

*Laser-Scan Ltd.*

*Software Product Specification*

*DTMPREPARE package*

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Science Park, Milton Road, Cambridge, England CB4 4FY tel: (0223) 420414

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## DESCRIPTION

DTMPREPARE is an advanced data preparation package for vector data which is to be used for DTM generation. It is recommended for use with the Laser-Scan "DTMCREATE" DTM creation package.

The DTMPREPARE package is one of 3 Laser-Scan DTM production and manipulation packages:

- o DTMPREPARE - prepares IFF format vector data for DTM construction using package DTMCREATE
- o DTMCREATE - the DTM creation package
- o TVES - **T**errain **V**isualisation and **E**xploitation **S**oftware

All three packages are supplied with a background package "MATRIX". Package MATRIX contains Laser-Scan DTI (**D**igital **T**errain **I**mage) format DTM management programs, a basic DTM viewing program and a DTI manipulation subroutine library for applications programmers. (See separate SPS for MATRIX package)

## DTMPREPARE - input/output

Data input to the DTMPREPARE package is from Laser-Scan IFF (**I**nternal **F**eature **F**ormat) vector files. Input vector data may consist of contour strings and/or spot heights, and two dimensional river and ridgeline strings. Modules within DTMPREPARE enable the user to select automatic contour data validation options, and options to derive three dimensional river and ridgeline strings from two dimensional input by reference to relevant contours. Data output is in IFF format.

## FACILITIES

DTMPREPARE offers the following features:

- o use of standard DEC VAX
- o use of junction structured (link-node) data to form network links and improve processing performance
- o options to produce LITES2 command files to enable automated assistance in IFF editing
- o diagnostic printout facility.

## HARDWARE PREREQUISITES

The following computer hardware requirements are needed to run DTMPREPARE.

- o Any DEC VAX, MicroVAX or VAXstation computer supported by the current version of VAX/VMS.
- o At least 10MB of available disc space for software, plus sufficient for data files.

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- o At least a 4096 page working set per process, and a virtual page count of 30000 pages is needed for efficient operation of the larger utilities.
- o Any DEC-compatible alphanumeric terminal.

### SOFTWARE PREREQUISITES

DTMPREPARE modules run under VAX VMS Version 5.4-3 (or later version, assuming continued upward compatibility by DEC), concurrently with other interactive and batch processes.

A minimum working set of 4000 pages is recommended.

Laser-Scan's IFF Map Processing package (IMP) is essential. Laser-Scan STRUCTURE package is a prerequisite for the module I3D. Laser-Scan's LITES2 interactive digitising and editing software is recommended for digitising and editing vector input data. LASERTRAK automated digitising is recommended for large numbers of input documents.

### GROWTH CONSIDERATIONS

The minimum hardware and software requirements for any future version of this product may be different from the minimum hardware requirements for the current version.

### SUPPORT LEVEL

DTMPREPARE is a fully supported Laser-Scan standard software product.

### COMPONENT MODULES

DTMPREPARE consists of the following component modules:

## MODULE I3D

The module I3D is a 3D string generator. Its purpose is to generate heightened river or ridgeline 3D strings by overlaying unheighted strings with contour data.

The 3D strings output by I3D may be input to the Laser-Scan DTMCREATE package as rivers, ridgelines or 3D breaklines to control valley floors, hill tops and complex geomorphic areas disturbed by mining or other human activity.

The module must be used in conjunction with the STRUCTURE package module ILINK, and the LITES2 interactive cartographic editor.

ILINK is used to ensure that the unheighted river and ridgeline data has exact junctions suitable for link-node structuring within I3D. In the case of river strings, the link-node data structure is used to derive network relationships to enable accurate heighting of river confluences and to ensure consistent down hill flow.

The LITES2 cartographic editor is used to generate supplementary heightened features for areas of the map where the contour information alone provides insufficient control. I3D produces a LITES2 guidance file that will allow the creation of supplementary features to be automatically driven.

I3D offers the following features:

- o produces three dimensional strings from two dimensional river or ridgeline strings by overlaying with source contours and/or spot heights.
- o accepts Laser-Scan's IFF (Internal Feature Format) data as input from disk.
- o outputs modified data to IFF disk file as 3 dimensional strings.
- o enables the user to apply IFF layer and feature code selection criteria to the incoming strings to identify each as a river, ridgeline or contour feature.
- o creates an internal representation of a river network allowing river confluences to be efficiently identified, and checks for consistent down-hill flow of rivers to be performed.
- o user control over the mode of operation and heighting parameters.
- o options to output LITES2 command files to enable automated assistance in IFF editing.
- o diagnostic printout facility.

## **MODULE ITCHECK**

The module ITCHECK detects and tabulates errors in IFF vector data. It is used to validate a height value associated with a map feature, and to check for errors in the form of a feature.

Typically, the data input for checking will consist of heightened contours and spot heights, and map features such as rivers and ridge lines. These features are used in the generation of a DTM by modules in the package DTMCREATE.

Errors in height or form may arise from data capture or data editing operations. Validating the map data using ITCHECK is an important aid to controlling the quality and accuracy of the output DTM, and in a production situation may avoid expensive and time-consuming problems resulting from the input into the terrain modelling process of incorrectly heightened or malformed data.

Features found in error are reported in a text file and may be optionally copied to a separate IFF file for subsequent plotting or interrogation. Optionally also a LITES2 guidance file may be produced to assist correction or investigation of the features that have been detected in error.

The checks performed by ITCHECK are grouped into six categories. A single category or a number of categories of checks, may be selected at run time. The following checks are performed in each category:

### **Category 1 Height checks**

Supplementary contour heights are divisible by the supplementary contour interval.

Contour heights are divisible by the contour interval.

Index contour heights are divisible by the index contour interval.

All heights lie within a specified range.

Contour values between lower and upper range limits are present.

Index contour values between lower and upper range limits are present.

Coastline features have zero height.

### **Category 2 Link checks**

Features lie within a rectangular map border as defined by the control point (CP) entry or via the BORDER command.

Loop features are correctly closed.

Connecting line features have the same height.

Line features such as contours are connected to two other items.

### **Category 3 Intersection checks**

River features do not cross line features more than once.

Line features do not cross other line features.

**Category 4** Profile height checks

The heights of neighbouring features are consistent with the contour interval.

**Category 5** Loop, duplicate points and spot height single coordinate checks.

Spot heights have a valid CB (one coordinate in CB entry).

Line feature ends do not cross.

Line features do not contain internal loops.

Line features do not have duplicate points.

**Category 6** Validity of spot heights checks

Spot heights are consistent with neighbouring contours.

The user may select which group of features are input into the checks. For example, checking may be restricted to just index contours. Feature codes are used to define which features belong to a given group.

All parameters controlling the check operations may be defined by the user at run time.