Laser-Scan Ltd.

CONVERT PACKAGE

IFFDIGIT Reference

Issue 1.2 - 22-September-1992

CONTENTS

IFFDIGIT - Change Record

Version 1.0   S Townrow   16-December-1991

      Module I2DIGIT   - documentation for new utility I2DIGIT created.

Version 1.1   S Townrow   28-January-1992

      Module I2DIGIT   - documentation tidied and updated to include a new
                            qualifier, /RESOLUTION.

Version 1.2   S Townrow   22-September-1992

      Module I2DIGIT   - Nine   new   qualifers   /BORDER,   /OFFSET,
                        /SCALE_FACTOR, /SCALE_IFF, /SCALE_SHEET, /XMIN,
                        /XMAX, /YMIN and /YMAX have been documented.
                       - The above qualifiers are now available as commands
                        in the parameter file. This is described in the
                        DATA PREPARATION section under the documentation
                        for the parameter file.
                       - The IFF coordinates are now scaled using the
                        resolution defined by /RESOLUTION, combined with
                        the scale from the IFF Map Descriptor or from a
                        scale command. An new section has been added
                        which describes how the DIGIT coordinates are
                        calculated.
                       - Ten new messages have been added as a result of
                        the   modifications made. These are NOEXTENT,
                        BADBORDER, BADCP, BADEXTENT, BADSCALE, MDNOT2,
                        MINOFFSET, OUTOFRANGE, TWONUMS and UNSETMD.

PREFACE

Intended audience

> This manual is intended for users of a specific utility of the
> Laser-Scan CONVERT package running under the VAX/VMS operating system.
> Each manual contains the documentation for a particular CONVERT
> utility and a site will only receive new or updated documentation for
> those utilities which they have purchased.

Structure of this document

> This document is composed of 2 major sections.
>
> The Introduction is an overview of the CONVERT package and its
> purpose.
>
> There then follow the User Guides for the individual modules which
> comprise CONVERT. Each individual module contains the same basic
> categories of information. These are:

> MODULE   - the name of the CONVERT module.

> FORMAT DESCRIPTION   - a description of the data format written or
>   read by the utility programs in this conversion
>   module.

> DATA PREPARATION   - guidance on how to digitise or prepare the IFF
>   and other data required by the utility programs
>   in this module.

> For each utility program in the module, there will then be the
> following categories:

> UTILITY   - the name of the utility.

> FUNCTION   - a synopsis of what the utility does.

> FORMAT   - a summary of the utility command format
>   and command qualifiers. Default qualifier
>   settings are indicated.

> PROMPT   - how it prompts the user.

> PARAMETERS   - description of expected command parameters.

> COMMAND QUALIFIERS   - description of all command qualifiers.
>   Qualifiers are ordered alphabetically and
>   default argument values are indicated.

> RESTRICTIONS   - a summary of restrictions on the use of

                            qualifiers

        DESCRIPTION   - the definitive description of the utility
                                   action.

        COMMANDS   - for interactive utilities only, a description
                                   of all commands. Commands are ordered
                                   alphabetically and default argument values are
                                   indicated.

        EXAMPLES   - annotated examples of utility useage.

        MESSAGES   - all classes of message are listed and described
                                   and suggested user action given. The messages
                                   are divided into sections according to message
                                   severity within which the messages are ordered
                                   alphabetically by message mnemonic.

Conventions used in this document

        Convention   Meaning

        <CR>   The user should press the carriage control key
                                on the terminal

        <CTRL/x>   The phrase <CTRL/x> indicates that the user must
                                press the key labelled CTRL while simultaneously
                                pressing another key, for example, <CTRL/Z>.

        $ **IFF2SIF<CR>**   Command examples show all user entered commands
                                in **bold** type.

        $ **IFF2SIF<CR>**   Vertical series of periods, or ellipsis, mean
                    .   either that not all the data that CONVERT would
                    .   display in response to the particular command is
                    .   shown or that not all the data that the user
                                would enter is shown.

        file-spec...   Horizontal elipsis indicates that additional
                                parameters, values or information can be
                                entered.

        [logical-name]   Square brackets indicate that the enclosed item
                                is optional. (Square brackets are not, however,
                                optional in the syntax of a directory name in
                                a file-specification, or in the syntax of a
                                substring specification in a VMS assisnment
                                statement).

```
-------------------------------------------------------------------
Convention              Meaning
-------------------------------------------------------------------
'integer'               An integer number is expected in the specified
                        input or output field. (See "Command line data
                        types" below).

'real'                  A real number is expected in the specified input
                        or output field. (See "Command line data types"
                        below).

'file-spec'             A VMS file specification is expected in the
                        specified input or output field.

'device-name'           A VMS device specification (for instance, MTA0:)
                        is expected in the specified input or output
                        field.
-------------------------------------------------------------------
```

CHAPTER 1

DIGIT FORMAT DESCRIPTION

FORMAT DESCRIPTION

   ### The Scitex DIGIT Format

   This section describes the DIGIT format created by the I2DIGIT
   utility. An important fact to note is that the actual DIGIT format
   will be written to tape with adjacent bytes reversed. This is because
   the VAX is a 'little-endian' machine and Hewlett Packards are
   'big-endian' which means that their byte orders are opposite to each
   other. The format is described here as it would appear on the VAX for
   clarity and the actual DIGIT tape will contain a file that has the
   same structure but the values will look very different.

   A DIGIT file is divided into groups of 128 words called sectors.   As
   all coordinates are held in word format, this means the range of the
   map can only be 1 to 32767. This may clearly cause rounding problems
   when creating DIGIT files from IFF which uses a floating point
   representation for coordinates and so appropriate scaling values
   should be used to provide maximum resolution.

   Another important factor to know about DIGIT is that the coordinates
   are held as height followed by width which equates to (Y,X) and with
   the Y (height) coordinates inverted. (ie the origin is in the top
   left corner).

   The DIGIT format does not hold text information and is only geared
   towards lines and arcs. Point features can be represented in DIGIT as
   2 point line features with coincident end points.

   The tape based DIGIT format created by I2DIGIT is written in blocks of
   6144 words (12288 bytes) and each block therefore holds 48 sectors.
   The end of a block not used is padded out with zeros.

   The first sector is the File Header sector which contains information
   about the whole file. The file is divided into partitions which are
   collections of lines and may consist of any number of sectors.

   The file header record looks as follows:

310	12	1	1	9	0	0	0
16672	8224	8224	8224	8224	1	11	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0

```
          0         0         0         0         0         0         0         0
```

The first record (8 words) in the sector are:

   1) File type - which will always be 310 for DIGIT files.

   2) File size - which is the number of sectors in the file.

   3) Number of header sectors - the header sector can hold
       references to 15 partitions. Any additional partitions will
       overflow into another header sector. This will usually be 1.

   4) Number of partitions - this will be one for files created by
       I2DIGIT.

   5) Location of first directory - always 9 since it points to the
       9th word in the header sector where the first partition is
       described.

  6-8) unused and should contain zeros.

Records 2-16 contain a directory of all the partitions in the file.
The words in each of these records are defined as:

  1-5) Partition name - contains a 10 character name padded with
        blanks as necessary. The values are the decimal equivalent
        of adjacent pairs of ASCII characters.

    6) Partition start sector - the sector number where each
        partition starts.

    7) Partition size - the extent of each partition in sectors.

    8) Unused and should contain zeros.

Following the header sector is the partition data which may consists
of up to 32767 sectors.   The first two records (16 words) contain
information about the whole partition. Here is part of some partition
data showing the first 16 words and part of a feature.


```
       16672      8224      8224      8224      8224     32767     32767        30
           1         1     32767     32767         0         0         0         0
      -32738    -32726    -32766    -32737    -32727      4468     11600      4469
       11603      4471     11610      4472     11613      4473     11618      4474
       11625      4476     11633      4478     11639      4480     11645      4482
       11650      4484     11655      4488     11660      4490     11665      4493
       etc...
```

The partition header has words 1 to 16 defined thus:

  1-5) Partition name - same name as held in the directory in the
       file header

    6) Maximum Y value

    7) Maximum X value

    8) Resolution in points per millimetre

    9) Minimum Y value - taken from /OFFSET value

   10) Minimum X value - taken from /OFFSET value

   11) Maximum Y value

   12) Maximum X value

 13-16) Unused and should contain zeros.

After the partition header are the features denoted by line codes and
coordinates.   The negative values are the line codes and the positive
ones are the feature coordinates (in Y,X order).

The line codes are described below:

Code name	Value	Description
START LINE	-32738	None
FONT TYPE	-32736	Font Number (0-999)
LINE WIDTH	-32731	Font Width (1-99)
CURVE TYPE	-32737	Followed by: 1 - Linear 2 - Parabolic 3 - Cubic
TERMINATION	-32737	Followed by: 4 - Open/Straight Ends 9 - Open/Round Ends 5 - Closed
PRIORITY	-32737	Followed by: 6 - Low 7 - Normal 8 - High
COLOUR	No Code	Colour Number
END OF DATA	-32513	NONE

The START LINE code is compulsory and requires no parameters. When other codes require parameters they are followed by the codes representing the digits making the numbers. So, for example, a feature with a Font Type of 502 would have the codes -32736, -32724, -32729 and -32727 since -32736 is the code for the FONT TYPE and -32736, -32729 and -32727 are the codes for digits 5, 0 and 2 respectively. A list of codes representing digits 0 to 9 are given below.

Digit	0	-32729	Colour	1	-32766
Digit	1	-32728	Colour	2	-32765
Digit	2	-32727	Colour	3	-32764
Digit	3	-32726	Colour	4	-32763
Digit	4	-32725	Colour	5	-32762
Digit	5	-32724	Colour	6	-32761
Digit	6	-32723	Colour	7	-32760
Digit	7	-32722	Colour	8	-32759
Digit	8	-32721	Colour	9	-32758
Digit	9	-32720	Colour	10	-32757
			Colour	11	-32756
			Colour	12	-32755

Also shown are the single colour numbers that may be attributed to a feature. These do not follow a code but appear anywhere in the code description at the beginning of a line, but not between a code and its parameter.

Codes CURVE TYPE, TERMINATION and PRIORITY have the same code (-32737) with parameters 1 to 9 and these parameters appear in the file represented by there own codes. For example, a feature with high priority will have the code sequence -32737, -32721 since -32721 is the representation of digit 8 which is used to denote the 'high' option associated with PRIORITY.

Feature characteristics assigned to a feature remain in effect (ie for all following features) until other codes are found which change them. The only exception to this is the Closed parameter which should be present on each line it applies to.

Example DIGIT File

```
     310   1275      1      4      9      0      0      0
   16672   8224   8224   8224   8224      1    628      0
   16928   8224   8224   8224   8224    629     31      0
   17184   8224   8224   8224   8224    660    602      0
   17440   8224   8224   8224   8224   1262     13      0
       0      0      0      0      0      0      0      0
       0      0      0      0      0      0      0      0
       0      0      0      0      0      0      0      0
       0      0      0      0      0      0      0      0
       0      0      0      0      0      0      0      0
       0      0      0      0      0      0      0      0
       0      0      0      0      0      0      0      0
       0      0      0      0      0      0      0      0
       0      0      0      0      0      0      0      0
       0      0      0      0      0      0      0      0
       0      0      0      0      0      0      0      0
   19767  21057  21280   8224   8224  11225  13175     30
       1      1  11225  13175      0      0      0      0
  -32738 -32736 -32727 -32737 -32727   4468  11600   4469
   11603   4471  11610   4472  11613   4473  11618   4474
   11625   4476  11633   4478  11639   4480  11645   4482
   11650   4484  11655   4488  11660   4490  11665   4493
   11671   4495  11679   4497  11689   4499  11694   4501
   11703   4503  11709   4506  11719   4507  11725   4508
   11732   4510  11736   4511  11739   4514  11748   4516
   11757   4518  11764   4520  11770   4524  11779   4531
   11786   4535  11791   4538  11795   4538  11804   4537
   11811   4536  11815   4537  11822   4541  11826   4542
   11835   4542  11842   4544  11853   4545  11866   4546
   11873   4547  11880   4548  11887   4553  11893   4557
   11901   4559  11907   4560  11912   4562  11917   4564
   11926   4566  11932   4567  11937   4568  11944   4572
   11963   4572  11973   4573  11982 -32738   4563  12318
    4563  12315   4565  12313   4564  12310   4564  12307
    4563  12306   4565  12304   4568  12302   4571  12300
    4572  12299   4574  12298   4577  12299   4579  12301
    4582  12303   4584  12302   4585  12300   4585  12298
    4584  12293   4581  12291   4579  12289   4578  12287
    4577  12285   4575  12279   4574  12276   4572  12272
  -32738   4115  10363   4117  10360   4122  10355   4125
   10351   4130  10348   4134  10346   4138  10344   4142
   10342   4149  10338   4153  10336   4156  10333   4162
   10330   4166  10327   4170  10324   4173  10322   4178
   10319   4184  10318   4191  10315   4196  10313   4201
   10312   4205  10311   4211  10311   4214  10311   4218
   10311   4223  10311   4227  10310   4232  10310   4237
   10309   4243  10308   4247  10307   4251  10305   4255
   10304   4258  10304   4262  10305   4267  10306   4270
   10307   4272  10307   4273  10307 -32738 -32737 -32728
    4265  10144   4273  10151 -32738 -32737 -32727   3499
   10878   3499  10881   3498  10886   3497  10889   3497
   10891   3498  10893   3499  10896   3499  10899   3498
   10901   3498  10903 -32738   3711  11121   3712  11122
```

```
         3713 11118  3713 11116  3712 11113  3710 11111
        -32738  3830 11111  3832 11109  3835-32513     0
            0     0     0     0     0     0     0     0
            0     0     0     0     0     0     0     0
            0     0     0     0     0     0     0     0
            0     0     0     0     0     0     0     0
            0     0     0     0     0     0     0     0
            0     0     0     0     0     0     0     0
         etc
          .
          .
          .
            0     0     0     0     0     0     0     0
            0     0     0     0     0     0     0     0
            0     0     0     0     0     0     0     0
            0     0     0     0     0     0     0     0
            0     0     0     0     0     0     0     0
            0     0     0     0     0     0     0     0
```

CHAPTER 2

DIGIT DATA PREPARATION

DATA PREPARATION

Comparison of DIGIT and IFF

IFF is a feature orientated data format - data is separated into
features, and each feature represents one 'thing' on the map. An
integer feature code is used to say what type of thing it is that the
feature represents. A feature might thus be a contour, or a house, or
a river, depending on the type of map being digitised, and the way
that the data is to be used.

The DIGIT format shares this concept of a 'feature' but does not
identify features uniquely as there is not provision for feature
serial numbers. I2DIGIT will write the whole file into one partition
containing features which can have upto six characteristics. These
characteristics are defined in the FORMAT DESCRIPTION section.

Feature Translation

When converting from IFF to DIGIT, it is not possible to translate
fully some IFF graphical types. In fact the only features to be
translated exactly are linear features with GT 1 consisting simply of
a string of coordinates.

Arcs, circles and interpolated curves (GTs 2, 3, 4, 5, 6) have the
points output directly from the ST entry and do not have their points
created. The parameter file should be used to give these features the
appropriate flag. (ie cubic or parabolic).

All symbol features (GT 7,8 and 9) are output as lines of 2 pixels in
length so that the Scitex VTR operation will recognise them.

All text features (GT 10) are ignored.

Area fill features (GT 12) will not be automatically output with the
relevant closed flag present. This must be done explicitly via the
parameter file.

The I2DIGIT Parameter File

This file contains the information needed when translating IFF
features into DIGIT features by associating certain characteristics
with IFF feature codes. This is essential for the successful
conversion of IFF features into DIGIT ones. Optional commands
identical to certain command line qualifiers may also be put in the
table. The parameter file contains various commands and a table
section as described below :

Optional Parameter Commands

There are a number of commands which may be included in the parameter
file rather than on the command line as qualifiers. The command
should begin the line but not include the backslash ('/') and be
followed by the appropriate value(s).

If the same command is given in the parameter file and on the command
line as a qualifier, then the qualifier value will be used. If no
command is given at all where one is required, a default value will be
used. The default values are documented with each qualifier.

The available commands are BORDER, OFFSET, RESOLUTION, SCALE_FACTOR,
SCALE_IFF, SCALE_SHEET, XMIN, XMAX, YMIN and YMAX which are identical
to the qualifiers of the same names. Refer to the I2DIGIT COMMAND
QUALIFIERS section for a description of each qualifier.

See the sample parameter file below for examples of the available
commands.

The DIGIT Translation Table

Each line of the table is prefixed with a command which identifies the
line as belonging to that table. The lines are free-format, so the
order of entries matters, but the actual position of entries on the
line is not important. Any text starting with the "!" character is
regarded as a comment, and is ignored. Comments can appear on the
same lines as commands, or on separate lines. Note that commands may
be in upper or lower case.

The DIGIT translation table describes the translations required to
produce DIGIT feature characteristics from IFF features. The
characteristics are described below. Each line is prefixed with the
'DIGIT' command which tells the program that the line in the parameter
file is part of the translation table.
A line in the parameter file has the form :-

    DIGIT   fc   font   line   curve   term   prio   col

where the fields are :-

    DIGIT - the command DIGIT which states that this line is an
             entry in the DIGIT translation table.

    fc - the feature code in the IFF file to be given the
             following DIGIT characteristics. This should be in the
             range 1-32767.

    font - the DIGIT font number in the range 0-999. However the
             value may be -1 to denote it is undefined, in which case
             it will not appear with this feature in the DIGIT file.

    line - the DIGIT line width in the range 1-99. However the
             value may be -1 to denote it is undefined, in which case
             it will not appear with this feature in the DIGIT file.

curve - the DIGIT curve type number in the range 1-3. The values of these represent the following curve types:

> 1) - Linear
> 2) - Parabolic
> 3) - Cubic

The curve type may be -1 to denote it is undefined, in which case it will not appear with this feature in the DIGIT file.

term - the DIGIT termination number and may be 4, 5 or 9. The values of these represent the following terminations:

> 4) - Open/Straight
> 5) - Closed
> 9) - Open/Round Ends

The termination may be -1 to denote it is undefined, in which case it will not appear with this feature in the DIGIT file.

prio - the DIGIT line priority in the range 6-8. The values of these represent the following priorities:

> 6) - Low
> 7) - Normal
> 8) - High

The priority may be -1 to denote it is undefined, in which case it will not appear with this feature in the DIGIT file.

col - the DIGIT line colour in the range 1-12. This value may be -1 to denote it as undefined, in which case it will not appear with this feature in the DIGIT file.

An example follows :-

```
! I2DIGIT parameter file
!
BORDER           100
OFFSET        100 100
RESOLUTION        30
!SCALE_FACTOR      2.0      ! not used with SCALE_IFF and
SCALE_SHEET
SCALE_IFF      1000.0
SCALE_SHEET   50000.0
XMIN              0.0
XMAX          10000.0
YMIN              0.0
YMAX          10000.0
!
!
! FC     FONTTYPE LINEWIDTH CURVETYPE TERMINATOR PRIORITY COLOUR
!
DIGIT    1      101       1         1          5        7
2
DIGIT    10     110       2         1          6       -1
3
DIGIT    11     111       3         2         -1        6
4
DIGIT    12     112       4        -1         -1       -1
2
DIGIT    101    230       9         1          5        8
11
```

CHAPTER 3

I2DIGIT UTILITY

UTILITY I2DIGIT

FUNCTION

        I2DIGIT reads an Internal Feature Format (IFF) file, and produces a
        Scitex DIGIT file on magnetic tape only.

FORMAT

        $ I2DIGIT Input-IFF-file Output-device-name

        Command qualifiers   Defaults

        /[NO]APPEND   /NOAPPEND
        /BORDER=integer   /BORDER=0
        /FC=(integer[,...])   All features
        /LAYER=(integer[,...])   All layers
        /[NO]LOG   /NOLOG
        /OFFSET=(integer,integer)   /OFFSET=(1,1)
        /PARAMETER=file-spec   No parameter file
        /PARTITION_NAME   Partition name will be filename
        /RESOLUTION=integer   /RESOLUTION=32
        /SCALE_FACTOR=real   /SCALE_FACTOR=1.0
        /SCALE_IFF=real   /SCALE_IFF=1000.0
        /SCALE_SHEET=real   Taken from Map Descriptor entry
        /XMIN=real   Taken from Control Point entry
        /XMAX=real   Taken from Control Point entry
        /YMIN=real   Taken from Control Point entry
        /YMAX=real   Taken from Control Point entry

PROMPT

        _Input-IFF-file: input-IFF-file-spec

        _Output-device-name: output-magtape-device

PARAMETERS

Input-IFF-file

        - This parameter specifies the name of an IFF file, and is compulsory.
          The data written to the output file is read from this file. Only one
          filename may be specified for each run of the program.
          The default device and extension LSL$IF:IFF.IFF are applied to the
          input file specification when it is parsed.

Output-device-name

        - This parameter specifies the name of the magnetic tape device name,
          and is compulsory. The device often has a four character name
          followed by a colon, (eg MUB1:) and must have been previously mounted

          using MOUNT/FOREIGN.

COMMAND QUALIFIERS

/APPEND
/NOAPPEND (default)

          - The default action of I2DIGIT is to initialise a tape by rewinding it
            and writing the DIGIT file from the beginning. When /APPEND is
            present, the utility will search the tape for an end-of-volume mark
            which is denoted by two consecutive tape marks. The device head will
            be left positioned between the two marks so that when the new DIGIT
            file is written, it will overwrite the second take mark leaving one
            mark separating the last tape file with the new one.   I2DIGIT will
            always write two tape marks after the DIGIT file. Thus, by using
            /APPEND, it is possible to create a tape containing many DIGIT files
            separated by single tape marks with a double tape mark denoting the
            end-of-volume.

/BORDER=integer

          - this qualifier is used to create a border around the map extent so
            that thick lines which lay exactly along an edge will not be clipped.
            The integer value to be given should be in DIGIT pixels and will
            default to zero.   The border is available as a command in the
            parameter file, but the qualifier value will take precedence.

/FC=(integer[,...])

          - causes I2DIGIT to output only those IFF features which have the
            specified feature code(s) and which lie in the layers selected using
            /LAYER. The /FC qualifier will accept single, multiple or ranges of
            feature code arguments.   Ranges may be specified with starting and
            ending feature codes that are separated by a colon, for example
            /FC=56:58.   When specifying more than one range of feature codes,
            separate each range with a comma, for example /FC=(1:5,56:89,95). The
            maximum number of feature codes which may be specified is 1024. If
            the qualifier is not given, then all features will be translated.

/LAYER=(integer[,...])

          - causes I2DIGIT to output only those feature which are in the specified
            layers and in the range specified with /FC. The /LAYER qualifier will
            accept single, multiple or ranges of layer arguments. Ranges may be
            specified with starting and ending layer numbers that are separated by
            a colon, for example /LAYER=0:3. When specifying more than one range
            of layers, separate each range with a comma, for example
            /LAYER=(0:2,4:5). The maximum number of layers which may be specified
            is 1024.   If the qualifier is not given, then all layers will be
            translated.

/LOG
/NOLOG (default)

>   - When /LOG is present, the I2DIGIT utility will output diagnostic
>   messages about any file creation or deletion as it processes the input
>   IFF file so that any errors may be traced.

/OFFSET=(integer,integer)

>   - this qualifier is used to shift the DIGIT coordinates by a number of
>   pixels in x and y respectively, and should be used when the origin
>   lies inside the map (ie the IFF file contains negative coordinates).
>   If the IFF coordinates are negative and no offset is given, the output
>   DIGIT coordinates may fall outside the range 1 to 32767 which is not
>   permitted and will cause the program to exit. The values to be given
>   should be in DIGIT pixels and will default to 1 in the X direction and
>   1 in the Y direction (1,1). The offset is available as a command in
>   the parameter file, but the qualifier values will take precedence.

/PARAMETER=file-spec

>   - This qualifier is compulsory and specifies the IFF parameter file,
>   which defines the transformation of feature codes in the IFF data to
>   data types in the DIGIT file. Refer to the DATA PREPARATION section
>   for details of the parameter file entries and their ranges.

/PARTITION_NAME=string

>   - specifies the name to be used for the partition which will be written
>   to the partition header. There is space for only 10 characters in the
>   header and so the string will be truncated if it is longer.   The
>   truncated name will be reported to the user. The string should not be
>   enclosed in quotes, but if it is they will be removed.   Characters
>   permitted in the partition name string must be alphabetic for the
>   first character and alphabetic or numeric for the remainder.

/RESOLUTION=integer

>   - specifies the resolution of the DIGIT data in points per millimetre
>   which is used in the formula described below. The resolution is
>   available as a command in the parameter file, but the qualifier value
>   will take precedence. The default value is 32 points per millimetre.

/SCALE_FACTOR=real

>   - this qualifier should be used instead of the default qualifiers
>   /SCALE_IFF and /SCALE_SHEET and is intended for use when the file is
>   held in sheet units. It is used to define the number of sheet mm
>   represented by 1 IFF file unit and if given with no number, will
>   default to 1.0. If no scale qualifiers or commands are given, the
>   default action by the program is to use the default values of

/SCALE_IFF and /SCALE_SHEET. This qualifier is available as a command
in the parameter file, but the qualifier value will take precedence.

/SCALE_IFF=real

- this qualifier should be used together with /SCALE_SHEET and defines
  the number of ground mm represented by 1 IFF file unit. If it is not
  given, it will default to 1000 since it is usual that the IFF
  coordinates will be held in metres. It is available as a command in
  the parameter file, but the qualifier value will take precedence.

/SCALE_SHEET=real

- this qualifier should be used together with /SCALE_IFF and defines the
  number of ground units represented by 1 sheet unit. (eg 50000 for a
  1:50000 sheet). If it is not given, it will default to the value held
  in the IFF Map Descriptor. It is available as a command in the
  parameter file, but the qualifier value will take precedence.

/XMIN=real

- this qualifier defines the minimum X value of the ground extent around
  the IFF file. It is used so that maps covering the same area of
  ground will be located on top of each other when in DIGIT form.   The
  value given should ideally be less than or equal to the minimum X
  value in the IFF file excluding any origin offset in the Map
  Descriptor. If all the extent values surround the IFF range, this
  will guarantee that the DIGIT coordinates will lie inside the
  Reference Points.   If the qualifier is not given, it will default to
  the appropriate value held in the IFF Control Point (CP) entry. It is
  available as a command in the parameter file, but the qualifier value
  will take precedence.

/XMAX=real

- this qualifier defines the maximum X value of the ground extent around
  the IFF file. It is used so that maps covering the same area of
  ground will be located on top of each other when in DIGIT form.   The
  value given should ideally be greater than or equal to the maximum X
  value in the IFF file excluding any origin offset in the Map
  Descriptor. If all the extent values surround the IFF range, this
  will guarantee that the DIGIT coordinates will lie inside the
  Reference Points.   If the qualifier is not given, it will default to
  the appropriate value held in the IFF Control Point (CP) entry. It is
  available as a command in the parameter file, but the qualifier value
  will take precedence.

/YMIN=real

      - this qualifier defines the minimum Y value of the ground extent around
        the IFF file.   It is used so that maps covering the same area of
        ground will be located on top of each other when in DIGIT form.   The
        value given should ideally be less than or equal to the minimum Y
        value in the IFF file excluding any origin offset in the Map
        Descriptor.   If all the extent values surround the IFF range, this
        will guarantee that the DIGIT coordinates will lie inside the
        Reference Points.   If the qualifier is not given, it will default to
        the appropriate value held in the IFF Control Point (CP) entry.   It is
        available as a command in the parameter file, but the qualifier value
        will take precedence.

/YMAX=real

      - this qualifier defines the maximum Y value of the ground extent around
        the IFF file.   It is used so that maps covering the same area of
        ground will be located on top of each other when in DIGIT form.   The
        value given should ideally be greater than or equal to the maximum Y
        value in the IFF file excluding any origin offset in the Map
        Descriptor..   If all the extent values surround the IFF range, this
        will guarantee that the DIGIT coordinates will lie inside the
        Reference Points.   If the qualifier is not given, it will default to
        the appropriate value held in the IFF Control Point (CP) entry.   It is
        available as a command in the parameter file, but the qualifier value
        will take precedence.

RESTRICTIONS

      There are certain types of IFF feature that I2DIGIT does not translate
      fully:

      Arcs, circles and interpolated curves (GTs 2, 3, 4, 5 and 6) have the
      points output directly from the ST entry.   The parameter file should
      be used to give these features the appropriate flag.   (ie cubic or
      parabolic).

      All text features (GT 10) are ignored.

      Area fill features (GT 12) will not be automatically output with the
      relevant closed flag present.   This must be done explicitly via the
      parameter file.

      I2DIGIT will write all the selected features from the IFF file into
      one partition only.

      Note that only a single dataset may be transferred during a single run
      of the program but /APPEND can be used to create a tape contain many
      files.

      The /SCALE_IFF and /SCALE_SHEET qualifiers are mutually exclusive with
      /SCALE_FACTOR.

DESCRIPTION

Command line

The symbol I2DIGIT is normally set up as:

        I2DIGIT == "LSLEXE:I2DIGIT"

and the program may then be used as if it were a normal VMS utility.

PROGRAM ACTION

For a full description of the DIGIT output format, see FORMAT
DESCRIPTION section in the documentation of this module.

Before running the program, it is necessary to have created a
parameter file which must have an entry for each feature (referenced
by feature code) that is required in the translation. Any features
not present in the parameter file will be ignored during conversion.
For details of how to create a parameter file, refer to the DATA
PREPARATION section.

After decoding the command line for the input file name, output device
name and the qualifiers, the parameter file is read. If an entry in
the parameter file is incorrect the whole line is ignored which will
mean that features corresponding to that entry will not be translated.

I2DIGIT then creates a temporary work file on disk which is given the
same name as the input file but with the extension '.I2DIGIT_TMP', for
example, TEST.I2DIGIT_TMP. If the program is aborted by a method
outside its control (eg by the user typing Ctrl-Y), then this file
will left in the current working directory. This is a binary file and
should not be displayed or printed but deleted as it is intended for
internal use by the program.

The program must generate this temporary file because the DIGIT format
requires the file size (in DIGIT sectors) to be written in the first
sector. Clearly, this will not be known until the IFF file has be
processed and so to prevent the need to perform two passes of the IFF
file, the data is first written to disk and then copied to the tape.

The tape is then initialised and this will only be successful if a
valid tape device is given and the tape device has been mounted using
MOUNT/FOREIGN. There is no need to specify a record or blocksize as
the program will write tape files with a blocksize of 12288 bytes.

The are three criteria that must be fulfilled in order to process an
IFF feature:

> o The feature must have a valid entry in the parameter file.

> o If the /FC qualifier is given, then its feature code must
>   fall within this list. If not, then all features are
>   converted subject to the other conditions.

> o If the /LAYER qualifier is given, then the feature must fall
>   within a layer specified in this list. If not, then all
>   layers are converted.

All symbol features (GT 7,8 and 9) are output as lines of 2 pixels in
length so that the Scitex VTR operation will recognise them.

When the processing of the IFF file is complete, the temporary file is
copied directly to the tape having patched the file size value into
the header sector.

DIGIT Pixel Calculation

The Height and Width values to be written to the DIGIT file will be
calculated thus:

Height = (YMAX - YMIN) * factor * RESOLUTION + (2*BORDER)

Width = (XMAX - XMIN) * factor * RESOLUTION + (2*BORDER)

And the DIGIT coordinates calculated using:

Digit X = (IFF X - XMIN) * factor * RESOLUTION + BORDER

Digit Y = (YMAX - IFF Y) * factor * RESOLUTION + BORDER

Where,

factor =   _IFF scale
          SHEET scale

by default, or

factor = SCALE_FACTOR

if /SCALE_FACTOR is used.

The Reference Points will be written as:

Top Left Reference Point Height = Y offset given with /OFFSET
Top Left Reference Point Width = X offset given with /OFFSET
Bottom Right Reference Point Height = Y offset + **Height**
Bottom Right Reference Point Width = X offset + **Width**

NOTE

>   Until experienced is gained in using I2DIGIT, it is
>   quite likely that the program will generate DIGIT
>   pixels outside the valid range for 2-byte integers (1
>   to 32767) and hence abort. This will be because one
>   or more of the values given in the above calculation
>   is wrong causing an incorrect shift or scaling of the
>   coordinates. If this happens, the maximum and minimum
>   values should be substituted into the formula by hand
>   to determine which value is wrong.

It is assumed to be the responsibility of the user to use appropriate
values to be substituted into the above formulas so that the DIGIT
pixels will fall inside the area defined by the Reference Points and
inside the range 1 to 32767. Each DIGIT pixel coordinate will be
tested if it lies within the range 1 to 32767 and if it does not, a
warning is given to flag the offending feature. However, it is very
likely that by simply correcting the values to be substituted in the
formula this problem will be solved. This should be done rather than
trying to edit the offending feature, since many or all of the
features could be outside the range.

EXAMPLES

$ **I2DIGIT/PARTITION_NAME=TESTDIG/PARAMETER=TEST.PAR TEST MUB1:<CR>**
Processing IFF file...
Operation successfully completed.
 ELAPSED: 0 00:00:05.92 CPU: 0:00:00.64 BUFIO: 24 DIRIO: 89 FAULTS: 109

This example shows a normal run of I2DIGIT successfully converting the IFF file
TEST.IFF and writing a DIGIT file to device MUB1:.

$ **I2DIGIT/LAYER=1/FC=(1:42)/PARAMETER=TEST.PAR/LOG/APPEND GRUNTHOS MUB1:<CR>**

Parameter file : LSL$USER_ROOT:[STEPHEN]TEST.PAR;10
IFF file   : LSL$USER_ROOT:[STEPHEN]GRUNTHOS.IFF;1
Initialising tape MUB1: for read - Please wait.
Searching for end of tape mark...
Processing IFF file...
Disk files closed.
Writing DIGIT to tape...
Operation successfully completed.
 ELAPSED: 0 00:01:01.46 CPU: 0:00:17.45 BUFIO: 27 DIRIO: 2958 FAULTS: 158

This example show the use of most of the qualifiers.   The program reported
searching for the end of the tape because /APPEND was used.

MESSAGES (INFORMATIONAL)

These messages give information only, and require no immediate action by the
user. They are used to provide information on the current state of the program,
or to supply explanatory information in support of a warning or error message.

LINEINPAR, line 'number' of parameter file

> **Explanation:** This message always appears after an error has occurred while
> decoding a line in the parameter file, and it informs the user of the
> offending line number. The previous message will have been generated either
> by LSLLIB or by the program itself, and the line in question will be
> ignored.

> **User action:** If the error message was generated by LSLLIB, it most likely
> indicates an error in the parameter file which should be amended.
> Otherwise, see the relevant error message explanation.

MESSAGES (WARNING)

These messages are output when an error has occurred that can be corrected
immediately by the user or that the program will attempt to overcome.

DEFRES, Resolution outside sensible range - defaulted to 'number'

   Explanation: The resolution specified on the command line was outside a
   sensible range and the default value was given as reported.

   User action: If the defaulted value is not acceptable, specify a valid
   resolution on the command line. If the required resolution is still outside
   the range, please contact Laser-Scan.

LONGNAME, Partition name truncated to 'name'

   Explanation: The partition name given exceed 10 characters in length.
   Since the DIGIT format can only hold up to 10 characters for the partition
   name, it has been truncated.

   User action: If the truncated name is unacceptable, give a new name and run
   the program again, otherwise this message can be ignored.

NOEXTENT, Missing extent value. CP entry used.

   Explanation: One or more of the XMIN, XMAX, YMIN, YMAX extent values was
   missing from the command line or parameter file and so the extent will be
   taken from the Control Point (CP) entry. The extent values can be taken
   from a combination of the command line or parameter file, but if the same
   one is given in both, the command line value will take precedence.

   User action: If use of CP entry is acceptable, then this warning can be
   ignored. Otherwise the missing extent value should be specified on the
   command line or in the parameter file and the program run again.

UNKCMD, unknown command "'command'"

   Explanation: The given command in the parameter file was not recognised.
   The LINEINPAR message indicating the parameter file line number will follow,
   and the program will continue to read the file, ignoring this line.

   User action: This message is most likely due to an error in the program and
   should be reported to Laser-Scan.

MESSAGES (ERROR)

These messages indicate an error in processing which will cause the program to
terminate. The most likely causes are a corrupt or otherwise invalid input
file, or an error related to command line processing and file manipulation.

BADBORDER, Invalid border width given

> **Explanation:** The width given to the BORDER command or qualifier was less
> than zero.   The minimum value for this is zero and the units are in DIGIT
> pixels.

> **User action:** Respecify the offending value and run the program again.

BADCP, Invalid value in the CP entry

> **Explanation:** The CP entry contains fields that are crossing.   (ie the
> minimum x or y is greater than the maximum x or y).

> **User action:** Correct the CP entry using IPATCH/WRITE and run the program
> again.

BADEXTENT, minimum value greater than maximum value

> **Explanation:** Either XMIN was greater than XMAX or YMIN was greater than
> YMAX, given a nonsensical map extent.

> **User action:** Respecify the offending value(s) and run the program again.

BADSCALE, Invalid 'scale-type' value given

> **Explanation:** The input scale value given for the SCALE_IFF, SCALE_SHEET,
> SCALE_FACTOR or taken from the Map Descriptor was less than zero.

> **User action:** Respecify the offending value or amend the Map Descriptor
> (using ITRANS/DESCRIPTOR) and run the program again.

ERRCLO, error closing file "'file-spec'"

> **Explanation:** Some form of error occurred in closing one of the input files.

> **User action:** Depends upon the associated LSLLIB message which should give
> an indication as to the nature of the problem.

ERRCLOTMP, error closing temporary work file

> **Explanation:** Some form of error occurred while closing the temporary work
> file.

> **User action:** Depends upon the associated LSLLIB message.

ERRINITTAPE, error initialising magtape device "'device-name'"

Explanation: An error occurred in initialising the magnetic tape drive for
reading. The associated LSLLIB and system error messages should clarify the
problem.

User action: Dependent upon the associated messages. One possible cause of
problems is that the tape has not been mounted.

ERRINPAR, entry 'number' of line 'number' out of range. Line ignored

Explanation: The given entry is outside the permitted range for that
attribute and the whole line is ignored. This will mean that features of
that feature code will not be translated. The entry number will be in the
range 1 to 7 with the feature code being entry 1. The line number given is
the true line number in the parameter file including comment lines. See the
DATA PREPARATION section for details of the permitted ranges for DIGIT
feature information.

User action: Amend the range of the offending entry in the parameter file
and run the program again.

ERROPN, error opening file "'file-spec'"

Explanation: Some form of error occurred in opening one of the input or
output files.

User action: Depends upon the associated LSLLIB messages.

ERROPNTMP, error opening temporary work file

Explanation: Some form of error occurred in opening the temporary work
file.

User action: Depends upon the associated LSLLIB messages.

ERRRDPAR, error reading from parameter file 'file-spec' at line 'number'

Explanation: The given line could not be read from the parameter file.   An
additional LSLLIB message will follow, giving the reason for the failure.
If this is due to a system error, the system error message will also appear.
The program exits immediately.

User action: Ascertain the cause of the failure from the messages given,
and take the appropriate remedial action. If the error is due to a serious
problem such as a system failure, the System Manager should be informed.

ERRREADTMP, error reading from the temporary work file

Explanation: An internal error was detected when read from the temporary
work file.

User action: This error should not normally occur and should be reported to
Laser-Scan unless any associated error message gives a clear indication as
to the problem.

ERRREOPNTMP, error re-opening temporary work file

   Explanation: Some form of error occurred when trying to re-opening the
   temporary work file. This message exists in addition the I2DIGIT__ERROPNTMP
   message in order to make in easier to determine when the program stopped.

   User action: Depends upon the associated LSLLIB messages.

ERRSELTMP, error selecting temporary file for I/O

   Explanation: An error occurred while selecting the temporary file reading
   or writing. The associated LSLLIB and system error messages may clarify the
   problem.

   User action: The user should not normally encounter this error, however the
   associated LSLLIB or system error message may indicate the problem. If the
   problem is not apparent from these messages please contact Laser-Scan.

ERRWRITETMP, error writing to the temporary work file

   Explanation: An internal error was detected when writing to the temporary
   work file.

   User action: This error should not normally occur and should be reported to
   Laser-Scan unless any associated error message gives a clear indication as
   to the problem.

ERRWRTTAPE, error writing to tape

   Explanation: An error occurred while writing to the tape device.   The
   associated LSLLIB and system error messages may clarify the problem.

   User action: The user should not normally encounter this error, however the
   associated LSLLIB or system error message may indicate the problem. If the
   problem is not apparent from these messages please contact Laser-Scan.

ERRWRTTAPEMK, error writing a tape mark to tape

   Explanation: An error occurred while writing a tape mark to the tape
   device.   The associated LSLLIB and system error messages may clarify the
   problem.

   User action: The user should not normally encounter this error, however the
   associated LSLLIB or system error message may indicate the problem. If the
   problem is not apparent from these messages please contact Laser-Scan.

INVDEVICE, unknown device name "'device'" given

   Explanation: The device name given on the command line was not recognised.

   User action: Specify a legal device name on the command line.

INVNAME, partition name "'string'" contains invalid characters.

Explanation: The partition name specified or taken from the input filename
contained one or more invalid characters. Valid characters are alphabetic
for the first character, and the remaining characters may only be alphabetic
or numeric. No punctuation or symbol characters are permitted.

User action: Specify a legal partition name or ensure that the first 10
characters of the filename are valid.

MDNOT2, Map Descriptor is not of type 2

Explanation: The MD entry should be of type 2 for all files. This message
only occurs when trying to extract the SHEET scale from the MD when
SCALE_FACTOR and SCALE_SHEET are not used.

User action: Correct the MD entry using ITRANS/DESCRIPTOR and run the
program again.

MINOFFSET, Minimum offset value of 1 required.

Explanation: The minimum value which can be given to the OFFSET command or
qualifier is 1 since the valid range for DIGIT pixel values is between 1 and
32767.

User action: Give two valid offset values and run the program again.

MISSINGENTRY, IFF file has missing "'code'" entry

Explanation: The IFF file has a missing entry which suggests that it may
have been corrupted somehow.

User action: Try examining the file using IPATCH to try to determine the
problem. The history (HI) entry may give an indication of the programs
which may have caused the entry to be missing.

NOEOV, no end-of-volume mark on tape.

Explanation: The tape does not contain an end-of-volume mark which is
denoted by two consecutive tape marks. This is searched for when appending
to a tape so that the tape head may be left between the two tape marks and a
new file added.

User action: Only use the /APPEND qualifier when appending to a tape
containing an end-of-volume mark.

NOINPUTFILE, no input file given

Explanation: I2DIGIT requires that a valid IFF input file is given on the
command line and one was not given.

User action: Run the program again with a valid IFF file specified ion the
command line.

NOSUCHFILE, file 'name' does not exist

Explanation: The file specified on the command line does not exist.

User action: Ensure that the file-spec given on the command line is for a
file that exists.

NOTMNTFOR, magtape device "'device'" must be mounted foreign

Explanation: The specified tape device specified has not been mounted
foreign.

User action: Mount the tape with the MOUNT/FOREIGN command and rerun
I2DIGIT.

OUTOFRANGE, coordinates out of range in FSN 'number'

Explanation: The coordinates of the specified feature are out of the valid
range of 1 to 32767 for DIGIT pixels. This is most likely to be because one
or more of the values used in the formula which calculates the DIGIT pixel
are incorrect.

User action: Do not edit the feature until you have checked the scale,
extent, border and offset values. Refer to the documentation for the
formula and substitute (by hand) the maximum and minimum IFF values into it
to determine which value is incorrect. It may require some practice to get
appropriate values for the arguments to the formula as it is intended to be
as flexible as possible.

TWONUMS, Two integers for X and Y required

Explanation: The offset requires two integers for the X and Y value to be
given to /OFFSET qualifier or to the OFFSET command in the parameter file.

User action: Given two values for the OFFSET and run the program again.

UNSETMD, Map Descriptor required for scale

Explanation: The MD entry is required to set so that the SHEET scale can be
taken from it.   This is required if SCALE_FACTOR and SCALE_SHEET are not
used.

User action: Correct the MD entry using ITRANS/DESCRIPTOR and run the
program again.

MESSAGES (OTHER)

In addition to the above messages which are generated by the program itself,
other messages may be produced by the command line interpreter (CLI) and by
Laser-Scan libraries. In particular, messages may be generated by the IFF
library and by the Laser-Scan I/O library, LSLLIB. IFF library messages are
introduced by '%IFF' and are documented in the IFF library users' guide.   In
most cases IFF errors will be due to a corrupt input file, and this should be
the first area of investigation. If the cause of the error cannot be traced by
the user, and Laser-Scan are consulted, then the output file should be preserved
to facilitate diagnosis. LSLLIB messages are introduced by '%LSLLIB' and are
generally self-explanatory.   They are used to explain the details of program
generated errors.