U. S. DEPARTMENT OF THE INTERIOR
U. S. GEOLOGICAL SURVEY

A DIGITAL VERSION OF THE 1970 U.S. GEOLOGICAL SURVEY TOPOGRAPHIC MAP OF THE SAN FRANCISCO BAY REGION, THREE SHEETS, 1:125,000

Digitized by Douglas S. Aitken[1]

Open - File Report 97-500

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This database, identified as "A digital version of the 1970 U.S. Geological Survey topographic map of the San Francisco Bay Region, three sheets, 1:125,000," has been approved for release and publication by the Director of the USGS. Although this database has been reviewed and is substantially complete, the USGS reserves the right to revise the data pursuant to further analysis and review. This database is released on condition that neither the USGS nor the U. S. Government may be held liable for any damages resulting from its use.

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[1]U.S. Geological Survey, 345 Middlefield Rd., MS 531, Menlo Park, CA 94025

INTRODUCTION

This Open-File report is a digital topographic map database. It contains a digital version of the 1970 U.S. Geological Survey topographic map of the San Francisco Bay Region (3 sheets), at a scale of 1:125,000. These ARC/INFO coverages are in vector format. The vectorization process has distorted characters representing letters and numbers, as well as some road and other symbols, making them difficult to read in some instances. This pamphlet serves to introduce and describe the digital data. There is no paper map included in the Open-File report. The content and character of the database and methods of obtaining it are described herein.

The database was compiled using ARC/INFO versions 5.x and 6.x, a commercial Geographic Information System (Environmental Systems Research Institute, Redlands, California). It is stored in uncompressed ARC export format (ARC/INFO version 7.x) in a compressed UNIX tar (tape archive) file. The tar file was compressed with gzip, and may be uncompressed with gzip, which is available free of charge via the Internet from the gzip Home Page (http://w3.teaser.fr/~jlgailly/gzip). A tar utility is required to extract the database from the tar file. This utility is included in most UNIX systems, and can be obtained free of charge via the Internet from Internet Literacy's Common Internet File Formats Webpage (http://www.matisse.net/files/formats.html). ARC/INFO export files (files with the .e00 extension) can be converted into ARC/INFO coverages in ARC/INFO (see below) and can be read by some other Geographic Information Systems, such as MapInfo via ArcLink and ESRI's ArcView (version 1.0 for Windows 3.1 to 3.11 is available free from ESRI's web site: http://www.esri.com).

OBTAINING THE DIGITAL DATA

The digital database package can be obtained in any of three ways:

1. Sending a tape with request

A compressed tar file of the topographic map database and related files can be obtained by sending a tape with request and return address to:

San Francisco Bay Region Topo Sheet
c/o Database Coordinator
U.S. Geological Survey
345 Middlefield Road, M/S 975
Menlo Park, CA 94025

Please indicate which of the database packages you would like. Below is a listing of all of the available database packages and their sizes.

The compressed tar file will be returned on the tape. The acceptable tape types are:

2.3 or 5.0 GB, 8mm Exabyte tape.

2. Anonymous ftp over the Internet

To obtain the tar file by anonymous ftp do the following:

cd local_directory	• go to a directory to receive the tar file
ftp wrgis.wr.usgs.gov	• make ftp connection with the USGS computer WRGIS
Name: anonymous	• use "anonymous" as your user name
Password: your email address	• use your email address as a password
cd pub/geologic	• go down to the pub/geologic directory
cd ca/of97-500	• go down to the open file directory
type binary	• change transfer type to binary
get sht1.tar.gz (or insert desired package)	• copy the compressed tar file across Internet to the receiving directory
quit	• close the ftp connection

3. From the Western Region Geologic Information Web Page.

To obtain the tar file via the World Wide Web:

The U.S. Geological Survey now supports a set of graphical pages on the World Wide Web. Digital geologic publications (including this one) can be accessed via these pages. The web page for digital geologic publications from the Western Region is "http://wrgis.wr.usgs.gov". Once at the main page, click on '**Geologic Map Databases**' under the heading '**Data Online**'; next click on '**California**.' Scroll down to get to the listing for this database. Set your web browser to save to a local disk and click on the link for the database package that you want to download.

Database Package	Compressed Size (MB)	Uncompressed Size (MB)
sht1.tar.gz	9	38
sht2.tar.gz	18.3	86.2
sht3.tar.gz	24.3	110.4
sfcu.tar.gz	16.6	63.2
sfdr.tar.gz	10.8	39.8
sfrd.tar.gz	8.1	41.5
sfir.tar.gz	19.2	77.8
sfix.tar.gz	2.8	9.2
sftopo.ps	-	0.872
sftopo.txt	-	0.016

EXTRACTING THE TOPOGRAPHIC MAP DATABASE FROM THE TAR FILE

These extraction procedures use the Sheet 1 (sht1.tar.gz) database package as an example. If you download other packages, simply replace sht1.tar.gz with the appropriate gzip'd tar file wherever sht1.tar.gz shows up.

If you obtained the database package on tape:

put the tape in your tape drive	
cd local_directory	-go to a directory to receive the tar file
tar xvfb /dev/rstn 20	-/dev/rstn is the tape device with n an integer, this puts the tar file in local_directory; 20 is the block size of the tar file
gzip -d sht1.tar.gz	-makes a 38 MB uncompressed tar file sht1.tar
cd local_directory2	-go to the directory that will hold the directory sht1 (if different from local_directory)
tar xvfb {path to tar file}/sht1.tar 20	-extract the sht1 directory from the tar file; 20 is the block size of the tar file.

If you obtained the database package by anonymous ftp or from the web page:

gzip -d sht1.tar.gz	-makes a 38 MB uncompressed tar file sht1.tar
cd local_directory2	-go to the directory that will hold the directory sht1 (if different from local_directory)
tar xvfb {path to tar file}/sht1.tar 20	-extract the sht1 directory from the tar file.

Each of the processes described above will create a directory "sht1" that contains the ARC export files and supporting files as described below. The directory structure at this point will look like this:

```
sht1/
        sh1c.e00
        sh1d.e00
        sh1ir.e00
        sh1ix.e00
        sh1r.e00
        sftopo.txt
        sftopo.ps
        import.aml
```

BASE MAP DATABASE CONTENTS

The San Francisco Bay Region topographic sheets database is available in two formats, by sheet (Sheets 1, 2 and 3), which includes all of the layers for each sheet, or by layer (culture, drainage, roads, intermediate contours and index contours), which include any one of the five layers for all three sheets. Each of these layers (coverages) has been converted to uncompressed ARC/INFO export files. The ARC export files and the associated ARC/INFO coverages, as well as the additional digital material included in the database package, are described below:

Sheet 1 (sht1.tar.gz)

ARC/INFO export file	Resultant Coverage	Description of Coverage
sh1c.e00	sh1c	Culture
sh1d.e00	sh1d	Drainage
sh1ir.e00	sh1ir	Intermediate contours
sh1ix.e00	sh1ix	Index contours
sh1r.e00	sh1r	Roads

Sheet 2 (sht2.tar.gz)

ARC/INFO export file	Resultant Coverage	Description of Coverage
sh2c.e00	sh2c	Culture
sh2d.e00	sh2d	Drainage
sh2ir.e00	sh2ir	Intermediate contours
sh2ix.e00	sh2ix	Index contours
sh2r.e00	sh2r	Roads

Sheet 3 (sht3.tar.gz)

ARC/INFO export file	Resultant Coverage	Description of Coverage
sh3c.e00	sh3c	Culture
sh3d.e00	sh3d	Drainage
sh3ir.e00	sh3ir	Intermediate contours
sh3ix.e00	sh3ix	Index contours
sh3r.e00	sh3r	Roads

Culture (sfcu.tar.gz)

ARC/INFO export file	Resultant Coverage	Description of Coverage
sh1c.e00	sh1c	Sheet 1 culture
sh2c.e00	sh2c	Sheet 2 culture
sh3c.e00	sh3c	Sheet 3 culture

Drainage (sfdr.tar.gz)

ARC/INFO export file	Resultant Coverage	Description of Coverage
sh1d.e00	sh1d	Sheet 1 drainage
sh2d.e00	sh2d	Sheet 2 drainage
sh3d.e00	sh3d	Sheet 3 drainage

Roads (sfrd.tar.gz)

ARC/INFO export file	Resultant Coverage	Description of Coverage
sh1r.e00	sh1r	Sheet 1 roads
sh2r.e00	sh2r	Sheet 2 roads
sh3r.e00	sh3r	Sheet 3 roads

Intermediate contours (sfir.tar.gz)

ARC/INFO export file	Resultant Coverage	Description of Coverage
sh1ir.e00	sh1ir	Sheet 1 intermediate contours
sh2ir.e00	sh2ir	Sheet 2 intermediate contours
sh3ir.e00	sh3ir	Sheet 3 intermediate contours

Index contours (sfix.tar.gz)

ARC/INFO export file	Resultant Coverage	Description of Coverage
sh1ix.e00	sh1ix	Sheet 1 index contours
sh2ix.e00	sh2ix	Sheet 2 index contours
sh3ix.e00	sh3ix	Sheet 3 index contours

ASCII text files and PostScript plot files (these 3 files are included with each of the above database packages):

sftopo.ps	This pamphlet.
sftopo.txt	A text-only file containing an unformatted version of sftopo.ps
import.aml	ASCII text file in ARC Macro Language to convert these ARC export files to ARC coverages in ARC/INFO
utm2lam.prj	A projection file which can be used to reproject these coverages into Lambert Conformal Conic projection, which was the projection in which these maps were originally published

The following directory is produced in the process of converting the export files into ARC coverages:

info/	INFO directory containing the database files that accompany each ARC/INFO layer (coverage).

Once the ARC export coverages have been imported (see discussion below), the directory, or ARC workspace, will look like this:

sht1/
- info/
- sh1c/
- sh1d/
- sh1ir/
- sh1ix/
- sh1r/
- sftopo.ps
- sftopo.txt
- import.aml

The sheet 2 and sheet 3 packages will look the same, only the coverages will be those associated with each of these 2 sheets.

sfcu/
- info/
- sh1c/
- sh2c/
- sh3c/
- sftopo.ps
- sftopo.txt
- import.aml

The drainage, road, intermediate contour and index contour packages will look the same except they will contain the appropriate thematic layers.

The drainage and culture layers for each of the three sheets have been edited in order to allow for mosaicing of adjacent sheets. Marginal material between adjacent sheets was removed from each of these six coverages. If you download any of the three sheets (sht1.tar.gz, sht2.tar.gz or sht3.tar.gz), you will get the drainage and culture layers with all of the border information. If you download one of the thematic data packages (sfcu.tar.gz or sfdr.tar.gz), you will get the versions prepared for mosaicing.

CONVERTING ARC EXPORT FILES

ARC export files are converted to ARC coverages using the ARC command IMPORT with the option COVER. In order to ease conversion and to maintain naming conventions, an ASCII text file in ARC Macro Language that will convert all of the export files in the database into coverages and create the associated INFO directory has been included. Change directories to the database package workspace (where the .e00 files are). From the ARC command line type:

Arc: &run import.aml

Pick the desired .e00 file off of the popup menu and the export file will be converted to an ARC/INFO coverage.

ARC export files can also be read by some other Geographic Information Systems. Please consult your GIS documentation to see if you can use ARC export files and the procedure to import them.

DIGITAL COMPILATION

The topographic map information was digitized from stable originals (cronaflex mylar blackline positives) of the map separates at 1:125,000 scale. The following separates were scanned:

1. Composite of the culture, culture-names, land net and primary roads
2. Composite of the drainage and drainage names
3. Composite of intermediate and index contours
4. Secondary roads

Scanning was done on a Scitex R280 at a resolution of 20 points/millimeter (508 dpi). The Scitex R280 was used to edit the raster scans and to separate the index and intermediate contours into separate coverages. The raster scans were then vectorized on the Scitex R280 with a curvetype of 1 and a tolerance of 1. The vectorization process distorts characters representing letters and numbers, as well as some other symbols, rendering them unreadable in some instances. The vectorized scans were imported into ARC/INFO using the SCITEXLINE command. ARC/INFO was used to modify edge joins, and to remove duplicate names (in adjacent sheets) and marginal information (to allow for mosaicing of adjacent sheets). Each file was converted from digitizer inches to UTM meters using latitude/longitude intersections on the scanned separates as reference points.

SPATIAL RESOLUTION

Uses of this digital topographic map should not violate the spatial resolution of the data. Although the digital form of the data removes the constraint imposed by the scale of a paper map, the detail and accuracy inherent in map scale are also present in the digital data. The fact that this database was prepared from 1:125,000 originals means that higher resolution information is not present in the dataset. Plotting at scales larger than 1:125,000 will not yield greater real detail, although it may reveal fine-scale irregularities below the intended resolution of the database. Similarly, where this database is used in combination with other data of higher resolution, the resolution of the combined output will be limited by the lower resolution of these data.

DATABASE SPECIFICS

The map databases consist of ARC coverages which are stored in UTM projection (Table 1). Digital tics are located at the corners of the three map sheets. The San Francisco Bay Region topographic map sheets were originally published in Lambert Conformal Conic projection. A projection file (utm2lam.prj) has been included with each of the datasets to allow for reprojection back to the original coordinate system.

Table 1 - *Map Projection*
The map is stored in UTM projection

PROJECTION UTM	
UNITS METERS	-on the ground
ZONE 10	-UTM zone 10
DATUM NAD27	
PARAMETERS	-none

The content of the geologic database can be described in terms of the lines that compose the map. Descriptions of the database fields use the terms explained in Table 2.

Table 2 - *Field Definition Terms*

ITEM NAME	name of the database field (item)
WIDTH	maximum number of digits or characters stored
OUTPUT	output width
TYPE	B-binary integer, F-binary floating point number, I-ASCII integer, C-ASCII character string
N. DEC.	number of decimal places maintained for floating point numbers

LINES

The lines (arcs) are recorded as strings of vectors and are described in the arc attribute table (Table 3). The arcs in these coverages have not been attributed.

Table 3 - *Content of the Arc Attribute Tables*

ITEM NAME	WIDTH	OUTPUT	TYPE	N. DEC	
FNODE#	4	5	B		starting node of arc (from node)
TNODE#	4	5	B		ending node of arc (to node)
LPOLY#	4	5	B		polygon to the left of the arc
RPOLY#	4	5	B		polygon to the right of the arc
LENGTH	4	12	F	3	length of arc in meters
<coverage>#	4	5	B		unique internal control number
<coverage>-ID	4	5	B		unique identification number