

Laser-Scan Ltd.

DTMPREPARE - Acceptance Tests

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"DTMPREPARE Acceptance"

Category: Acceptance Tests

Issue 1.0	D R Catlow	23-Jul-1987
Issue 1.1	T A Adams	07-Aug-1987
Issue 2.0	A L Bennetton	24-Mar-1988
Issue 3.0	A L Bennetton	26-May-1988
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## 1 INTRODUCTION

This document describes the acceptance test procedure for the Laser-Scan Package DTMPREPARE which is part of the Laser-Scan LAMPS automated mapping system. It assumes that the user is familiar with the LITES2 map editor, and with the VMS operating system. See the "DTMPREPARE Reference Manual" for further information on DTMPREPARE.

The relevant data files and command files for the acceptance tests are supplied by Laser-Scan on installation of the package.

Note that Laser-Scan reserves the right to make minor modifications to this acceptance procedure to match their policy of continued software development.

DTMPREPARE is a package of routines which prepares vector data for use by the DTM generation utilities.

## 2 PREPARING FOR THE ACCEPTANCE TESTS

Check that the Laser-Scan-supplied package initialisation command file LSL\$COM:DTMPREPAREINI.COM has been invoked. This has probably been done automatically on your behalf at login time. A good check is to use the DCL command:

```
$ SHOW SYMBOL I3D
```

to verify that the DCL symbol I3D exists and points to the program image file "LSL\$EXE:I3D.EXE". If symbol I3D is not defined then invoke the package initialisation command file by giving the DCL command:

```
$ @LSL$COM:DTMPREPAREINI
```

then repeat the check for the existence of DCL symbol I3D.

Use the DCL SHOW LOGICAL command to ensure that logical name LSL\$IF points to a suitable working directory to receive the acceptance test IFF files. If not, then use the SI utility to set LSL\$IF appropriately.

The acceptance test command procedure will check for the existence of the required acceptance test data files in their usual directory on the Laser-Scan software distribution directory tree. It will set up a logical name LSL\$DTMPREPARE\_ACCEPT to point to this directory.

## 3 Invoking the Acceptance Tests

Invoke the acceptance test command procedure by giving the DCL command

```
$ @LSL$COM:DTMPREPARE_ACCEPT
```

The acceptance tests for DTMPREPARE are in two parts. The first is for module ITCHECK, the terrain checker, the second is for I3D, the river/ridge heighting utility.

The acceptance command procedure then explains briefly the various phases of the ITCHECK acceptance procedure. Before starting processing, it offers you the option of using the LITES2 map editor to inspect the initial data. It then runs the ITCHECK utility six times to carry out the various classes of error checking provided with the vector checking module. After each ITCHECK run the tabulated error file and LITES2 command file can be optionally printed. After all the ITCHECK runs are complete it offers you the option of using the LITES2 map editor to inspect the errors detected in each run.

The second part of the acceptance gives you the option of using the LITES2 map editor to inspect the initial unheighted river/ridgeline data. A first pass through I3D is then run with processing mode "INTERSECT". After this first pass you are given the option of examining the river/ridgeline data which is now heighted at each terrain intersection. A second pass through I3D is then run with processing mode "FLOW". This will detect a number of nodes in the river/ridgeline network for which a height is required which cannot be estimated automatically. A height must be edited into the partially heighted data at each node indicated, using LITES2 together with the LITES2 command file produced by I3D. The output from such an interactive heighting session, which is required by the third pass through I3D, has been saved. I3D is then run in INTERPOLATE mode, but before this you are given the option of using LITES2 to perform this height editing yourself. Finally the acceptance command procedure offers you the option of using the LITES2 map editor to examine the height control generated for the river and ridgeline features.

#### 4 The Acceptance Sequence: PART 1 - ITCHECK

For the purpose of acceptance, a data file containing contour and spot height data will be supplied. A number of errors in the height coding of the data, and in the geometry of the data have been introduced into the file. The errors are of the kind which may commonly occur during the data capture process (eg. crossing contour lines, incorrect heighting of a spot height and missing contour in a sequence of contours).

The acceptance procedure first runs ITCHECK six times with the detected errors being stored in tabulated error file and a LITES2 command file. Between runs the option to print out these files is offered. The six sets of tests will be carried out in the following sequence.

**CHECK 1** tests that:

1. All supplementary contour heights are divisible by the supplementary contour interval.
2. All contour heights are divisible by the contour interval.
3. All index contour heights are divisible by the index contour interval.
4. All contour heights lie within a specified height range.
5. All index contour heights lie within a specified height range.
6. Coastline items have zero height.

**CHECK 2** tests that:

1. No items cross or lie outside the rectangular map border as defined by the corner point (CP) entry.
2. Correct contour, lake and island closure if loop lines.
3. Unconnected contour line items.
4. Linking contour lines with height mismatch.
5. Contour lines linking to more than two other feature.

**CHECK 3** tests:

1. For touching or crossing contour lines.
2. For river lines crossing contour lines more than once.

**CHECK 4** tests:

1. The validity of the heights of neighbouring features. (This involves carrying out profiles across the map at a fixed eastings interval).

**CHECK 5** tests:

1. Start and end vectors of contour loops do not cross.
2. Contour lines do not contain internal loops.
3. Contour lines do not contain duplicate points.
4. Spot heights are defined by a single coordinate.

**CHECK 6** tests:

1. Spot height and neighbouring contour height values are valid.

The acceptance procedure will supply appropriate contour interval and tolerance values for each set of checks. The tabulated error files will be created on the current directory and will have the following filename specification:-

DTMPREPARE\_ACCEPTn.LIS (where n is check number eg 1 - 6)

The LITES2 command files will be created on the directory defined by the logical LSL\$LITES2CMD and will have the following filename specification:-

DTMPREPARE\_ACCEPTn.LCM (where n is check number eg 1 - 6)

After all the ITCHECK runs have been completed you are given the option to inspect the errors detected for each of ITCHECK runs using LITES2. The acceptance command procedure will automatically run LITES2 with the LITES2

command files generated from within the ITCHECK run.

At each error the LITES2 command file will position the cursor on the feature in error with message to the text screen or window. At this point control is passed to you. After examination of detected error you may continue the LITES2 command file by issuing the CONTINUE command.

The following sequence of LITES2 sessions are used in the acceptance of ITCHECK module.

1. CHECK 1 - contours in range, divisible by contour int. etc.

Pass [ ]/Fail [ ]

2. CHECK 2 - items within boundary, etc.

Pass [ ]/Fail [ ]

3. CHECK 3 - touching or crossing features.

Pass [ ]/Fail [ ]

4. CHECK 4 - validity of heights of neighbouring items.

Pass [ ]/Fail [ ]

5. CHECK 5 - loops, duplicate points etc.

Pass [ ]/Fail [ ]

6. CHECK 6 - spot heights and neighbouring contour heights.

Pass [ ]/Fail [ ]

## 5 The Acceptance Sequence: PART 2 - I3D

For the purpose of acceptance two files containing river and ridgeline data and one file containing terrain data will be supplied. The first river/ridgeline file does not contain any height data. This file will be used in the first pass through I3D with mode INTERSECT enabled. The second river/ridgeline file will contain data heighted at the nodes which will be identified by I3D during the second pass through I3D with FLOW mode enabled, as requiring heighting by the user. This file will be used in the third and final pass through I3D with mode INTERPOLATE enabled.

Note: the second river/ridgeline file would normally be created after an interactive session using LITES2 map editor to height the nodes indicated. The heighting of all these nodes during the acceptance test would be a time consuming task since considerable care must be taken to supply node height values which will enable I3D to determine the correct river flow.

You will be asked if you want to examine the original IFF file in LITES2.

**CHECK 1** tests that:

- o LITES2 can be optionally invoked to examine the first river/ridgeline input data to the acceptance test. Note that the river and ridge features have no height attribute (use EXAMINE ATTRIBUTE on selected river or ridgeline features). Also confirm that all the contours have a height attribute (type VERIFY AC). To proceed to the next check, exit from LITES2 by entering **QUIT**.

**Pass [ ]/Fail [ ]****CHECK 2** tests that:

- o The first pass through I3D will be invoked with enable mode INTERSECT selected. A touch tolerance is declared which determines when rivers or ridgelines which almost touch terrain features will be considered as actually touching. This creates a new output IFF file. In this test rivers (FC 2) and ridges (FC 9) are of particular interest. Expect a 'normal successful completion' message.

**Pass [ ]/Fail [ ]****CHECK 3** tests that:

- o LITES2 can now be optionally invoked to check that nodes on rivers and ridges intersecting with contours are heighted ( use EXAMINE ATTRIBUTE on selected river or ridgeline features). Enter **QUIT** to proceed with next check.

**Pass [ ]/Fail [ ]****CHECK 4** tests that:

- o The second pass through I3D will be invoked with enable mode FLOW selected. A maximum height interval and clip tolerance is declared which determines the output IFF file. This run finds a number of nodes in the river and ridgeline network which require interactive heighting ; storing them in a LITES2 command file - error messages identifying the 'number of unheighted free ends' and 'undirected river terminal links' are displayed. The LITES2 command file created will visit all nodes for which a required height cannot be estimated automatically. Also expect a warning stating 'data error was detected' and a 'normal successful completion' message. A checkplot IFF file containing flow symbols will also be created.

**Pass [ ]/Fail [ ]****CHECK 5** tests:

- o After the second I3D run you will be given the option to use LITES2 to height a few of these nodes, using the LITES2 command file generated by I3D. The checkplot IFF file is displayed - arrow and box symbols - showing a provisional direction of flow. On entering LITES2 the cursor

immediately visits an unheighted node and the operator should zoom in to obtain a satisfactory display. On entering **CONTINUE** the operator is prompted for a height value for the node in question - every contour has a height label to help in this process. The command file proceeds to the second unheighted node - maintaining the zoom factor - to continue with the interactive process. To abort the LITES2 command file enter **CTRL-C** followed by <return> and to exit LITES2 enter **QUIT**. A file already exists with the correct node heights which will be used in the subsequent checks.

Pass [ ]/Fail [ ]

**CHECK 6** tests that:

- o The third pass through I3D will be invoked with enable mode INTERPOLATE selected. Diagnostics will be enabled to show progress through the various stages of the heighting procedure. The run will generate a river/ridgeline IFF file with 3D strings containing heighted data. A new checkplot IFF file containing flow symbols will also be created to indicate the final flow determined. Expect a warning message confirming that 'flow determined in river network is not unique' and 'normal successful completion' message.

Pass [ ]/Fail [ ]

**CHECK 7** tests:

- o After the third I3D run you will be given the option to use LITES2 to examine the results of the heighting process. The checkplot file will be overlayed to give a graphical representation of the derived flow. Note that all river features with FC = 2 and ridgeline features with FC = 9 will be heighted at every point (use LITES2 commands NEXT and EXAMINE ATTRIBUTE). Other river or ridgeline features having a different FC will not be heighted since they were not defined in the group definition table that was loaded using the LOOKUP command in the I3D run. To exit out of LITES2 enter **QUIT**.

Pass [ ]/Fail [ ]

6 Conclusion

This completes the acceptance tests for the Laser-Scan DTMPREPARE software package.

Overall Pass [ ]/Fail [ ]

Comments:

Customer Representative:

Date:

Laser-Scan Representative:

Date: