Laser-Scan Ltd.

LAPROCESS

LASERAID/VTRAK POST-PROCESSOR

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UTILITY: LAPROCESS

REPLACES: Functions of IPR relating to LASERAID/VTRAK.
RAPATCH.

FUNCTION: LAPROCESS is the LASERAID/VTRAK Post-Processor. It performs the following operations:

(1) Transformation of the coordinate data into the target ('map') space specified at the digitising stage.

(2) Unification of 'two-part' features created using the LASERAID/VTRAK 'fumble' option.

(3) Ordering of closed features to make them clockwise or anti-clockwise depending on whether the LASERAID/VTRAK 'reverse' option was used.

(4) Deletion of 'paintout only' features.

(5) Processing of IFF files digitised using old (pre-convergence) versions of LASERAID. This has the side effect of allowing them to be read into the converged program using the 'OLD' option.

FORMAT:

$ LAPROCESS input-file-spec [output-file-spec]

Command Qualifiers	Defaults
/APPLY_CC	Qualifier not applied
/ELA	Qualifier not applied
/FLF	Qualifier not applied
/[NO]LOG	/NOLOG
/OLD_LAJ	Qualifier not applied
/[NO]WARNINGS	/WARNINGS

PROMPTS:

_Input IFF file:	input-file-spec
_Output IFF file:	[output-file-spec]

PARAMETERS:

input-file-spec - Specifies the IFF file which is to be processed.
Any part of the file name which is not specified will be taken from the default specification 'LSL$IF:IFF.IFF'.

output-file-spec - Specifies the IFF file which is to be created.
Any part of the file name which is not explicitly given will be taken from the parsed input specification. Note that a version number must **not** be specified for the output file. If a file with the specified name already exists, a new file will be created with the version number incremented by one.

QUALIFIERS:

/APPLY_CC - Specifies that the IFF cubic coefficient (CC) entries should be applied when transforming the coordinates. This option is provided to cater for very unusual processing requirements and is not likely to be of interest to customers.
The /ELA and /FLF qualifiers should be used to process files created using those pre-convergence versions of LASERAID. These are equivalent to /APPLY_CC but also cause the IFF FS entries to be set correctly.

/ELA - Specifies that the input IFF file was digitised using ELA (the pre-convergence edge-following version of LASERAID). Such files require the cubic coefficients to be applied, and the second word of the IFF FS entries to be modified to indicate edge-mode features.
This qualifier is **not** applicable to VTRAK data.

/FLF - Specifies that the input IFF file was digitised using FLF (the pre-convergence line-following version of LASERAID). Such files require the cubic coefficients to be applied, and the second word of the IFF FS entries to be modified to indicate line-mode features.
This qualifier is **not** applicable to VTRAK data.

/LOG
/NOLOG - Controls whether informational messages are produced.
If selected, these messages are sent to SYS$OUTPUT. The informational messages which may be produced by LAPROCESS are detailed in a later section of this manual.

/OLD_LAJ - Specifies that the input IFF file was digitised using a a pre-convergence version of LAJ, the junction spotting LASERAID. Such files are already in 'map' (target) space, but require the range to be set and the second word of the IFF FS entries to be modified to indicate line-mode features. This mode replaces the RAPATCH utility as a post-processor for LAJ output files.
This qualifier is **not** applicable to VTRAK data.

/WARNINGS
/NOWARNINGS - Controls whether warning messages are produced.
If selected, these messages are sent to SYS$OUTPUT. The warning messages which may be produced by LAPROCESS are detailed in a later section of this manual.

DESCRIPTION:

IFF files produced using converged LASERAID or VTRAK contain coordinate data which are in 'calibration space'. This is a true and square space (e.g. all inherent LASERTRAK and photographic distortions have been corrected in the case of LASERAID data), but it does not coincide with the 'map' or target space specified when the control points were measured.

In order to obtain the data in the required coordinate space it is necessary to apply a four-point transform to all of the IFF ST (coordinate string) and JB (junction block) entries in the file. This transform is defined by the IFF CP entries and is of the form:

$$X = a1 + a2*x + a3*y + a4*x*y$$
$$Y = b1 + b2*x + b3*y + b4*x*y$$

LAPROCESS calculates the appropriate transform coefficients and applies them to the coordinate data. In addition, it examines the feature status (FS) entry for each feature in the file and acts on any special processing options specified in the second word of that entry (see the IFF library documentation for details of the IFF entry structure). This word is bitwise-encoded with processing flags, as detailed below (note that the definition of bits 0 and 1 was changed when LASERAID was converged and may not accord with very old documentation):

Bit number	Value	Meaning when set	Meaning when clear
0	1	feature is closed	feature is open
1	2	feature is a line	feature is an edge
2	4	REVersed feature	non-REVersed feature
3	8	two-part (FINd) feature	not a two-part feature
4	16	Paintout-Only feature	normal feature (keep)
5	32	squaring flag set	squaring flag clear
6	64	INVerse polarity used	normal polarity
15	32768	PaintOut Suppress used	no PaintOut Suppress

All other bits are undefined at present.

LAPROCESS deletes any feature which has the Paintout-Only flag set, and operates on two-part and REVersed features as appropriate. Two-part features (captured using the FINd/FUMble option) are re-ordered to give all the coordinate strings a common direction, and closed features are forced anticlockwise unless the REVersed feature flag is set (in which case they are forced clockwise).

The /ELA, /FLF and /OLD_LAJ qualifiers allow data captured using pre-converged versions of LASERAID to be processed, and also allow such files to be updated using converged LASERAID (via the 'OLD' command option). Converged LASERAID distinguishes such 'very old' files by the fact that they have been processed. Note that these qualifiers are **not** applicable to VTRAK data.

WARNING:

It should be noted that old processing utilities such as IPR and OPR should **NOT** be used on data digitised using converged LASERAID/VTRAK. These programs will, amongst other things, attempt to apply the IFF CC (cubic coefficient) transform to the data. As the CC entry now contains **backwards** coefficients for use with the LASERAID/VTRAK RECover option, the data will be over-written and irretrievably corrupted.

EXAMPLES:

```
$ LAPROCESS CONTOURS
 ELAPSED: 00:01:32.06  CPU: 0:00:53.65  BUFIO: 29  DIRIO: 126  FAULTS: 108
$
```

This example demonstrates the most common use of LAPROCESS. IFF file LSL$IF:CONTOURS.IFF has been successfully processed and a new file has been produced with the same name and the next higher version number.

```
$ LAPROCESS/OLD_LAJ/LOG URBAN.SAV URBAN2.IFF
%LAPROCESS-I-IFFOPNINP, file DUA0:[LSL.IFF]URBAN.SAV;7 opened for input
%LAPROCESS-I-IFFOPNOUT, file DUA0:[LSL.IFF]URBAN2.IFF;1 opened for output
%LAPROCESS-W-REORDERJUNC, unable to reorder junction feature (NF 23 36)
 ELAPSED: 00:02:13.23  CPU: 0:01:45.06  BUFIO: 46  DIRIO: 562  FAULTS: 311
$
```

IFF file LSL$IF:URBAN.SAV was digitised using a pre-convergence version of LAJ. This file has been successfully processed, producing a new file LSL$IF:URBAN2.IFF which is usable in its own right and, potentially, as an OLD input file to converged LASERAID or VTRAK. One feature (NF 23 36) is flagged to be re-ordered, but LAPROCESS was unable to do this because it contains one or more junctions. The feature has undergone coordinate transformation but has not been re-ordered (this is not likely to cause any problems in practice).

```
$ LAPROCESS RIVERS
%LAPROCESS-E-ERROPIN, error opening LSL$IF:RIVERS.IFF for input
-RMS-E-FNF, file not found
 ELAPSED: 00:00:18.39  CPU: 0:00:00.34  BUFIO: 4  DIRIO: 9  FAULTS: 42
$
```

The specified file does not exist. No output file has been produced.

MESSAGES (informational):

These messages give information only, and require no immediate action by the user (except perhaps to verify that the correct options have been selected). They will only appear if /LOG has been specified on the command line.

IFFOPNINP, file 'file-spec' opened for input

Explanation: The specified IFF file has been successfully opened for input.

User action: None.

IFFOPNOUT, file 'file-spec' opened for output

Explanation: The specified IFF file has been successfully created and opened for output.

User action: None.

REORDERCLO, closed feature to be re-ordered (NF 'fsn' 'isn')

Explanation: The feature is marked both CLOSED and REORDER (i.e. bits 0 and 3 are set). This may occur with files digitised using the VTRAK 'automatic pass' option where a feature was captured in two parts (because a problem was encountered), but was subsequently found to be closed. If it occurs with data captured using LASERAID or interactive VTRAK then it indicates bad digitising practice. At present LAPROCESS treats the feature as two-part only, i.e. it reorders the feature correctly but does **not** ensure that its final direction follows the normal sense rules for closed features (i.e. clockwise or anticlockwise). The feature will still be geometrically closed, however.

User action: If the direction is crucial then the feature must be edited. If this causes significant inconvenience then Laser-Scan should be consulted.

UNITCC, unity CC entry in input file

Explanation: LAPROCESS has been instructed to make use of the cubic coefficients (i.e. /APPLY_CC, /ELA or /FLF has been specified), however an IFF CC entry has been encountered which represents a unit transform (no coordinate modification). The program does not apply any cubic coefficients until the next CC entry is found.

User action: Verify that the correct qualifier and/or input file was specified.

UNITCP, unity CP entry in input file - already processed ?

Explanation: An IFF CP entry has been found which represents a unit transform (i.e. the left- and right-hand sides are the same). Possibly the file has been processed already, or perhaps it was produced using VTRAK in ABSolute mode. The program does not apply any control point transformation until the next CP entry is found. This message is not produced if /OLD_LAJ was specified, as these files are expected to be in 'map' space already. Note that files produced using VTRAK in ABSolute mode always cause this message to be generated and no action need be taken in this case.

User action: If the input file was not produced using VTRAK in ABSolute mode then verify that the correct qualifier and/or input file was specified.

MESSAGES (warning):

These messages indicate that LAPROCESS has been unable to guarantee that a specified feature has been correctly processed in accordance with the flags held in the second word of the feature status (FS) entry. This is only important if the sense of the feature (i.e. clockwise or anticlockwise) is crucial to subsequent processing. These messages can be disabled by specifying /NOWARNINGS on the command line.

REORDERJUNC, unable to reorder junction feature (NF 'fsn' 'isn')

Explanation: The REORDER flag (bit 3) is set but the feature contains junction information. The order of the coordinate data is not changed. This message may appear frequently with /OLD_LAJ files, and it may be necessary to specify /NOWARNINGS in order to avoid voluminous output.

User action: None. Features which contain junction structure cannot be reordered.

REVERSEJUNC, unable to reverse junction feature (NF 'fsn' 'isn')

Explanation: The feature is marked CLOSED and REVERSE (bits 0 and 2 are set) but contains junction structure. The order of the coordinate data is not changed. Note that closed junction features which do **not** have the reverse bit set do not cause this message to be produced, however they are not forced anticlockwise (the default direction).

User action: None. Features which contain junction structure cannot be reversed.

SENSEUNKN, unable to determine sense of feature (NF 'fsn' 'isn')

Explanation: The feature contains too few points to enable its sense to be determined, or it has a very peculiar shape (e.g. a symmetrical figure of eight).

User action: If the direction is crucial then the feature must be edited.

MESSAGES (error):

These messages indicate an error in processing which has caused the program to terminate. The most likely causes are a corrupt or otherwise invalid input IFF file, or an error related to command line processing and file manipulation. It is most unlikely that any output file produced will be correctly processed, and such a file will in any case need to be mended using IMEND before it can be examined.

BADCP, bad control points in input file

Explanation: An IFF CP entry has been encountered which does not represent a valid four-point transformation (this would be the case if, for example, two or more of the control points were superimposed).

User action: Correct the offending CP entry or entries.

BADCPORCC, bad control points or cubic coefficients in input file

Explanation: An IFF CP entry has been encountered which, after the left-hand side has been corrected using the cubic coefficients, does not represent a valid four-point transformation. The error may be in the CC or the CP entries (or both). This message will only appear if /APPLY_CC, /ELA or /FLF was specified on the command line.

User action: Correct the offending control points or calibration if possible. Note that the RECover option in converged LASERAID **cannot** be used to correct the calibration of old files digitised using ELA or FLF.

ERROPIN, error opening 'file-spec' for input

Explanation: The specified file cannot be opened for reading. This message will usually be followed by another giving the reason for the failure.

User action: The accompanying message should indicate the cause of the error. Check the file specification for errors, check that logical name LSL$IF: has been assigned to the correct device and directory, check that the file and directory are not protected against read access. If the problem continues, notify the system manager.

ERROPOUT, error opening 'file-spec' for output

Explanation: The specified file cannot be created and opened for writing. This message will usually be followed by another giving the reason for the failure.

User action: The accompanying message should indicate the cause of the error. Check the file specification for errors, check that logical name LSL$IF: has been assigned to the correct device and directory, check that that directory is not write-protected. If the problem continues, notify the system manager.

TOOMNYSTS, too many ST entries in IFF feature (NF 'fsn' 'isn')

Explanation: The input IFF file may not have more than 65535 ST entries in any one feature. Either the file was not created using LASERAID/VTRAK, or it is corrupt.

User action: If it is really necessary to process features of this size, then Laser-Scan should be consulted.

UNEXPENT, unexpected "'entry'" between 'entry' and 'entry' (NF 'fsn' 'isn')

Explanation: The order of the entries in the specified feature is either illegal or sufficiently non-standard that LAPROCESS cannot process it. Presumably the file was not created using LASERAID/VTRAK.

User action: Either the offending feature should be corrected, or Laser-Scan should be consulted.

MESSAGES (fatal):

These messages indicate a fatal error in processing which has resulted in immediate program termination and may indicate an error in the program itself. It is most unlikely that the output file will be correctly processed, and it will in any case need to be mended using IMEND before it can be examined.

ERRFINDFS, error repositioning to IFF FS entry in input file

Explanation: This indicates an internal program error.

User action: Preserve the input IFF file and inform Laser-Scan.

ERRFINDRA, error repositioning to IFF RA entry in output file

Explanation: When attempting to patch the coordinate range into the output file the program was unable to locate the RA entry.

User action: Check that the **input** file contains an RA entry. If so, preserve the input and output IFF files and inform Laser-Scan.

ERRFINDST, error repositioning to IFF ST entry in input file

Explanation: This indicates an internal program error.

User action: Preserve the input IFF file and inform Laser-Scan.

MESSAGES (other):

In addition to the above messages which are generated by LAPROCESS 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. These 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 input file should be preserved to facilitate diagnosis.