

GIS Tips & Tricks

By Al Karlin, Ph.D., CMS, GISP

The Old DOS Prompt is Still Your Friend

In the early 1990's, with the introduction of Microsoft Windows' Graphical User Interface (GUI), the slow but steady disappearance of the old, familiar DOS prompt, C:>, began. With the exception of RapidLasso's LASTools™ (and even LASTools™ are accessible through an included GUI), most, if not all major lidar, GIS, and remote sensing software packages are accessed through a Microsoft "ribbon-line" GUI. Users have become so accustomed to the GUI that we forget that there are some routines that are easier, faster, and more efficient to access through the old DOS prompt.

GeoCue's LP360 tools, both the 64-bit "stand-alone" and the 32-bit LP360 for ArcGIS, are generally accessed through a GUI. The first time a user constructs an LP360 LAS Layer from LAS files previously unopened in LP360 to facilitate fast rendering, some preliminary processing is necessary. For the rendering, LP360 relies on pyramid files called .QVR files, based on a user-specified thinning factor. The higher the thinning factor, the fewer levels there will be in the pyramid file. Therefore, for very large, dense USGS QL1 .LAS files, a larger (higher) thinning factor will be used. For example, with a thinning factor of 16 (recommended for QL1 data files), the first pyramid level will contain every 16th point of the full resolution. The second level will contain every 16th point of the first level, and so on. In contrast, for USGS QL3 LAS data, a thinning factor of two or four would be appropriate.

The data-loader in the LP360 GUI does not prompt the user to build the .QVR files if the files do not exist, but the LP360 renderer will frequently fail to display the entire file at full resolution resulting from display card memory issues if the pyramid files do not. So, it is a good idea to check the directory containing the .LAS files and determine whether the .QVR files exist. The files will have the same name as the .LAS files, but with the .QVR extension. If the .QVR files do not exist, the LP360 data-loader GUI provides a checkbox (see LP360 user manual) to construct the .QVR files with a user-specified thinning factor. In general, on an Intel i7-level (or Xenon-level) computer with 8 gigabytes (GB) of RAM, it will take about one to four minutes per .LAS file to generate the .QVR file for a 1GB .LAS file. So for a small QL1 LiDAR project containing between five and 10 files (roughly 1GB each), this processing could take between five and 15 minutes of processing. Larger projects could require several hours, and are best processed overnight.

GeoCue has recently released the LAS File Analyst tools to support several U.S. government agency's needs for LAS file information. These tools were designed to review, analyze, and repair some LAS file issues. In order to do so, GeoCue needed to collect and record LAS file information into another supporting file, the .SCAN file. Similar to the .QVR support files, the .SCAN can be constructed through a GUI, in this case, the Live View GUI (see LP360 user-manual).

Fortunately, GeoCue provides "command line" access to the pyramiding and scanning executable programs. In fact, GeoCue provides 15 command-line, accessible executable

files, including LDPyramid.exe and LPScanInfo.exe, which will be demonstrated in this tip. These executables can be called from the command-line (DOS Prompt) or from other scripts (think: Python) or programs. Below is a demonstration on how to use these from the command-line.

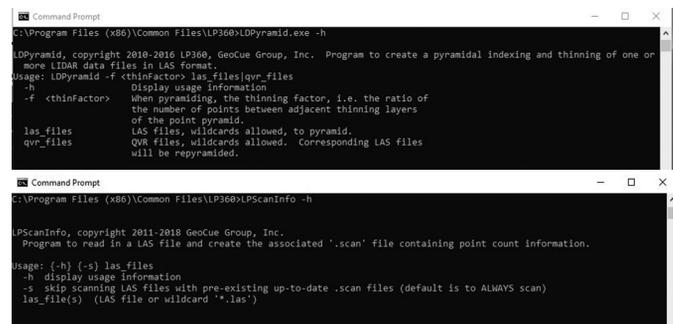
For LP360 v2018.2.59 and higher, the command-line executables are located in the C:\Program Files (x86)\Common Files\LP360 folder as, LDPyramid.exe (to construct the .QVR files) and LPScanInfo.exe (to construct the .SCAN files).

To execute the commands for building the .QVR files and/or the .SCAN files:

1. Open a DOS prompt (click: Windows | run | and type "CMD" or Windows | Windows System | Command Prompt),
2. Navigate to the C:\Program Files (x86)\Common Files\LP360 directory,
3. At the DOS prompt, type "LDPyramid.exe -f 16 (full path to LAS files)*.las and press "Enter" to build the .QVR files (do not forget the space between the -f and 16), and when the DOS prompt returns,
4. Type "LPScanInfo.exe -s (full path to LAS files)*.las and press "Enter" to build the .SCAN files.

While in the C:\Program Files (x86)\Common Files\LP360 directory, program "Help" can be retrieved by typing (at the DOS prompt):

LDPyramid.exe -h or LPScanInfo -h

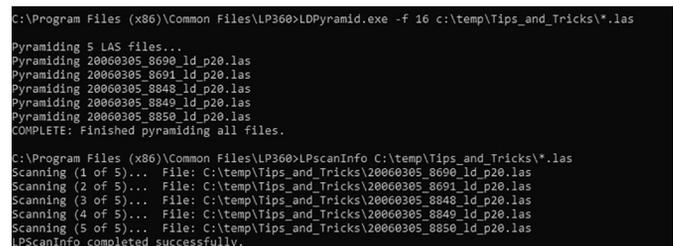


```
Command Prompt
C:\Program Files (x86)\Common Files\LP360\LDPyramid.exe -h
LDPyramid, copyright 2010-2016 LP360, GeoCue Group, Inc. Program to create a pyramidal indexing and thinning of one or more
LAS data files in LAS format.
Usage: LDPyramid -f <thinFactor> las_files[qvr_files]
-h Display usage information
-f <thinFactor> When pyramiding, the thinning factor, i.e. the ratio of
the number of points between adjacent thinning layers
of the point pyramid.
las_files LAS files, wildcards allowed, to pyramid.
qvr_files QVR files, wildcards allowed. Corresponding LAS files
will be repyramided.

Command Prompt
C:\Program Files (x86)\Common Files\LP360\LPScanInfo.exe -h
LPScanInfo, copyright 2011-2018 GeoCue Group, Inc.
Program to read in a LAS file and create the associated '.scan' file containing point count information.
Usage: [-h] [-s] las_files
-h display usage information
-s skip scanning LAS files with pre-existing up-to-date .scan files (default is to ALWAYS scan)
las_file(s) (LAS file or wildcard "*.las")
```

NOTE: If you just type in either LDPyramid.exe (or LPScanInfo.exe) without the -h switch, you will get an error, which you can ignore, along with the "Help" information, as above.

As an example, I ran the executables on 5 .LAS files that I download from the NOAA Coastal DataViewer (<https://coast.noaa.gov/dataviewer>); I'll write a tip about this lidar source in a future column) and stored in my "C:\Temp\Tips_and_Tricks" directory with:



```
C:\Program Files (x86)\Common Files\LP360\LDPyramid.exe -f 16 c:\temp\Tips_and_Tricks\*.las
Pyramiding 5 LAS files...
Pyramiding 20060305_8690_ld_p20.las
Pyramiding 20060305_8691_ld_p20.las
Pyramiding 20060305_8848_ld_p20.las
Pyramiding 20060305_8849_ld_p20.las
Pyramiding 20060305_8850_ld_p20.las
COMPLETE: Finished pyramiding all files.

C:\Program Files (x86)\Common Files\LP360\LPScanInfo C:\temp\Tips_and_Tricks\*.las
Scanning (1 of 5)... File: C:\temp\Tips_and_Tricks\20060305_8690_ld_p20.las
Scanning (2 of 5)... File: C:\temp\Tips_and_Tricks\20060305_8691_ld_p20.las
Scanning (3 of 5)... File: C:\temp\Tips_and_Tricks\20060305_8848_ld_p20.las
Scanning (4 of 5)... File: C:\temp\Tips_and_Tricks\20060305_8849_ld_p20.las
Scanning (5 of 5)... File: C:\temp\Tips_and_Tricks\20060305_8850_ld_p20.las
LPScanInfo completed successfully.
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According to John W. Hager, "... the station name of HIRAN 14 AMS 1962 and latitude and longitude values (seconds only) of 53.25" and 19.22". This is a difference of 8.27 meters. The equipment in 1962 was quite bulky and I think that this later value represented the HIRAN antenna position and that the astro was located the 8.27 meters away. Another reason for having the astro point and the antenna some distance apart is that they would be making the HIRAN measurements simultaneous with or before they would complete the astro observations." The ellipsoid of reference for the Zanderij Datum of 1962 is the International 1924 where $a = 6,377,388$ m and $1/f = 297$. The projection adopted for this datum is the Suriname Gauss-Krüger Transverse Mercator Grid, where the Central Meridian $\lambda_0 = 55^\circ 41'$ W, the False Northing = zero, and the False Easting = 500 km. Two scale factors at origin have been noticed with this grid: $m_0 = 0.99975$ and $m_0 = 0.9999$, the latter observed on some 1:50,000-scale maps dated around 1978. The most common scale factor for the Suriname TM Grid is $m_0 = 0.99975$.

In 1996, the U.S. National Geodetic Survey observed a number of positions with GPS receivers, one point being "008 Astro ECC 19" where $\phi = 5^\circ 26' 54.62257''$ N and $\lambda = 55^\circ 12' 19.04''$ W. Although this is a different point than the old datum origin, the similarity of the coordinates

show how close the NAD83 Datum is to the old Zanderij 1962 Datum. Proof of the pudding is the three-parameter shift values published by NIMA in TR8350.2, 03 January 2000 where from Zanderij to WGS84: $\Delta X = -265\text{m} \pm 5\text{m}$, $\Delta Y = +120\text{m} \pm 5\text{m}$, and $\Delta Z = -358\text{m} \pm 8\text{m}$. The NIMA solution was based on five collocated points. Thanks for a lot of help on Suriname go to John W. Hager and to Mark Nettles.

Update

A fascinating account of a boundary recovery survey used in the Guyana-Suriname Maritime Boundary Delimitation by David H. Gray of Ottawa Canada is found at:

<https://pdfs.semanticscholar.org/6bc4/c38aa6bdbac5a7359a6714d90eb9e9193ae8.pdf>

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On my Intel i7/32GB RAM computer, these files were generated in less than five seconds at the command prompt! To be fair, you can also generate the files using the LP360 GUIs following the LP360 user-manual instructions, but for large projects involving several hundred .LAS files, the command prompt is really convenient. And do not forget, you can call these programs from scripts.

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