Laser-Scan Ltd.

DFAD

Acceptance Tests

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1 **INTRODUCTION**

This document describes the acceptance test procedure for the Laser-Scan Package DFAD.

DFAD is a package containing a number of modules that have been designed specifically to handle DLMS Digital Feature Analysis Data. Utilities are provided to create, examine and validate DFAD data held within a Laser Scan Internal Feature Format (IFF) file, along with utilities to read and write a DLMS DFAD format magnetic tape. In addition modules are provided to create and modify a Feature Analysis Data Table (FADT); to merge a FADT with DFAD coordinate information, and to access an on-line DLMS Rules File.

The DFAD package includes the modules DFAD2I, DFADVAL, FADTINPUT, FADTMERGE, I2DFAD and MCEHED.

Data input to the DFAD package is from IFF file, FADT file and DFAD format magnetic tape. In addition the package modules FADTINPUT and DFADVAL utilise a DLMS Rules File. Output from the package modules is to IFF file, FADT file and DFAD format magnetic tape.

2 **OVERVIEW**

For the purpose of acceptance, an IFF file containing DFAD feature coordinate data but no DFAD attribute information is provided. This acceptance file has an unset MCE Map Header, and a layer 0 containing no DFAD accuracy regions. Feature attribute data will be merged with the coordinate data, and map header and accuracy region data will be entered, as part of the acceptance procedure. Opportunities are provided in the acceptance test to examine the premerged and merged IFF files using the IMP module IPATCH.

In addition to this IFF file, a second file containing merged and validated DFAD data is provided. This file is used with the other IFF file for acceptance of the module I2DFAD.

A partially completed FADT file is provided. The header and accuracy region records have already been entered, along with all but 3 feature attribute records. The remaining attribute records will be entered interactively during package acceptance.

A DLMS Rules File is provided. This will be used to validate DFAD analysis data as part of the acceptance of the modules FADTINPUT and DFADVAL.

In order to carry out acceptance for the tape conversion modules I2DFAD and DFAD2I, a scratch magnetic tape is required, and should be loaded on a tape drive. The acceptance procedure will inquire the name of the tape drive.

Acceptance will be performed using a supplied DCL command procedure to invoke the DFAD modules, and issue module commands. For acceptance of the modules FADTINPUT and MCEHED, and in order to examine the acceptance IFF file using IPATCH, it is necessary for commands to be typed at the terminal. The commands that should be entered are detailed in this document.

The acceptance procedure is invoked by typing **@LSL$COM:DFAD_ACCEPT**

3 DESCRIPTION OF ACCEPTANCE PROCEDURE

The acceptance procedure first demonstrates the module FADTINPUT. FADTINPUT is used to create, edit and list a FADT file. This file contains manuscript header records, accuracy region records, and feature attribute (analysis) records. The data from the FADT is transferred to an IFF file, and attached to DFAD features, using the module FADTMERGE.

A partially completed FADT will be used for acceptance. The header and accuracy records have been entered, and will be examined and listed as part of acceptance. All but 3 feature attribute records have also been entered. These records will be entered interactively during acceptance of the module.

FADTINPUT will be invoked by the command procedure, and a new version of the DFAD package acceptance FADT will be created.

The first form to be displayed on the screen is the 'FADTINPUT Record Type Option'. To examine the completed header record, enter **4<CR>**. The contents of the FADT header page will be displayed on the screen. Use **<CR>** to return to the 'Record Type Option' form. To view the completed DSI Record, enter **2<CR>**. Following the display of the DSI data use **<CR>** to return the 'Record Type Option' form.

To view the accuracy records, enter **1<CR>**. The form that appears first shows the contents of the ACC header record. Note that 2 accuracy regions are defined for this manuscript. To view the attributes and coordinates of the first accuracy region type **<CR>**. Use **<CR>** again to view the second accuracy region data, and then **<CR>** to return to the 'Record Type Option' form.

Pass [ ]/Fail [ ]

The next part of acceptance for FADTINPUT involves the input of analysis data for 3 DFAD features. Select the option to input FADT feature records by pressing **<CR>**. An empty FADT record will be displayed on the screen, and the cursor will be positioned on the FAC field.

Analysis data for DFAD feature 6008 will be entered first. To do this, type **6008** and press **<TAB>** (on the lefthand part of the keyboard). Note that since this record does not already exist in the file, the remaining analysis fields (with the exception of the defaulted 'security' and 'releasability' fields) remain blank.

The cursor will now be positioned in the 'type' field. A DFAD feature may be of type 0 (point), type 1 (line) or type 2 (area). To check that FADTINPUT correctly validates any entered values against the DLMS format specification, enter an invalid number eg. **4** followed by **<TAB>**. The message **'Type does not obey DLMS Specification'** will be displayed. Use the delete key to cancel this value, and enter a correct value for a point feature by typing **0** followed by **<TAB>**.

The cursor will now be positioned in the 'FID' field. The correct FID for this DFAD point feature is 902. Enter this by typing **902** and press the **<TAB>** key. The cursor will now be positioned in the 'height' field. Enter a value of 20 by

typing **20** followed by **<TAB>**. The 'security' has already been given a default value of 0. To accept this value press the **<TAB>** key. This operation should be repeated for the 'releasability' field.

The cursor will now be positioned in the 'SMC' field. To enter the correct value of 3 type **3** followed by **<TAB>**. Use the same operation to enter values of 10, 20 and 50 for the 'ori', 'width' and 'length' fields respectively. Note that when **<TAB>** key is pressed after entering the 'length' field, the message **'No next field on form'** is displayed to indicate that there are no more fields on this form.

To move the cursor to a previous field use the **<BS>** (backspace) key. Using this key and the **<TAB>** key it is possible to move between fields on the form. This mechanism allows fields that have been incorrectly entered to be modified.

To enter the analysis record for this feature into the FADT use **<CR>**. The message **Validating the entire record** will be displayed briefly indicating that FADTINPUT is checking the analysis records against the DFAD acceptance Rules File. This operation involves the validation of all the analysis data in combination. Any validation failures are reported, and the cursor will be automatically positioned over a field in error, allowing the user to edit a field value. If validation is successful, the record will be written to the FADT, and a blank feature record form will be displayed.

Use the operations detailed above to enter analysis data for DFAD point features 6009 and 6010. The required field values for these features are:

FAC 6009 type 0 FID 420 height 8 security 0 releasability 0 SMC 3 ori 14 width 4 length 20
FAC 6010 type 0 FID 420 height 8 security 0 releasability 0 SMC 3 ori 63 width 20 length 20

Pass [ ]/Fail [ ]

When these records have been successfully entered into the FADT, it is possible to examine them, and modify them if required. The cursor should now be positioned in a 'FAC' field of a blank record form. In order to examine the analysis data associated with DFAD feature 6008, enter **6008** followed by **<TAB>**. The contents of this record will now be displayed on the form. Movement between the form fields is now possible using the **<TAB>** and **<BS>** keys. To exit from this record use **<CR>**. Note that the entire record will again be validated before writing back to the FADT.

To return to the 'Record Options Form' use **<CR>**, and select option 5 on the form by typing **5<CR>** in order to exit from FADTINPUT. The contents of the FADT will now be saved, and used in the remaining stages of the acceptance procedure.

Pass [ ]/Fail [ ]

It is possible to list the contents of a FADT file using FADTINPUT. Answer yes to the question 'List the contents of the FADT file on the line-printer ?', in order to produce a listing of the DFAD acceptance FADT. This should be checked to verify that the analysis codes for features 6008, 6009 and 6010 have been correctly entered.

Pass [ ]/Fail [ ]

The module FADTMERGE is used to transfer FADT records to an IFF file. The header, DSI and accuracy header data is transferred to the relevant fields in a MCE Map Header. The accuracy region data from the FADT is used to form a series of accuracy regions in layer 0 of the IFF file. The feature records in the FADT, which contain the feature analysis data are merged with the DFAD feature coordinates (geometry) in the IFF file. Merging is performed on the basis of FAC value in the FADT, and Feature Serial Number (FSN) in the IFF file.

Prior to merging an opportunity is offered to examine the unmerged IFF file using IPATCH. This is the IFF file that is input into FADTMERGE. If this option is selected, the following sequence of commands should be typed at the terminal, once the IPATCH> prompt is displayed.

Type **MH<CR>** to position on the Map Header, and then enter **TYPE<CR>** to list the contents of the entry on the terminal. Note that with the exception of the Map Header type, and Map Header length fields at the beginning of the record, all the remaining fields are unset.

Type **NO<CR>** to position on the start of the first layer in the file. This will be layer 0. If you now move to the next entry in the file by typing **NEXT<CR>**, you will find you are now positioned on the end of the layer (EO entry). This is because the layer is empty and currently contains no DFAD accuracy regions.

Type **NO<CR>** to position on the start of the next layer. This is layer 1 which holds DFAD area features. Type **NEXT<CR>** and you will be positioned on the start of the first feature. Repeat this command 3 times and you will be positioned in turn on the FS, ST and EF entries for this feature. Note that there is no AC entry - this will be generated by FADTMERGE and will hold the feature analysis data. Note also that the feature code is 102 which is used globally to identify a DFAD point feature. A feature code that is specific to the type of area feature will be generated by FADTMERGE.

The **NEXT<CR>** may be repeated a number of times to examine a number of other features in the file. Type **EXIT<CR>** to exit from IPATCH.

Pass [ ]/Fail [ ]

FADTMERGE is now invoked to transfer FADT records to the IFF file. The /ACCURACY /HEADER and /MERGE qualifiers are used to transfer all FADT records to the IFF file. The /FC qualifier is used so that features in the output IFF file will be given a feature code that is related to both the type of feature, and the feature identifier. The input FADT is the FADT modified during FADTINPUT acceptance. Note that if the 3 records originally missing from the file have not been entered, a mismatch for FSNs 6008, 6009 and 6010 will be reported by FADTMERGE, and these features will not be copied to the output file.

Pass [ ]/Fail [ ]

An opportunity is now offered to examine the merged IFF file using IPATCH. This is the file generated by the module FADTMERGE. If this option is selected, the following sequence of commands should be typed at the terminal, once the file IPATCH> prompt is displayed.

Type **MH<CR>** to position on the Map Header, and then enter **TYPE<CR>** to list the contents of the entry on the terminal. Note that a large number of fields in the Map Header are now set. The field values may be examined more meaningfully during package acceptance for the DFAD module MCEHED.

Type **NO<CR>** to position on the start of the first layer in the file. This will be layer 0. If you now move to the next entry in the file by typing **NEXT<CR>**, you will find you are positioned on the start of the first accuracy region.

If the **NEXT<CR>** command is given you will be positioned on the FS. The feature code for a DFAD accuracy region is 301. If **NEXT<CR>** is typed again you will be positioned on an AC entry. The type is 8 indicating an ACC accuracy ancillary code, and the text field will hold the absolute and relative horizontal accuracy values. If a listing of the FADT was produced as part of FADTINPUT acceptance, these values should be compared with the FADT record values for accuracy region 1. If **NEXT<CR>** is typed again you will be positioned on the feature's ST entry. If you enter **TYPE<CR>** the coordinates of the accuracy region will be displayed. The coordinates have been translated from their latitude and longitude DDDMMSS.SH representation in the FADT, to latitude and longitude in .1 seconds of arc relative to the origin of the manuscript. If **NEXT<CR>** is now given you will be positioned on the end of the first accuracy region.

Using **NEXT<CR>** repeatedly as detailed above will allow the second accuracy region to be similarly examined. Repeat the command until the end of layer 0 (an EO entry) is encountered.

Type **NO<CR>** to positioned on the next layer in the IFF file, and then use **NEXT<CR>** repeatedly to examine a number of the DFAD features present in the layer. When positioned on a FS entry note that a feature now has a feature code that is a combination of the feature type and feature identifier. The formula used to generate the feature code is:

FC = FID + ((type+1) * 1000)

Note that all features now have an AC entry of type 7, and that the analysis data has been transferred from the FADT feature records to the text field of this AC. Compare the listing of the FADT produced during FADTINPUT acceptance with the AC records. If data for DFAD features 6008, 6009 and 6010 was entered during FADTINPUT acceptance, these features may be specifically examined. For example to examine feature 6008 type **NF 6008<CR>** followed by a series of **NEXT<CR>** commands. Type **EXIT<CR>** to exit from IPATCH.

Pass [ ]/Fail [ ]

The DFAD module MCEHED is used to interactively examine and edit fields in a MCE IFF Map Header. For acceptance, the file generated by FADTMERGE will be used. The majority of fields relevant to a DFAD manuscript, for example the coverage and overall accuracy of the manuscript, have been set by FADTMERGE from information contained in the FADT.

Once the prompt MCEHED> has been displayed, type **SHOW ALL<CR>** to examine all the fields in the Map Header. Specific groups of fields may be examined by giving the command SHOW followed by a group name. Type **SHOW COVERAGE<CR>** to examine just those fields relating to the manuscript origin and corners. If a listing of the FADT records has been produced as part of FADTINPUT acceptance, you should compare these values with the values in the FADT header record. Type **SHOW ACCURACY<CR>** to examine the overall accuracy of the manuscript, and compare with the manuscript accuracy values on the FADTINPUT listing.

Pass [ ]/Fail [ ]

MCEHED may also be used to edit a Map Header field. This is done by typing the name of the field, and supplying a new field value. The new value may be specified on the same line as the field name, or in response to a prompt on the terminal. For acceptance the manuscript compilation date will be set. First type **SHOW HISTORY<CR>** to examine the current compilation date (**CDTE**). In the acceptance file this is still unset. Type **CDTE 31 5 88 <CR>** and the compilation date will be set to 31-May-1988. Type just **CDTE<CR>** and you will be prompted for a date. Note that the data format DD-MMM-YY may also be used - type **30-Jun-88<CR>** and the compilation date will be set to 30-Jun-1988. The format of the date stored in the Map Header is the format required in the DLMS Specification.

To save the edit just performed on the IFF file, type **EXIT<CR>**.

Pass [ ]/Fail [ ]

The DFAD module DFADVAL is used to validate the MCE Map Header data, the geometry and attributes of DFAD accuracy regions, and the geometry and analysis attributes of DFAD point, line and area features. In a production flowline DFADVAL should be run on a DFAD IFF file before writing the data to a DFAD format magnetic tape. Errors detected by DFADVAL should be corrected, depending on the nature of the error, using FADTINPUT, MCEHED or the LITES2 cartographic editor.

Geometric checks such as whether area features are defined anticlockwise; feature coordinates fall within the manuscript bounds, and whether features have any crossing segments are performed. Checks on the FAC order of DFAD features, and gaps in the FAC sequence are made, as well as checks on whether the analysis values held in the AC 7 entry of a DFAD feature are all present, and are valid for the type of feature. If the /RULES qualifier is specified the analysis codes are also validated against entries in a DLMS Rules File.

For acceptance, all categories of checks will be performed by DFADVAL. If acceptance succeeds only messages relating to the number of the first feature in each layer, breaks in sequence numbering, and the total number of features in a layer should be reported on the terminal.

Pass [ ]/Fail [ ]

Acceptance for the two DFAD tape modules I2DFAD and DFAD2I is performed together, since DFAD2I is used to verify that the DFAD format tape has been correctly written by I2DFAD. In order to carry out acceptance, a magnetic tape should be loaded on a tape device. This should be a scratch tape as I2DFAD will overwrite any existing data on the tape. You will be asked to supply the tape device name as part of acceptance. Note that the tape should be loaded but not mounted.

I2DFAD is used to transfer DFAD data held in an IFF file to a DFAD format magnetic tape. The format of this tape is detailed in the DMA DLMS Specification. I2DFAD will be run twice in order to transfer data from 2 IFF files - the first of these files is the IFF file generated by FADTMERGE. In the first run, the tape is initialised, so that the data is written as the first manuscript. In the second run, the tape is rewound and the data is appended to the tape after the previous manuscript. Note that as part of this operation, DFAD2I performs checks to ensure that the second manuscript is correctly geographically positioned in relation to the first manuscript. Diagnostics will be enabled so that the progress of the IFF to DFAD data transfer may be

monitored.

Pass [ ]/Fail [ ]

An opportunity to confirm the structure of the DFAD tape using the DUMP utility, is offered as part of acceptance. If selected, a DUMP of the first 4 blocks of the tape will be output to the terminal. Block 1 is a manuscript header record of 27 bytes (6 36 bit words). Block 2 is a DataSet Identification (DSI) of 648 bytes length, and records in ASCII data extracted from the Map Header of the IFF file. Block 3 is an Accuracy (ACC) record of 2700 bytes length, and records in ASCII accuracy region data extracted from layer 0 of the IFF file. Block 4 is a feature record of length 2709 bytes (602 36 bit words) holding in binary format the DFAD feature geometry and analysis data.

Pass [ ]/Fail [ ]

DFAD2I is used to convert data from DFAD format magnetic tape to IFF file. DFAD2I will be run twice in order to transfer the two manuscripts on the tape. In the first run, the /MANUSCRIPT=1 qualifier is specified to select the first manuscript on the tape. In the second run, the tape is rewound, and the /LATITUDE and /LONGITUDE qualifiers are used to search for the second manuscript on the basis of manuscript origin. In both cases the /DIAGNOSTICS qualifier is specified so that the tape to disk conversion process may be monitored.

Pass [ ]/Fail [ ]

To confirm that the data has been correctly read from tape, the IMP utility IDIFFERENCE may be used to compare the files generated by DFAD2I with the original files. If file transfer has been correctly performed the only differences should be in the IFF History (HI) entry, and NS entry, and in the Map Header (MH) entry since not all header fields are stored on the DFAD format tape. There should be no differences reported in the IFF feature coordinates or analysis codes.

Pass [ ]/Fail [ ]

Overall Pass [ ]/Fail [ ]

Comments:

Customer Representative: **Date:**

Laser-Scan Representative: **Date:**