the TGSP for the following reasons:

- Enable multi-color plots

- Increase capabilities of the basic plot package
- Decrease execution time.

The next sections will explain the high-level portions of the modified software.

2.2.1 Multi-Color Functions

Several subroutines were written to aid the user with the color interface to the TGSP. The following is a list of these subroutines and a brief description of their use:

Subroutine CURS

Sets up a crosshair cursor pattern for the Lexidata.

Subroutine LEXCLR (ILEV)

This program changes the current color level being written to by the plot package

ILEV = Color level to be written to

Subroutine LXBLACK

This subroutine sets the color-look-up table values to zero

Subroutine LXCCLR (ILEV, ICOLOR)

This subroutine will change the Lexidata color look-up table for a given level

ILEV < 0 - change current level
 = 0 - background / 0, 0, 0
 = 1 - default / 15, 0, 0 red
 = 2 - default / 0, 15, 0 green
 = 3 - default / 0, 10, 10 blue
 ICOLOR = Three element array which contains values (0-15) for red, green, blue respectively

Subroutine LXDEFT

This subroutine restores all three color levels to their original default values

Subroutine LXLEV (ILEV)

This subroutine changes the Lexidata color level
ILEV = Level to be written to

Subroutine TASC_AXIS (XS,YS,XE,YE,NTIC,NLAB,SVAL,STVAL,ISIDE,IAXIS)

Draws X, Y, and Z axes on surface plots

XS = X - axis minimum in Lexidata units
YS = Y - axis minimum in Lexidata units
XE = X - axis maximum in Lexidata units
YE = Y - axis maximum in Lexidata units
NTIC = Number of tics along axis
NLAB = Number of labeled tic marks
SVAL = Minimum axis value in user units
STVAL = Maximum axis value in user units
ISIDE = Viewing elevation flag
IAXIS = Flag to determine axis to be drawn
= 1 X - axis is drawn
= 2 Y - axis is drawn
= 3 Z - axis is drawn

Subroutine TASC_ROTATE (X,Y,A)

Performs an in-place transformation of point (X,Y)
thru angle A
X = X coordinate
Y = Y coordinate
A = Rotation angle (radians)

2.2.2 Added Capabilities

Subroutine CONREC

The ability to add headers and label axes has been added to the contour plots. The following common blocks control these functions:

```
COMMON BLOCKS;  
  /CRLABS/ HEADER,XTITLE,YTITLE  
  /CRMXXMX/ XMIN,XMAX,YMIN,YMAX,NDEC  
  /CRTICS/ NXMAJ,NXMINOR,NYMAJ,NYMINOR
```

```
COMMON ARGUMENTS;
```

```
  HEADER,XTITLE,YTITLE
```

These arguments contain plot header, X-axis, and Y-axis information (Character * 40)

```
  XMIN,XMAX,YMIN,YMAX
```

These arguments contain the X and Y minimum and maximum axis values.

```
  NDEC
```

This argument defines the minimum number of decimal places to be displayed on the X and Y axis

```
  NXMAJ,NYMAJ
```

These arguments define the number of major labeled tick marks along the X and Y axes.

```
  NXMINOR,NYMINOR
```

These arguments define the number of minor unlabeled tick marks along the X and Y axes.

```
Subroutine SRFACE:
```

The ability to add headers and label axes has been added to the surface plots. The following common blocks control these functions:

```
COMMON BLOCKS;  
  /SRLABS/ XTITLE,YTITLE,ZTITLE  
  /SRMXXMX/ XMIN,XMAX,YMIN,YMAX,NDEC
```

```
COMMON ARGUMENTS;
```

```
  XTITLE,YTITLE,ZTITLE
```

These arguments contain X, Y and Z-axis information (Character * 40)

```
  XMIN,XMAX,YMIN,YMAX
```

These arguments contain the X and Y minimum and maximum axis values.

NDEC

This argument defines the minimum number of decimal places to be displayed on the X and Y axis.

ADDITIONAL AUTOGRAPH COMPATIBLE ROUTINES

This section is divided into two parts. Part 1 contains a list of the routines in TGSP which enhance related routines in the AUTOGRAPH package along with a short description of each. Part 2 contains descriptions of the arguments of these routines. See the AUTOGRAPH writeup for a set of sample programs using the package and the output produced by each of the programs.

Each of the following routines draws a complete graph allowing different colors for each curve with one call. Each is implemented by a set of calls to the lower level AUTOGRAPH routines AGSTUP, AGCURV, and AGBACK.

Part 1

TGY(YDRA,NPTS,GLAB,ILEV)

Draws a graph of the curve defined by the data points $((I,YDRA(I)), I=1,NPTS)$ with a graph label specified by GLAB.

TGXY(XDRA,YDRA,NPTS,GLAB,ILEV)

Draws a graph of the curve defined by the data points $((XDRA(I),YDRA(I)), I=1,NPTS)$ with a graph label specified by GLAB.

TGMY(YDRA,IDX,MANY,NPTS,GLAB,ILEV)

Draws a graph of the family of curves defined by data points $((I,YDRA(I,J)), I=1,NPTS, J=1,MANY)$ with a graph label specified by GLAB. The order of the subscripts of YDRA may be reversed (see the routine DISPLA, argument LROW).

TGMXY(XDRA,YDRA,IDX,MANY,NPTS,GLAB,ILEV)

Draws a graph of the family of curves defined by the data points $((XDRA(I),YDRA(I,J)), I=1,NPTS, J=1,MANY)$

with a graph label specified by GLAB. XDRA may be doubly-subscripted and the order of the subscripts of XDRA and YDRA may be reversed.

Part 2

This part contains descriptions of the arguments to the routines: TGY, TGXY, TGMY, TGMXY. In calls to the routines TGY, TGXY, TGMY and TGMXY

XDRA

An array of x-coordinates, dimensioned as implied by the current value of the AUTOGRAPH control parameter ROW. The value of the AUTOGRAPH parameter NULL/1.--1.E36 by default--when used as an x-coordinate, implies a missing data point. The curve segments on either side of such a point are not drawn.

YDRA

An array of y-coordinates, dimensioned as implied by the current value of the AUTOGRAPH control parameter ROW. The value of the AUTOGRAPH parameter NULL/1.--1.E36 by default--when used as a y-coordinate, implies a missing data point. The curve segments on either side of such a point are not drawn.

IDXY

The first dimension of the arrays XDRA (if it has two dimensions) and YDRA.

MANY

The number of curves to be drawn by the call to TG... Normally, the second dimension of XDRA (if it has two dimensions) and YDRA.

NPTS

The number of points defining each curve to be drawn by the routine TG... Normally, the first (or only) dimension of XDRA and YDRA.

GLAB

A character string (or an array containing a character string) defining a label to be placed at the top of the graph. The string may not be more than 40 characters. If it is fewer than 40 characters, the last character must be \$. (The \$ is stripped off when the label is printed.) A zero may be used in place of the argument GLAB, indicating that the previous label should continue to be used. (The

initial label consists of blanks.) Note that the use of a zeroed GLAB is non-standard. The routines AGSETP, AGSETF, and AGSETI may be used to define labels in a more nearly standard manner.

ILEV

An integer array, dimensioned MANY, each element being an integer from 0 to 3 representing the color to draw a curve. The value ILEV(1) determines the color of the first curve, and ILEV(MANY) determines the level of the last curve. Note:

- 0 is the background, usually black
- 1 is usually red
- 2 is usually green
- 3 is usually blue.

3.

USER INTERFACE

When the user wishes to use to TGSP the following link is required:

```
LINKINTER program_name, user_library
```

When the user wishes to use the LINKINTER command file the following sequence is required:

```
$LINKINTER program_name, user_library
```

At the end of each frame plotted the user is offered the following options:

- <cr>/Clear - TO CLEAR SCREEN AND CONTINUE
- Color - TO CHANGE COLORS
- Overlay - TO CONTINUE WITHOUT ERASING SCREEN
- Print - TO PRODUCE HARD COPY
- Zoom - TO ZOOM AND SCROLL
- Quit - TO TERMINATE THE PROGRAM.

The routine [TGSP.INTER]LXPRMT.FOR is responsible for the prompting sequence seen by the user at the end of each frame plotted. If the user wishes to modify this routine the following command sequence should be used once changes are made to LXPRMT.FOR:

```
$FOR LXPRMT
```

```
$LINKINTER main_name,LXPRMT,any_userlib/lib
```

4.

SUMMARY

The TASC GRAPHICS SOFTWARE PACKAGE was developed from the NCAR plot package. Enhancements were made to add color capability, to make the package interactive, and to provide axes on surface plots. Attached are updates to the NCAR documentation reflecting these capabilities.

REFERENCES

1. Henderson, L., and Clare, F., NCAR Graphics Software, National Center for Atmospheric Research, Boulder, Colorado, 1979.
2. Capp, D.W., "The Weapons Support System Gravity Evaluation Software Program Documentation," The Analytic Sciences Corporation, Technical Report No. TR-1946-2, October 1981.
3. White, J.V., "The Weapons Support System Data Smoothing and Spectrum Analysis Program Documentation," The Analytic Sciences Corporation, Technical Report No. TR-1946-3, October 1981.
4. Ayres, C.L., Goldstein, J.D., and Staudinger, J.R., "The Weapons Support System Multisensor Simulation Software Program Documentation," The Analytic Sciences Corporation, Technical Report No. TR-1946-4, October 1981.
5. Tait, K.S., "The Weapons Support System Geofast Estimation Software Program Documentation," The Analytic Sciences Corporation, Technical Report No. TR-1946-5, October 1981.

UPDATES -- NCAR GRAPHICS SOFTWARE MANUAL

6/30/81

Version 1.3

TASC Updates

1. Page 31a. Add the following description of new common areas:

COMMON BLOCKS;

/CRLABS/ HEADER, XTITLE, YTITLE
/CRMXXM/ XMIN, XMAX, YMIN, YMAX, NDEC
/CRTICS/ NXMAJ, NXMINOR, NYMAJ, NYMINOR

COMMON ARGUMENTS;

HEADER, XTITLE, YTITLE

These arguments contain plot header, X-axis, and Y-axis information (Character * 40)

XMIN, XMAX, YMIN, YMAX

These arguments contain the X and Y minimum and maximum axis values.

NDEC

This argument defines the minimum number of decimal places to be displayed on the X and Y axis.

NXMAJ, NYMAJ

These arguments define the number of major labeled tick marks along the X and Y axes.

NXMINOR, NYMINOR

These arguments define the number of minor unlabeled tick marks along the X and Y axes.

2. Page 33. The following internal default values have been changed to:

SIZEM 1.0
SLT 0.09
YBT 0.09
SIDE 0.86

3. Page 34. The following internal default values have been changed to:

IOFFM 1
ISOLID 1023

4. Page 134. The default value of ISKIRT is set to 1.
5. Page 134a. Add the following description of new common areas:

COMMON BLOCKS;
/SRLABS/ XTITLE, YTITLE, ZTITLE
/SRMXMX/ XMIN, XMAX, YMIN, YMAX, NDEC

COMMON ARGUMENTS;
XTITLE, YTITLE, ZTITLE
These arguments contain X, Y and Z-axis
information (Character * 40)

XMIN, XMAX, YMIN, YMAX
These arguments contain the X and Y minimum
and maximum axis values.

NDEC
This argument defines the minimum number of
decimal places to be displayed on the X and
Y axis.

6. Page 243a. Add the following subroutine description:

Subroutine CURS

Sets up a crosshair cursor for the Lexidata.

Subroutine LEXCLR (ILEV)

This program changes the current color level being
written to by the plot package

ILEV = Color level to be written to

Subroutine LXBLCK

This subroutine sets the color-look-up table values
to zero

Subroutine LXCOLR (ILEV,ICOLOR)

This subroutine will change the Lexidata color look-up
table for a given level

ILEV = <0 - Change current level
= 0 - background / 0,0,0
= 1 - default /15,0,0 red
= 2 - default /0,15,0 green
= 3 - default /0,10,10 blue

ICOLOR = Three element array which contains values
(0-15) for red, green, blue respectively

Subroutine LXDEFT

This subroutine restores all three color levels to
their original default values

Subroutine LXLEV (ILEV)

This subroutine changes the Lexidata color level
ILEV = Level to be written to

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ISIDE,IAXIS)

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IAXIS = Flag to determine axis to be drawn
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= 2 Y - axis is drawn
= 3 Z - axis is drawn

Subroutine TASC_ROTATE (X,Y,A)

Performs an in-place transformation of point (X,Y)
through angle A

X = X coordinate
Y = Y coordinate
A = Rotation angle in radians

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