



LGS-AO: Starlist Processing

Author	Date	Comment
Jlyke	03 June 2007	Original
mkassis	03 June 2007	Added steps 4 & 5, modified step 3
mkassis	6 Aug 2009	Added steps 7-11 to document LCH starlist submission procedures
jlyke	04 Nov 2009	Revised procedure to reflect process_list changes
mkassis	02 Dec 2009	Updated SBMs e-mail address and appendix 6
jlyke	09 Dec 2009	Revised for telescope argument
Jlyke	17 Apr 2012	Added -notoo, -nodat, -noeng args
Jlyke	31 Jan 2014	Added process_spiral, add_space_event
Jlyke	02 Jun 2014	Updated for space-track.org use
Jlyke	02 May 2017	Documented -nodup and -moreeng options

Contents:

1. Background
2. Sending a list to Space Command (*i.e.* Laser Clearinghouse, US Strategic Command, *etc.*)
3. Receiving a clearance list from Space Command
4. Adding a space event (*i.e.* blanket closure)

Background: LGS-AO observers submit starlists to Keck at least 3 days before their observations so that we can send the targets to Space Command. The LGS-AO software and Space Command each require a specific starlist format. A small number of ToO targets will be added by default to the lists. There are command line arguments for skipping the ToO targets.

1. Sending and Receiving lists are done as kics@HQ.
2. Adding a space event is done by kNobsao@kNaoserver
3. Code for Sending a list and Receiving a list is at HQ in these locations:
 - a. /home/kics/starlists/util/
 - b. /home/k2ao/IDL/lgsao/
4. Code for Adding a space event is at the summit in these locations:
 - a. /net/kalahuipuaa/local/apps1/kroot/summit/instr/bin
 - b. /home/k2obsao/randyc (until a permanent location is defined)

Sending a List:

1. Open a web browser and go to <http://www/software/starListPage/StarListsPage.php>.
2. Download the starlist(s) for the UT date of the observing night and note the filename (should be something like 000024.dat).
3. Log in to HQ machine as kics



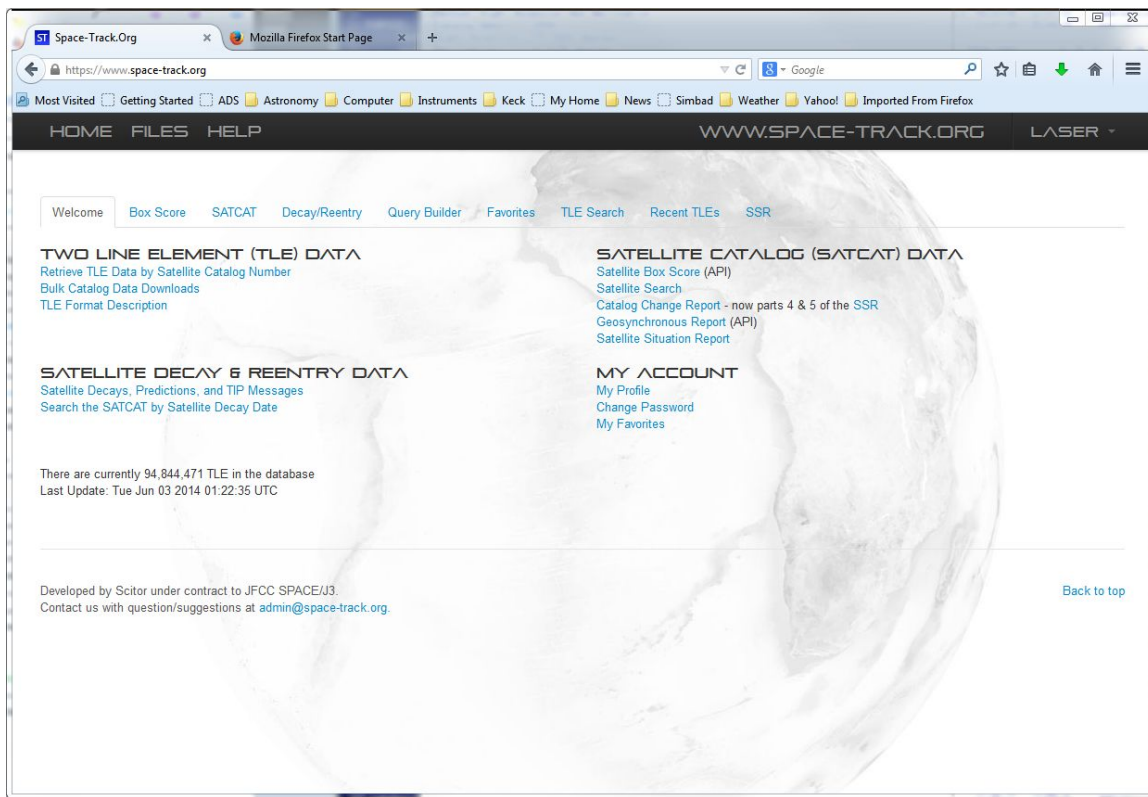
4. Cd to /home/kics/starlists/<tel>, where <tel> is k1 or k2. Hereafter, we shall assume k2.
5. Create a directory for the UT date of observation in the format “yymmdd” (*e.g.* 120418).
6. Cd to the directory you just created.
7. Copy the starlist(s) that you downloaded into the directory. If there are multiple starlists, combine them into one list. The “.dat” suffix is required.
8. Use one of the following methods to process the list:
 - a. One starlist (specifically one “*.dat” file):
 - i. Run “process_list” with no arguments
 - b. Multiple starlists (more than one “.dat” file)
 - i. Run “process_list starlist_file yymmdd” (*e.g.* process_list 000024.dat 070609)
 - c. Skip ToO:
 - i. Run “process_list –notoo”
 - d. No starlist (you just want the engineering stars):
 - i. Run “process_list –nodat”
 - e. Skip eng stars (your starlist is an engineering list):
 - i. Run “process_list –noeng”
 - f. Add more eng stars (you want 50 eng stars)
 - i. Run “process_list –fulleng” (can also use –moreeng or –alleng arguments to do the same thing)
 - g. Skip the duplicate check (only if prompted and you know the duplicate is a false positive)
 - i. Run “process_list –nodup”
 - ii. False positives are possible because the duplicate check only checks RA to 3 decimal places
9. See Appendix 1 for the processing details. Email output is sent to spacemail@keck.hawaii.edu
 - a. lgs070609.lst as attachment
 - b. lgs070609.notup as attachment if targets are unobservable
 - c. 2x PRM files as output by process_clearinghouse
10. (optional) Forward the 1 or 2 emails originally sent to the SAs to the observers. If observers respond by the Space Command deadline, fine. If not, fine.
11. Save the 2 PRM files (Az/El and RA/Dec) to a location visible by your browser
12. Upload the 2 PRM files to <https://www.space-track.org>.
 - a. User: laser@keck.hawaii.edu
 - b. Password: In “showpasswords”
 - c. Note: as of June 2, 2014, Chrome was unwilling to download files from the space-track.org site (see screenshot).
13. Homepage of laser@keck.hawaii.edu on <https://www.space-track.org>



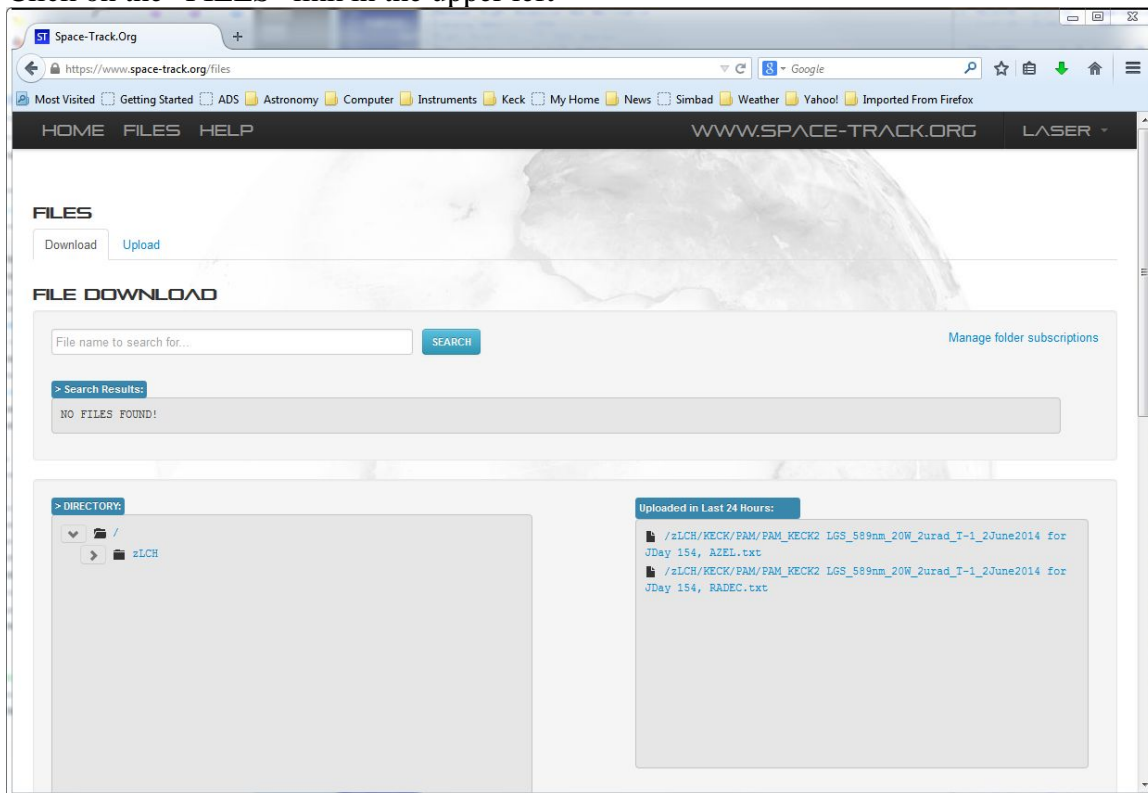
KECK INSTRUMENT TECHNICAL NOTE

KITN: 0003

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14. Click on the “FILES” link in the upper left





15. Click on the “Upload” tab

Space-Track.Org

https://www.space-track.org/files/#/upload

Most Visited Getting Started ADS Astronomy Computer Instruments Keck My Home News Simbad Weather Yahoo! Imported From Firefox

HOME FILES HELP WWW.SPACE-TRACK.ORG LASER

FILES

Download Upload

UPLOAD FILES

Browse... No files selected.

Destination

/zLCH/KECK/PRM

UPLOAD

MY UPLOADS (LAST 30 DAYS):

File Path	File Name	Uploaded
NO FILE DATA ...		

INSTRUCTIONS:

- Select a file no larger than 20 MBs for upload.
- Choose the appropriate destination to upload to.

Developed by Scitor under contract to JFCC SPACE/J3. Back to top

16. Click on “Browse...” to select both the Az/El and RA/Dec PRM files for your JDay

17. Select “zLCH/KECK/PRM” from the “Destination” drop list

18. Click the green “UPLOAD” button

19. Send an alert email to USStratcom@keck.hawaii.edu to inform USStratCom that we have uploaded PRM files. USStratcom is an internal mail alias that includes the following email addresses:

- JSpOCSSAOps@vandenberg.af.mil
- JSpOCSSAOps@us.af.mil
- UDG_614AOCDET1_SSAOPS@us.af.mil

Notes:

Contents of /home/kics/starlists/k2/120415/:

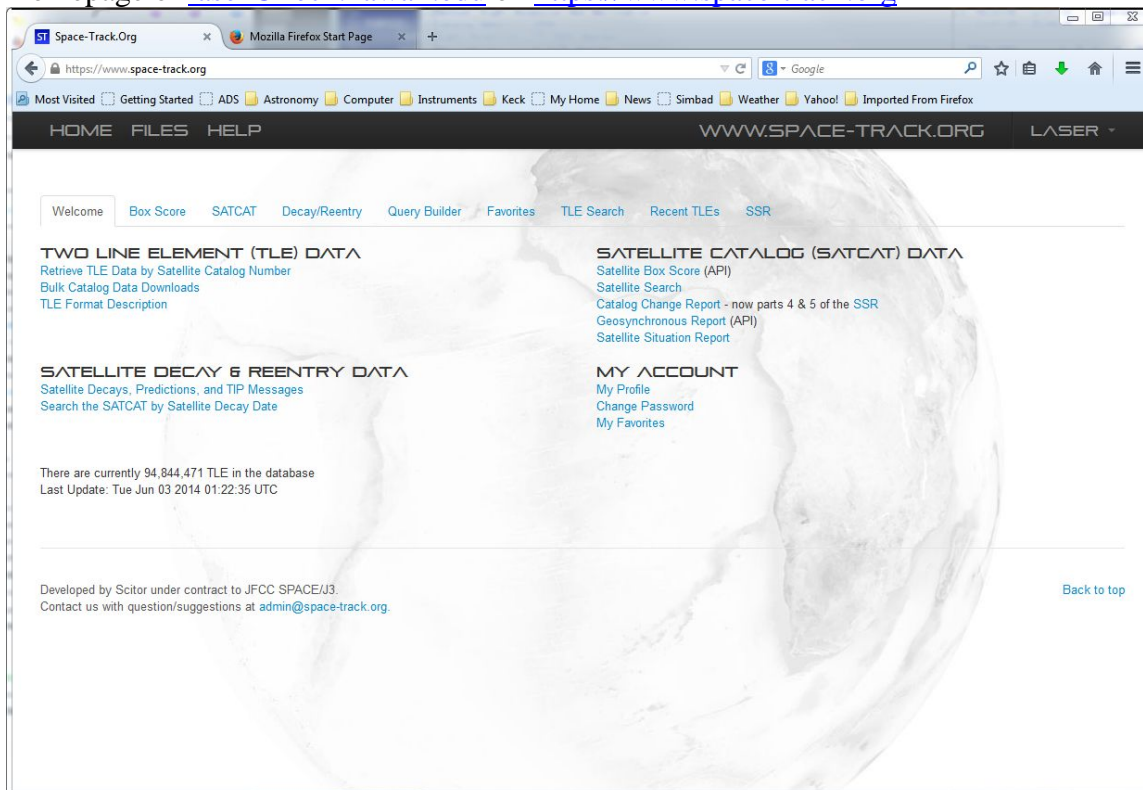
```
000636.dat*
lgs120415_sc.all
lgs120415_sc.lst
lgs120415_sc.txt
lgs120415.all
lgs120415.log
lgs120415.lst
lgs120415.lst.edit
lgs120415.nochange
lgs120415.norename
lgs120415.notup
lgs120415.orig*
```



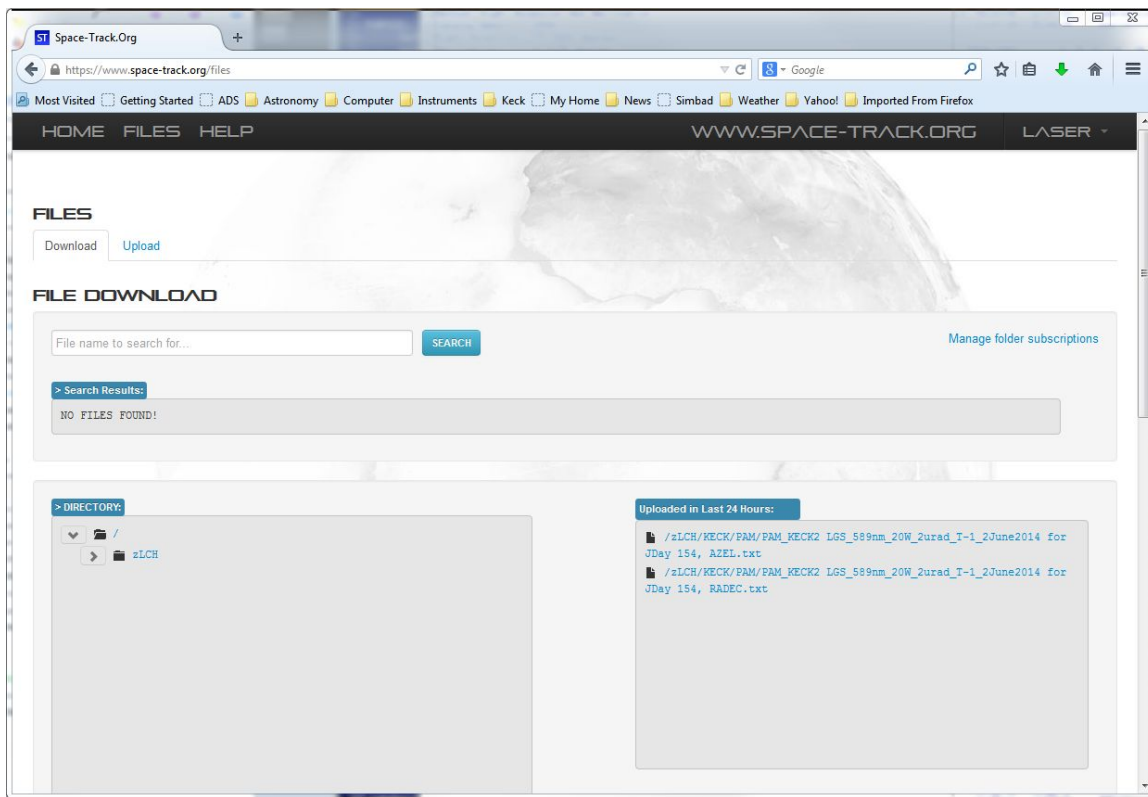
```
lgs120415.pre_flagmove
lgs120415.txt*
old/
opensDos120415.txt
opensForSA.txt
opensUnix120415.txt
PAM_KECK2_LGS_589nm_20W_2urad_T-2_20120413_JDAY106_AZEL.txt*
PAM_KECK2_LGS_589nm_20W_2urad_T-2_20120413_JDAY106_RAD.txt*
PRM_KECK2_LGS_589nm_20W_2urad_20120410_for J-Day 106_AZ-EL.txt
PRM_KECK2_LGS_589nm_20W_2urad_20120410_for J-Day 106_RA-DEC.txt
tempaz.txt
tempa.txt
tych120415_v10.lst
ul.out
u2.out
unique.check
unique.check2
```

Receiving a List:

1. The laser@keck.hawaii.edu email alias will receive an email from JSpOC or an SBM alerting us to new PAM files in the space-track.org account.
2. Download the 2 PAM files from <https://www.space-track.org>.
 - a. User: laser@keck.hawaii.edu
 - b. Password: In “showpasswords”
 - c. Note: as of June 2, 2014, Chrome was unwilling to download files from the space-track.org site (see screenshot). Firefox on PC works.
3. Homepage of laser@keck.hawaii.edu on <https://www.space-track.org>



4. Click on the “FILES” link in the upper left



5. Typically, the 2 PAM files for your JDay will be in the “Uploaded in Last 24 Hours:” section on the right. If not navigate within the “>DIRECTORY:” section on the left. The files should be in /zLCH/KECK/PAM/
6. Right click on each PAM file and select “Save Line As...”
 - a. Note that Firefox may trim the filename after the first space. You should save the file with the appropriate JDAY and AzEl or RaDec designation and NO spaces (IDL no-likey) (e.g.)
 - i. PAM_KECK2_JDAY154_AzEl.txt
 - ii. PAM_KECK2_JDAY154_RaDec.txt
7. If you do not see this email by 2 pm on the day of observing:
 - a. Login to <https://www.space-track.org> and see if the files are there
 - b. If the files are not there, you need to phone Space Command. The number is available internally at <http://www.keck.hawaii.edu/optics/ao/operations/contacts.html>.
8. As `kics@some_hq_machine`, copy the PAM files to `/home/kics/starlists/k2/140119` (or the appropriate directory)
9. Run `process_spiral`, you will be prompted to select 3 files:
 - a. The laser starlist (`lgs140119.lst`—note—NOT `k2lgs140119.lst`)
 - b. The PAM RA/Dec file (there can be no spaces in the filename)
 - c. The PAM Az/El file (there can be no spaces in the filename)

10. Successful output:

```
puhala{kics}434: process_spiral
```

IDL Version 6.0, Solaris (sunos sparc m64). (c) 2003, Research Systems, Inc.



Installation number: 2182-1.

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*****NOTE FOR Solaris USERS*****

The Motif library supplied by Sun in Solaris 8 requires a patch, available free of charge from <http://www.sunsolve.sun.com>, before it will work properly with IDL. Without this patch, editable text and table widgets may cause the IDL program to crash. The patch number is 108940-23, for both 32 and 64-bit Sparc platforms.

```
% Compiled module: PROCESS_SPIRAL.
/home/kics/starlists/k2/140117/lgs140117.lst
/home/kics/starlists/k2/140117/lgs140117.lst
% Compiled module: READSTARLIST.
% Compiled module: COPY_STRUCT.
/home/kics/starlists/k2/140117/PAM_KECK2_LGS_J-Day017_RA-DEC.txt
/home/kics/starlists/k2/140117/PAM_KECK2_LGS_J-Day017_RA-DEC.txt
% Compiled module: READ_SPIRAL_WINDOWS.
KECK2
      17      1      2014
      17      1      2014
/home/kics/starlists/k2/140117/PAM_KECK2_LGS_JDay017AzEl.txt
/home/kics/starlists/k2/140117/PAM_KECK2_LGS_JDay017AzEl.txt
% Compiled module: READ_ZENITH_WINDOWS.
% Compiled module: OBSERVATORY.
% Compiled module: TEN.
% Compiled module: JULDAY.
% Compiled module: CT2LST.
% Compiled module: SUNPOS.
% Compiled module: EQ2HOR.
% Compiled module: CO_NUTATE.
% Compiled module: NUTATE.
% Compiled module: POLY.
% Compiled module: CIRRRANGE.
% Compiled module: ISARRAY.
% Compiled module: CO_ABERRATION.
% Compiled module: HADEC2ALTAZ.
% Compiled module: MINMAX.
% Compiled module: RADEC.
Renaming ./opensForSA.txt to opensDos140117.txt in dos format
could not open /dev/kbd to get keyboard type US keyboard assumed
could not get keyboard type US keyboard assumed
Moving ./sat_opens.txt to /net/k2aoserver/k2aodata/nightly/14/01/17/sat_opens.txt for permissive code
Moving ./idl_opens.sav to /net/k2aoserver/k2aodata/nightly/14/01/17/idl_opens140117.sav
```

Notes:

- The file sat_opens.txt is used by the “Backend” tool to ensure the laser is shuttered during predictive avoidance closures.
- The file idl_opensYYMMDD.sav is used by the Spiral or “Frontend” tool to nicely shutter the laser during PA closures.

Adding a Space Event:



1. A space event typically results in an all-sky or blanket closure. In the past, these have been from a few minutes to a few nights! Mostly they are on the minutes timescales
2. Run `add_space_event` as `kNobsao@kNaoserver` via command line or AO VNC sessions (must have `Xdisplay` set properly)
 - a. AO VNC sessions, right-click for menu then
 - i. KN AO Tools -> LGSAO Ops -> Add Space Event
3. Enter
 - a. Number of closures
 - b. Start UT
 - c. End UT
4. An IDL dialog will prompt you to select the `idl_opensYYMMDD.sav` file
5. You will be prompted whether you wish to restart the Spiral and Backend Tools. Note that restarting will shutter the laser.
6. Output in AO nightly, will be
 - a. New:
 - i. `idl_opensYYMMDD.sav`
 - ii. `sat_opens.txt`
 - iii. `opensForSA.txt`
 - iv. `opensUnixYYMMDD.txt`
 - v. `opensDosYYMMDD.txt`
 - b. `add_space_event.log`
 - c. Old:
 - i. `idl_opensYYMMDD_HH:MM:SS.sav`
 - ii. `sat_opensYYMMDD_HH:MM:SS.txt`
 - iii. `opensForSAYYMMDD_HH:MM:SS.txt`

Notes:

- The Spiral and Backend tools MUST be restarted for the changes to take effect.
- The timestamp will be when `add_space_event` was run



• Appendices:

1) process_list processing details:

1. moves files from previous iterations of process_list to
/home/kics/starlists/yymmdd/old/
2. starts a logfile (lgsymmdd.log)
3. cp .dat file to lgsymmdd.orig
4. calls check_equ.pl lgsymmdd.lst
 - a. checks that lgs targets are using J2000.0 coordinates. Exits if not.
5. calls scopy:
 - a. cp .orig file to .txt
 - b. dos2unix .orig file to .lst
6. calls move_lgsflag:
 - a. "lgs=1" flag moved to end of line
7. calls detab.pl lgsymmdd.lst
 - a. changes tabs to spaces
 - b. removes proper motions
 - c. removes differential rates
8. changes "*" to "+" and "?" to "_" via sed
9. mv .lst to .norename
10. calls rename_tt.pl lgsymmdd.norename > lgsymmdd.lst
 - a. changes all tt stars to "ttXXX" where XXX is a number starting at 000
11. calls checkForDup lgsymmdd.lst
 - a. looks for duplicate target names and exits if found
12. calls checkForDupCoord lgsymmdd.lst
 - a. looks for duplicate target coordinates and exits if found
 - b. may be a false positive (only checks 3 decimal places). If so, you may re-run process_list with a "-nodup" option. The script will prompt you.
13. check for b-v flags
14. calls tychoL [-a] -d dd mm yyyy
 - a. uses /home/kics/starlists/master_tycho_list_v10 to find 22 (50 with -a option) engineering stars
 - b. if lgs targets plus engineering stars are greater than maxtargs (400) exits, else prepends the eng stars to the .lst file
15. calls spacecom dd mm yyyy
 - a. strips off tt stars
 - b. adds zenith
 - c. calculates if targets are observable
16. calls rm_notup.pl yymmdd
 - a. strips unobservable targets from lgsymmdd_sc.* and lgsymmdd.lst
17. calls process_clearinghouse lgsymmdd_sc.txt
 - a. email is sent to spacemail with PRM files attached
18. cp .lst up to /kroot/starlists/laser/
19. send mail to laser SAs with attachment of lgsymmdd.lst



20. if rm_notup.pl stripped any targets, sends those targets in separate attachment for observers

2) process_clearinghouse code that is a wrapper for IDL code. See appendix three and four for header information on the IDL code.

```
#!/bin/csh -f
#
# CSH Wrapper for the process_clearinghouse.pro function. Process
# clearinghouse reads and processes the *.sc files so that targets
# are properly formatted for the space command clearinghouse program.
# It will generate two files.
source ~kics/starlists/misc/idl60_setup
setenv LM_LICENSE_FILE /sol/apps/flexlm/licenses/license.apua

set DIR = $PWD
set DCODE = `pwd | sed -e 's/.*starlists\\//'^
set NIGHTLY = `echo $DCODE | sed -e "s/(\\.\\.)(\\.\\.)(\\.\\.)/1/2/3/"`
if ( $1 == "" ) then
    echo "USAGE: process_spiral lgslst_sc.txt"
    exit -1
endif

idl <<here
.r process_clearinghouse
pcboth, '$1'
here
```



3) Header for process clearinghouse IDL pro file. The script is found in /home/k2ao/IDL/lgsao under the k2oa account.

```
*****
;
; NAME:
;   PROCESS_CLEARINGHOUSE
;
; PURPOSE:
;   Take the output from process_list and creates a file
;   that may be sent to the Laser Clearing house.
;   The goal is to put the starlist in a format that
;   is accepted by the "Spiral 3" software used by
;   LCH to list the open windows for observing.
;   Removes the non-lgs targets.
;
;
; CALLING SEQUENCE:
;   process_clearinghouse, starlist, utdate
;
; INPUTS:
;   starlist - the starlist as output from process_list.
;   This starlist has the filename like lgs090717_sc.txt
;   AZ-EL targets must appear before the RA-Dec targets
;   in this starlist.
;   utdate   - UTdate for the observations
;
;
; OUTPUTS:
;   outfile - properly formatted starlist for LCH
;   If the outfile already exists, the old outfile is moved to a
;   file with the same name + a suffix of the version number.
;   A new version number increase each time the software is run.
;
;   Two examples of outfiles are the following:
;   PRM_KECK LGS_generated 20090714(UTC)_for J-Day 198 (20090717)_AZ-EL.txt
;   - contains only the zenith position for the laser in Az-El format.
;   PRM_KECK LGS_generated 20090714(UTC)_for J-Day 198 (20090717)_RA-DEC.txt
;   - contains the coords for all observer targets in RA-Dec formats.
;
; OPTIONAL INPUT KEYWORDS:
;   COORDFLAG=coordflag so that we know to process either RA-DEC or AZ-EL
;   AZLIST = target list for AZ-EL coordinates.
;
; EXAMPLE:
;   process_clearinghouse lgs090717_sc.txt 090717
;
; ERROR HANDLING:
;
; RESTRICTIONS:
;
; NOTES:
;
; PROCEDURES USED:
```



```
; month_convert
;
;
; MODIFICATION HISTORY:
; 2008 Sep 01 MK Original Version
; 2008 Sep 30 MK Updated with formatting and content changes specified by CM
; Created left_justify function
; 2008 Oct 02 MK Updated with formatting and content changes specified by CM
; 2008 Oct 06 MK Updated with formatting and content changes specified by CM
; 2009 Jul 14 MK Updated with more documentation.
; 2009 Jul 22 MK Added ability to use more AZ-EL targes with a new file.
; *****
```



4) Header for pcboth IDL pro file. The script is found in /home/k2ao/IDL/lgsao under the k2ao account.

```
*****
;
; NAME:
;   PCBOTH
;
; PURPOSE:
;   Take the output from process_list and creates a file
;   that may be sent to the Laser Clearing house.
;   This is a wrapper script for process_clearinghouse which
;   which does all the work for formatting. This script
;   runs process_clearinghouse twice: once for the RA-DEC
;   coords and a second time for the AZ-EL coords. The files
;   generated by process_clearinghouse are then e-mailed
;   by this script to people on the spacemail distribution
;   list available in MSoffice.
;
;
; CALLING SEQUENCE:
;   pcboth, starlist
;
; INPUTS:
;   starlist - the starlist as output from process_list.
;   This starlist has the filename like lgs090717_sc.txt
;
; OUTPUTS:
;   outfile - (see process_clearinghouse.pro)
;
;
; OPTIONAL INPUT KEYWORDS:
;
; EXAMPLE:
;   pcboth starlist
;
; ERROR HANDLING:
;
; RESTRICTIONS:
;
; NOTES:
;
; PROCEDURES USED:
;   process_clearinghouse
;
; MODIFICATION HISTORY:
;   2008 Sep 01 MK Original Version
;   2009 Jul 14 MK Updated with more documentation.
*****
```



5) PI starlist confirmation email(s). If targets are not up, a second email is sent to you.

Forward these to the observers.

/home/kics/starlists/list.msg:

Dear Observer,

The attached file is your processed LGS starlist. All targets with "lgs=1" will be sent to Space Command for laser approval. This is the starlist that you will use during your night.

Please note that we have renamed your tip/tilt stars "ttXXX" to ease communications between you and the observing assistant (OA).

We have appended several "engXXX" stars that we use for LGS checkout.

Thank you,

Keck AO Operations Team

/home/kics/starlists/notup.msg

Dear Observer,

Our processing has shown that the targets in the attached file are not observable during your upcoming LGS night. These targets and their tip/tilt stars have been removed from your starlist and will not be sent to Space Command for laser approval.

A typo in coordinates may have produced this result. Please inspect the file to ensure we do not miss a high priority target.

Thank you,

Keck AO Operations Team

6) Example e-mail sent to SBMs for starlist approval. Forward the email you receive with the two PRM* file attached.

a) AZ-EL PRM

b) RA-DEC PRM

To: JSpOCSSAOps@vanderberg.af.mil

Subject: Keck PRM for JD **198**

Aloha SBMs,

Keck Observatory's Laser Clearinghouse request for **July 17** Zulu is attached. It includes **one** az/el target (zenith) and **71** RA/dec targets.

Regards,

Randy Campbell
Keck Observatory



Email method for sending and receive lists from USStratCom

(superceded by <https://www.space-track.org> method)

Sending a List:

1. Open a web browser and go to <http://www/software/starListPage/StarListsPage.php>.
2. Download the starlist(s) for the UT date of the observing night and note the filename (should be something like 000024.dat).
3. Log in to HQ machine as kics
4. Cd to /home/kics/starlists/<tel>, where <tel> is k1 or k2. Hereafter, we shall assume k2.
5. Create a directory for the UT date of observation in the format “yymmdd” (e.g. 120418).
6. Cd to the directory you just created.
7. Copy the starlist(s) that you downloaded into the directory. If there are multiple starlists, combine them into one list. The “.dat” suffix is required.
8. Use one of the following methods to process the list:
 - a. One starlist:
 - i. Run “process_list” with no arguments
 - b. Multiple starlists (more than one “.dat” file)
 - i. Run “process_list starlist_file yymmdd” (e.g. process_list 000024.dat 070609)
 - c. Skip ToO:
 - i. Run “process_list –notoo”
 - d. No starlist (you just want the engineering stars):
 - i. Run “process_list –nodat”
 - e. Skip eng stars (your starlist is an engineering list):
 - i. Run “process_list –noeng”
9. See Appendix 1 for the processing details. Email output is sent to spacemail@keck.hawaii.edu
 - a. lgs070609.lst as attachment
 - b. lgs070609.notup as attachment if targets are unobservable
 - c. 2x PRM files as output by process_clearinghouse
10. (optional) Forward the 1 or 2 emails originally sent to the SAs to the observers. If observers respond by the Space Command deadline, fine. If not, fine.
11. Check e-mail and save files attached to e-mail “Laser Clearinghouse starlist files for J-Day XXX (YYYYMMDD).” Check formatting on files: number of targets; check J-Day, etc. JDate Calculator web link: <http://www-air.larc.nasa.gov/tools/jday.htm>
12. Although not a hard limit, we recommend forwarding the PRM email to USStratcom@keck.hawaii.edu 72 hours before observing. See Appendix 6 for example e-mail text. USStratcom is an internal mail alias that includes the following email addresses:



- a. JSpOCSSAOps@vandenbergh.af.mil
- b. JSpOCSSAOps@us.af.mil
- c. UDG_614AOCDT1_SSAOPS@us.af.mil

13. (optional) Call to confirm receipt of files. Do this 15 min after submission.

Notes:

Contents of /home/kics/starlists/k2/120415/:

```
000636.dat*
lgs120415_sc.all
lgs120415_sc.lst
lgs120415_sc.txt
lgs120415.all
lgs120415.log
lgs120415.lst
lgs120415.lst.edit
lgs120415.nochange
lgs120415.norename
lgs120415.notup
lgs120415.orig*
lgs120415.pre_flagmove
lgs120415.txt*
old/
opensDos120415.txt
opensForSA.txt
opensUnix120415.txt
PAM_KECK2_LGS_589nm_20W_2urad_T-2_20120413_JDAY106_AZEL.txt*
PAM_KECK2_LGS_589nm_20W_2urad_T-2_20120413_JDAY106_RAD.txt*
PRM_KECK2_LGS_589nm_20W_2urad_20120410_for_J-Day_106_AZ-EL.txt
PRM_KECK2_LGS_589nm_20W_2urad_20120410_for_J-Day_106_RA-DEC.txt
tempaz.txt
tempra.txt
tych120415_v10.lst
u1.out
u2.out
unique.check
unique.check2
```

Receiving a List:

1. Predictive Avoidance (PAM) files are received by the laser@keck.hawaii.edu email alias. Sometimes they arrive from a JSpOC address, sometimes the SBM's address. There should be two files with filenames like:
 - a. PAM_KECK2_LGS_589nm_20W_2urad_T-1_16Jan2014 for JDay 017, AZEL.txt
 - b. PAM_KECK2_LGS_589nm_20W_2urad_T-1_16Jan2014 for JDay 017, RADEC.txt
2. If you do not see this email by 2 pm on the day of observing:
 - a. Ask Randy or Bob if they received the files (they are the official contacts and sometimes the SBM's do not use the laser alias)
 - b. If they don't have it, you need to phone Space Command. The number is available internally at <http://www.keck.hawaii.edu/optics/ao/operations/contacts.html>.



3. Save the PAM files to a unix-accessible location. We strongly suggest you remove the extraneous spaces from the filenames
4. As kics@some_hq_machine, copy the PAM files to /home/kics/starlists/k2/140119 (or the appropriate directory)
5. Run process_spiral, you will be prompted to select 3 files:
 - a. The laser starlist (lgs140119.lst—note—NOT k2lgs140119.lst)
 - b. The PAM RA/Dec file (there can be no spaces in the filename)
 - c. The PAM Az/El file (there can be no spaces in the filename)
6. Successful output:

puhala[kics]434: process_spiral

IDL Version 6.0, Solaris (sunos sparc m64). (c) 2003, Research Systems, Inc.

Installation number: 2182-1.

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*****NOTE FOR Solaris USERS*****

The Motif library supplied by Sun in Solaris 8 requires a patch, available free of charge from <http://www.sunsolve.sun.com>, before it will work properly with IDL. Without this patch, editable text and table widgets may cause the IDL program to crash. The patch number is 108940-23, for both 32 and 64-bit Sparc platforms.

% Compiled module: PROCESS_SPIRAL.

/home/kics/starlists/k2/140117/lgs140117.lst

/home/kics/starlists/k2/140117/lgs140117.lst

% Compiled module: READSTARLIST.

% Compiled module: COPY_STRUCT.

/home/kics/starlists/k2/140117/PAM_KECK2_LGS_J-Day017_RA-DEC.txt

/home/kics/starlists/k2/140117/PAM_KECK2_LGS_J-Day017_RA-DEC.txt

% Compiled module: READ_SPIRAL_WINDOWS.

KECK2

17 1 2014

17 1 2014

/home/kics/starlists/k2/140117/PAM_KECK2_LGS_JDay017AzEl.txt

/home/kics/starlists/k2/140117/PAM_KECK2_LGS_JDay017AzEl.txt

% Compiled module: READ_ZENITH_WINDOWS.

% Compiled module: OBSERVATORY.

% Compiled module: TEN.

% Compiled module: JULDAY.

% Compiled module: CT2LST.

% Compiled module: SUNPOS.

% Compiled module: EQ2HOR.

% Compiled module: CO_NUTATE.

% Compiled module: NUTATE.

% Compiled module: POLY.

% Compiled module: CIRRRANGE.

% Compiled module: ISARRAY.

% Compiled module: CO_ABERRATION.

% Compiled module: HADEC2ALTAZ.

% Compiled module: MINMAX.

% Compiled module: RADEC.

Renaming ./opensForSA.txt to opensDos140117.txt in dos format



could not open /dev/kbd to get keyboard type US keyboard assumed

could not get keyboard type US keyboard assumed

Moving ./sat_opens.txt to /net/k2aoserver/k2aodata/nightly/14/01/17/sat_opens.txt for permissive code

Moving ./idl_opens.sav to /net/k2aoserver/k2aodata/nightly/14/01/17/idl_opens140117.sav

Notes:

- The file sat_opens.txt is used by the “Backend” tool to ensure the laser is shuttered during predictive avoidance closures.
- The file idl_opensYYMMDD.sav is used by the Spiral or “Frontend” tool to nicely shutter the laser during PA closures.