CETN-VI-22
(12/90)

Coastal Engineering Technical Note

ISRP-PC: A PERSONAL COMPUTER INTERACTIVE SURVEY REDUCTION PROGRAM

PURPOSE: To describe the capabilities of the Interactive Survey Reduction Program (ISRP-PC).

BACKGROUND: Beach and nearshore profile surveys are required to design and monitor completed coastal projects. Several tools and techniques are available to collect this type of field data such as: boat and fathometer, boat and survey sled, and the Coastal Research Amphibious Buggy (CRAB). Regardless of how the data are collected, there is the need to edit incorrect data points, make datum adjustments, plot the data, and compute volume differences between surveys. ISRP-PC is a powerful and user friendly personal computer program which allows the operator to make these type of corrections and analyze profile survey data.

Beach profile survey data can be referenced in terms of cartesian coordinates where Y is the horizontal distance (relative to a baseline) along a transect normal to the shoreline, Z is the elevation relative to a common datum, and X is the horizontal position parallel to the shoreline. The Y and Z components of the cartesian coordinates are manipulated in ISRP-PC. ISPR-PC refers to the spatial position of the transect as **Profile Number** with a temporal identifier termed **Survey Number**.

DESCRIPTION OF PROGRAM: ISRP-PC runs on an IBM compatible computer with at least 440 kilobytes (K) of free memory, a graphics adapter (CGA, EGA, VGA or HERCULES), and either a hard disk (preferable) or two floppy disk drives. Hardcopy output can be dumped to either an IBM, Epson or compatible dot matrix printer, or most Hewlett Packard pen plotters.

ISRP processes one survey of one profile at a time. Using the ISRP options, the data for each profile line can be read in from a previously created data file or can be entered into the program through the keyboard. Once the data are under "program control," it can be edited, plotted, listed, converted to different units, and changed. After manipulations have been completed, and the user is satisfied with the data, it must be output to the user specified output file.

All data manipulations are performed by interactively executing various options. Each option is executed by entering the appropriate 2-letter code at the "Opt Code" prompt. Most options can be executed in any order though ISRP will not allow an improper sequence. The following is a summary of available options:

KEYBOARD DATA ENTRY

FD Fathometer Data entry
HI Check or enter Inst. height and location
HS "Half" Stadia data entry
KD Known data entry - Y,Z, (X)
MD Level and tape surveys (Measured Distances)
ND New Data, initialize for data entry
RT Recall entered data from the Temporary file
ST STadia survey data
TP Turning Point computation

READ/WRITE FILE OPTIONS

LI List Input, summarize data in the 2-D Input File
OD Write 2-D Data to the 2-D Output File, 3-D to 3-D Output File (if in 3-D Mode)
RD Read Data from the 2-D Input File
R3 Read data from the 3-D Input File
RT Recall entered Data from the temporary file

PLOTTING OPTIONS

PL (or PD) PLot Data (Screen and HP flatbed plots)
PP Post Plot an existing plot file

DATA MODIFICATION AND OTHER OPTIONS

CD Correct, Delete, Add Single Points
CF ConFigure ISRP, modify ISRP configuration file
CH Change, Delete, Switch groups of Points
CO Convert Ft. to M. or M. to Ft.
ED EDit data in Program Control
EN Terminate ISRP
HC Change the Profile Header info.
HE HELP - full description of ISRP flow and Options
LD List Data in Program Control
LS List Stored data
OS Temporary Exit to the Operating System
PR PRint a listing of the data to device LPT1
PS Print listing of data Stored with Option SA.
RS ReSet specific OPTIONS
SA Store (SAve) data for use in comparisons
SD Sort Data by offshore distance (after editing)
VC compute Volume and shoreline Changes

ISRP-PC can handle four data formats. Two of them, EDIT1 and EDIT2 formats, are compatible with CERC's Beach Profile Analysis System (BPAS). EDIT3 is a modified EDIT2 format with a 4 digit profile number and a three digit survey number. The fourth format is the ISRP 3-D format. Only the EDIT2 and EDIT3 formats can be read by the companion program, VOLUME-PC, which computes profile changes.

The EDIT2 is the most used format consists of an initial line followed by a series of continuation lines. A sample of the Edit2 format is shown below.

```
39188  511811110 1530 39 -290 Range 20+00 183  228  196  201  203  173  215  137
39188  512  221  119  246  103  251   88  268   68  282   50  325   21  363  -15
39188  513  397  -31  430  -45  456  -66  483  -86  511  -86  538  -86  577  -90
39188  514  620  -90  660  -90  723  -90  785  -86  842  -78  906  -83  973  -97
39188  515 1038 -112 1101 -123 1184 -135 1305 -151 1420 -162 1544 -174 1670 -183
39188  516 1768 -189 1914 -199 2068 -210 2208 -219 2354 -230 2473 -237 2601 -247
```

This format can be deciphered as follows:

Initial Line:	FORTRAN Format
Locality Code	A2
Profile Number	I3
Survey Number	I4
Line Number (always 1)	A1
Date (YRMODA)	I6
Time	I5
Number of Survey Points	I3
Minimum Elevation Reached	I5
Information Label	A11
First 4 Distance-Elevation Pairs	8I5

Continuation Lines:	
Locality Code	A2
Profile Number	I3
Survey Number	I4
Line Number (2-9,A-Z,a-z, misc characters)	A1
Seven Distance-Elevation Pairs	14I5

One of the most useful abilities of ISRP is to create screen plots and quality plotter plots. Data can be plotted at any time during program execution and compared to previous surveys as often as needed. The user may use ISRP's default plot specifications or specify new ones. By changing the axes limits, it is possible to zoom in on any part of the plot.

ISRP's power in processing survey data comes from its ability to change or modify all the parameters pertinent to the profile-survey being processed. This is done through the data modification options which allows the data to be corrected, changed, deleted, or added. Groups of adjacent points can be modified. Points may be specified by point index or by distance offshore. Any coordinate Y, Z, (X) may be changed, or points may be dropped. Coordinates may also be switched (useful if distances and elevations were entered in the wrong order). Points may be adjusted by addition or multiplication of specific coordinates by a constant. A multiplication correction is useful if one coordinate is measured in different units than the other ones or to move a decimal place. It is also possible to add a graduated depth correction based on the Y distance, useful for correcting data collected with an out-of-level

instrument. The user must enter the change in elevation DZ, and in distance DY, and the Y distance at which the correction equalled 0 (usually the location of the instrument).

The volumetric option computes the volume and shoreline changes between the data in program control with the first data set stored in memory. The comparison is made only for distances common to both surveys. The output includes the limits of this region, the change in shoreline position, and a table of cut and fill quantities.

The volumetric output table lists data limits, average thickness, and volume of each accretion and erosion cell. The computations are based on a linear digitization of the actual data into 400 increments. A variable-width interval is used in order to give greater detail to the landward end of the profile. Cut and fill volumes are computed based on vertical slices. This is useful for offshore data but can be very misleading for above zero elevation or datum. Total volume changes above and below a reference plane are also computed. The default reference plane is zero elevation, however, the user has the option to change the reference plane, e.g. +5.0, -10.0. The above volume change, based on the common landward bound and the horizontal datum, is a probably a better measure of the beach change. Extrapolation to the datum intercept can also be computed. At the users option, the elevation and change in elevation can be computed at specified distances. This can be useful in computing vertical changes. An example profile change table is shown below:

Analysis of Profile Changes between

Profile 188, Survey 51(811110) and Profile 188, Survey 54(811116)
Starting Distance = 183.00 FT, Ending Distance = 2791.00 FT

Cut/ Fill Cell	Distance to end FT	Elevation of end pt FT	Cell Volume YD3/FT	Cell Thickness FT	Profile Cum.Vol. YD3/FT	Profile Gross Vol. YD3/FT
1	356.99	-.93	-16.20	-2.76	-16.20	16.20
2	571.81	-8.95	14.57	1.83	-1.63	30.78
3	1034.27	-11.11	-44.48	-2.60	-46.12	75.26
4	2376.67	-23.13	41.99	.84	-4.13	117.25
END	2791.00	-25.95	.03	.02	-5.86	119.04

Volume Change: Above Datum= -15.20 YD3/FT, Below Datum= 9.34 YD3/FT
The Shoreline changed -40.67 FT, from 347.17 FT to 306.50 FT

AVAILABILITY: ISRP-PC maybe obtained from Mr. Michael W. Leffler at (919) 261-3511 (FAX 919 261-4432) of the US Army Engineer Waterways Experiment Station Field Research Facility, 261 Duck Road, Kitty Hawk, NC 27949-9440. For additional guidance in applying ISRP-PC to monitoring completed coastal projects, please contact Mr. Mark Hansen at (601) 634-3007.

REFERENCES: Birkemeier, W. 1984. "A User's Guide to ISRP: The Interactive Survey Reduction Program," Technical Report CERC-84-1, US Army Engineer Waterways Experiment Station Coastal Engineering Research Center, Vicksburg, MS.