# **Observer Target List User Manual**

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**DeVeny Manual** 

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This app is a simple interface for sending science targets to the TCS:

•	•			Observer Tar	get List				
Obse a: Prope Rotat Differ	rver Catalog ID: er Motion (α,δ@epoch): or PA: ential Tracking Rate (α,δ):	0 00:00:00.000 0.0,0.0@2000.0 0.0 0.0,0.0	O <b>δ</b> : M Re	bject Name: agnitude: btator Frame:	Test +00:00:00.00 -1.0 Target	D	Exte	Send to T Clear Offs rnal Target Comman	CS ets d: Preview/Direct
Sky Plot Sky Plot The computed columns (air mass, AZ, EL) can be updated by a re-sort.									
□ landolt92.tls 🛛									
ID ·	<ul> <li>Name</li> </ul>	Right Ascension	Declination	Magnitude	Air Mass	Azimuth	Elevation	Time of Transit	
0	Test	00:00:00.000	+00:00:00.00	-1.0	1.33	141.61	48.61	15:01	
1	TPHE_A	00:30:09.000	-46:31:22.00	14.651	14.57	158.67	3.93	15:31	
2	TPHE_B	00:30:16.000	-46:27:55.00	12.334	14.42	158.63	3.98	15:31	
3	TPHE_C	00:30:17.000	-46:32:34.00	14.376	14.68	158.66	3.91	15:31	
4	TPHE_D	00:30:18.000	-46:31:11.00	13.118	14.60	158.65	3.93	15:31	
5	TPHE_E	00:30:19.000	-46:24:36.00	11.63	14.25	158.60	4.02	15:31	
6	TPHE_F	00:30:50.000	-46:33:33.00	12.474	14.89	158.58	3.85	15:32	
7	TPHE_G	00:31:05.000	-46:22:43.00	10.442	14.36	158.46	3.99	15:32	
8	PG0029+024	00:31:50.000	+02:38:26.00	15.268	1.38	129.74	46.20	15:33	
9	PG0039+049	00:42:05.000	+05:09:44.00	12.877	1.38	124.55	46.42	15:43	
10	92_309	00:53:14.000	+00:46:02.00	13.842	1.51	125.80	41.30	15:54	
11	92_311	00:53:16.000	+00:48:29.00	10.595	1.51	125.75	41.32	15:54	
12	92_322	00:53:47.000	+00:47:33.00	12.676	1.52	125.64	41.22	15:55	
13	92_245	00:54:16.000	+00:39:51.00	13.818	1.52	125.63	41.05	15:55	
14	92_248	00:54:31.000	+00:40:15.00	15.346	1.52	125.56	41.01	15:55	
15	92_249	00:54:34.000	+00:41:05.00	14.325	1.52	125.54	41.01	15:55	
16	92_250	00:54:37.000	+00:38:56.00	13.178	1.52	125.56	40.98	15:55	
17	92_330	00:54:44.000	+00:43:26.00	15.073	1.52	125.46	41.01	15:56	
18	92 252	00:54:48.000	+00:39:23.00	14,932	1.52	125.51	40.95	15:56	

The list is loaded into the app via an input text file and displayed in a table. The first 2 lines in the input file are meta data containing information about the optional data. An example is shown below with all the optional data included:

```
#title=true ra=true dec=true epoch=false muRA=true muDec=true magnitude=true dRA=true dDec=true
rotatorPA=true rotatorFrame=true comment=true
#
"Vega - Alpha Lyrae" 18:36:56.336 +38:47:01.28 200.94 286.23 0.03 1.0 2.0 3.0 Target "line 1"
"HR 173 - HD 3795" 00:40:32.809 -23:48:17.56 635.18 -363.56 6.14 1.0 2.0 3.0 Fixed "line 2"
```

Title, Right Ascension, and Declination are required parameters and the rest are optional. The first line of the meta data declares which parameters will be supplied in the input file. The order of the columns cannot change and the only thing that can be edited in the first line is the true/false value for the column. In other words, the first line has to include all the parameters shown above. The second line is a simple separator and is also required.

The input parameters are:

- title or name (surrounded in double quotes) required it will be sent to the TCS as the science target name and cannot be blank
- Right Ascension (hh:mm:ss.sss) required the seconds can be either integer or float
- Declination (+/-dd:mm:ss.ss) required plus sign is optional for the degrees, and arc-seconds can be either integer or float
- Proper Motion in RA (mas/yr) this is the angular measurement used by most catalogs: xcos()
- Proper Motion in Dec (mas/yr) -
- Magnitude
- differential tracking rate in RA (arc seconds/hour)
- differential tracking rate in DEC (arc seconds/hour)
- rotator Postion Angle (degrees)
- rotator Frame ("Target" or "Fixed") a literal string without the guotes
- · comment (surrounded in double quotes) A convenience column for observer's use

The coordinates need to be in FK5 (J2000). Not all combinations of optional data make sense and the code is not robust enough to check for all the possible combinations. For instance; proper motion in RA and DEC should be supplied together.

The fields should all be separated by at least one space and the columns in the input file do not have to line up but extra spaces can be inserted so that they are more readable for the user. Magnitude is included in case the observer wishes to sort the table based on brightness. It is not used by the TCS and it is not sent as part of the command. The comment field is for the observer's convenience to include notes to make the table more user friendly. The value in this field is not sent to the TCS.

The table can be sorted by clicking on the column headers. First click does an ascending sort. Second click does a descending sort and third click reverts to original order.

The Menu Bar contains several items but the main item is File - Open Target List:

Observer Target List File Window Admin Help

Open Target List (o) will open a standard dialog box for selecting the input file. The default extension for the input file is \*.tls and all other types are greyed out. The input file has to be a standard ASCII text file but it can have any extension (or none at all). Binary file will not be read correctly.

The open file dialog box allows selection of other file extensions via a drop down menu. The user can choose "All Files (.)" from the file type drop down menu and that allows selection of any file in the directory. They files other than \*.tls would still be grey but they can be selected and loaded into the app:

0.0.0	Open		
	🖩 🔹 🧰 data	1 (Q,	
FAVORITES All My Files Stoonern All My Files Stoonern Desktop Documents Documents Documents Downents Movies JT Masik Protures Dropbox Google Drive	Name generic:198.185 passeries.199.185 passeries.199.185 passeries.199.185 passeries.255.185 passeries.255.185 passeries.255.185 targetList.265 targetList.265 targetList.265 targetList.265 targetList.265 targetList.265 targetList.265		<ul> <li>Date Ma 91(6)11</li> <li>91(6)11</li> <li>2121/12</li> <li>12/22/0</li> <li>1281/09</li> <li>2/291/12</li> <li>10/12/00</li> <li>10/12/00</li> <li>9/14/11</li> <li>10/12/01</li> <li>9/14/11</li> <li>10/20/1</li> <li>9/14/11</li> <li>7/9/12</li> </ul>
	All Files (*.*)	+	
New Folder			Cancel Open

Multiple input files can be used during one session and each file would be loaded into a separate tab.

The process of sending the target to the TCS is a 2 step process. First a target is selected from the table. The data is loaded into the upper view for a final check by the observer. It can be sent to the TCS as a science target by pressing the "Send to TCS" button. It is important to remember that even though some times it looks like that a row is highlighted in the table, the observer still has to make sure that the intended target is echoed in the upper panel.

(1) The TCS may either go to the target immediately or load the target into the preview pane. The behavior can be selected on the TCS's UI and cannot be controlled by the observer from the app. The selection is persistent till changed by the operator.

The observer can tell which mode the TCS is in by looking at the "External Target Command" label below the "Send to TCS" button. There are 2 possible values for this label; Preview or Direct. "Direct" means that the TCS will immediately slew to the requested science target.

It is possible to edit an item in the table and send the modified target to the TCS. Double clicking on a cell should go to the edit mode and after the editing is done, the row needs to be selected again by clicking some where else and clicking back on the edited row. Up and Down arrows can also be used for row selection. Please verify that the intended values are echoed in the upper panel before sending the target to the TCS. First row in the table (ID=0) is a special row for sending a target that was not in the input file. All the cells are filled with default values which are meant to be edited by the observer.

#### A Backward Compatibility

The format for the input file to the Observer Target List was changed recently to be more flexible and also some what compatible with Slew /Dither function within the LMI LOUI. The code is compatible with the old style input file so existing the files would still work but it is recommended to change to the new style for sake of maintenance and the added functionality that may be offered in the future. For instance, the old style input file has no means for providing rotator position angle and rotator frame.

Please note that the old style format required epoch as input but it is set to false by default in the new format. Setting epoch to true for the new format will cause parsing errors and is not supported. The only reason that it exists in the meta data is for backward compatibility.

### **Computed Columns**

Every table includes three extra columns which are computed for DCT based on the current time; Air Mass, Azimuth, Elevation and Time of Transit. These columns are provided to aid the observer in target selection and are time dependent. A re-sort of any of the columns causes the data to be recalculated and the updated values are shown.

The Air Mass column can also be computed for a specified time of day. Right clicking on the table brings up the dialog box for entering the time (local) for the calculation. The column will be refreshed and the font color changes to blue to indicate that the air mass is not for current time. Re-sorting any of the columns will override the calculations and reverts back to current air mass.

The tooltips for all the computed column headers show the time when the calculation was performed.

## **Inline Editing**

The first displayed line in the table (ID=0) is basically a blank like to offer the user the opportunity to send a target to the TCS that was not included in the input file. All the columns except ID and the computed columns are editable but one has to make sure that the edited column has been accepted by the app.

One can also edit an existing column in case the original data was incorrect or incomplete. There is no save function in the app so all edited data are transitory.

As with other cases, it is essential to double check the values in the top panel before sending the target to the TCS. The act of editing does not cause the target to be selected and the edits are not reflected in the top panel automatically. In order to select the edited target one has to click on another row and then click back on the edited row to select it.

Another way to generate a target in real time is to use the "Editable Target View" button on the bottom right of the top panel. This generates a new view (tab) with one editable row in it, same as the first line in other windows. Functionally there is no difference between this view and the first line of a loaded target list. It is simply there in case an observer does not already have a target list and does not wish to load one of the built-in standard lists.

## Sky Plot

Clicking on the "Sky Plot" buttons brings up a polar plot of AZ vs EL (north is up) for the current table. Selecting a target on the plot highlights the row on the table. One has to remember that this plot is time dependent and the Update button will refresh it with current values. The only difference between the two buttons is the window size of the plot.



### **Example Input Data**

The simplest input file includes title, RA and DEC which are the minimal required data for the TCS.

```
#title=true ra=true dec=true epoch=false muRA=false muDec=false magnitude=false dRA=false dDec=false
rotatorPA=false rotatorFrame=false
#
"Vega - Alpha Lyrae" 18:36:56.336 +38:47:01.28
"HR 173 - HD 3795" 00:40:32.809 -23:48:17.56
```

#### Input File Validation

There is an app for validating the input file before showing up at the telescope, Validate Input List. This app is available as a Mac OS X, Windows, or Linux download in 32bit or 64bit versions.

# Standard Target Lists

There are some built in standard target lists that could be displayed from the menu bar, File - Open Standard Target List:

Obs	erver Target List	File window P	amin Heip	_				13 🔛	F: 3488MB Rx:	484B/s
	Contraction (Sector)	Open Target Lis	t	жо 📃						
		Open Standard	Target List		AA2014_ubvr	i				
					clem07					
0 0	0	Preferences		COLUMN 1	clem13					
		Quit			hbstand					
Observer Catalog ID: <b>«:</b>		Catalog ID:		Indal±00		Cond to TCC				
		Open File			landolt09		Send to TCS			
Prop	er Motion ( $\alpha$ , $\delta$ @epoch):	0.0,0.0@2000.0	landolt92		External Target Command: Preview/Dirg					
Rota	tor PA:	0.0	R	otator Fram	e: Target					
Diffe	rential Tracking Rate ( $\alpha$ ,	0): 0.0,0.0								
		The compute	d columns (ai	r mass /	AZ EL) can be	hotebruu	by a re-	sort		
		The compute	u columns (u	r muss, /	12, EL/ cuil be	upuuteu	by are	3010		
	2014_ubvri.tls 🔲 clem	07.tls 🗖 clem13.tls	🗆 hbstand.tls 📃	landolt09.	tls 🗖 landolt92.1	tls 🔀				-
ID	▼ Name	Right Ascension	Declination	µα*cos(δ)	μδ	Magnitude	dRA	dDEC	Air Mass	Azim
0	Test	00:00:00.000	+00:00:00.00	0.0	0.0	-1.0	0.0	0.0	1.46	229.
1	TPHE_A	00:30:09.000	-46:31:22.00	0.0	0.0	14.651	0.0	0.0	9.37	197.
2	TPHE_B	00:30:16.000	-46:27:55.00	0.0	0.0	12.334	0.0	0.0	9.28	197.
3	TPHE_C	00:30:17.000	-46:32:34.00	0.0	0.0	14.376	0.0	0.0	9.38	197.
4	TPHE_D	00:30:18.000	-46:31:11.00	0.0	0.0	13.118	0.0	0.0	9.35	197.
5	TPHE_E	00:30:19.000	-46:24:36.00	0.0	0.0	11.63	0.0	0.0	9.21	197.
6	TPHE_F	00:30:50.000	-46:33:33.00	0.0	0.0	12.474	0.0	0.0	9.36	197.
	TPHE G	00.31.05 000	-46.22.43 00	0.0	0 0	10 442	0.0	0.0	9.11	197.
7	TITLE O	00.51.05.000	10.22.10.00		0.0	10.115				
7 8	PG0029+024	00:31:50.000	+02:38:26.00	0.0	0.0	15.268	0.0	0.0	1.30	222.
7 8 9	PG0029+024 PG0039+049	00:31:50.000 00:42:05.000	+02:38:26.00 +05:09:44.00	0.0	0.0	15.268	0.0 0.0	0.0 0.0	1.30	222.
7 8 9 10	PG0029+024 PG0039+049 92_309	00:31:50.000 00:42:05.000 00:53:14.000	+02:38:26.00 +05:09:44.00 +00:46:02.00	0.0 0.0 0.0	0.0 0.0 0.0	15.268 12.877 13.842	0.0 0.0 0.0	0.0 0.0 0.0	1.30 1.24 1.28	222. 221. 213.
7 8 9 10 11	PG0029+024 PG0039+049 92_309 92_311	00:31:50.000 00:42:05.000 00:53:14.000 00:53:16.000	+02:38:26.00 +05:09:44.00 +00:46:02.00 +00:48:29.00	0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0	15.268 12.877 13.842 10.595	0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0	1.30 1.24 1.28 1.28	222. 221. 213. 213.
7 8 9 10 11 12	PG0029+024 PG0039+049 92_309 92_311 92_322	00:31:50.000 00:42:05.000 00:53:14.000 00:53:16.000 00:53:47.000	+02:38:26.00 +05:09:44.00 +00:46:02.00 +00:48:29.00 +00:47:33.00	0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0	15.268 12.877 13.842 10.595 12.676	0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0	1.30 1.24 1.28 1.28 1.28	222. 221. 213. 213. 213.
7 8 9 10 11 12 13	PG0029+024 PG0039+049 92_309 92_311 92_322 92_245	00:31:50.000 00:42:05.000 00:53:14.000 00:53:16.000 00:53:47.000 00:54:16.000	+02:38:26.00 +05:09:44.00 +00:46:02.00 +00:48:29.00 +00:47:33.00 +00:39:51.00	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	15.268 12.877 13.842 10.595 12.676 13.818	0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0	1.30 1.24 1.28 1.28 1.28 1.28	222 221.0 213.4 213.4 213.3 213.0
7 8 9 10 11 12 13 14	PC0029+024 PC0029+049 92_309 92_311 92_322 92_245 92_245 92_248	00:31:50.000 00:42:05.000 00:53:14.000 00:53:47.000 00:54:16.000 00:54:16.000 00:54:31.000	+02:38:26.00 +05:09:44.00 +00:46:02.00 +00:48:29.00 +00:47:33.00 +00:39:51.00 +00:40:15.00	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	15.268 12.877 13.842 10.595 12.676 13.818 15.346	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	1.30 1.24 1.28 1.28 1.28 1.28 1.28 1.28	222 221.0 213.4 213.4 213.3 213.0 212.9
7 8 9 10 11 12 13 14 15	PC0029+024 PC0039+049 92_309 92_311 92_322 92_245 92_248 92_248 92_249	00:31:50.000 00:42:05.000 00:53:14.000 00:53:16.000 00:53:47.000 00:54:16.000 00:54:31.000 00:54:34.000	+02:38:26.00 +05:09:44.00 +00:46:02.00 +00:48:29.00 +00:47:33.00 +00:39:51.00 +00:40:15.00 +00:41:05.00	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	15.268 12.877 13.842 10.595 12.676 13.818 15.346 14.325	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	1.30 1.24 1.28 1.28 1.28 1.28 1.28 1.28 1.28	222 221.0 213.4 213.4 213.3 213.0 212.9 212.9
7 8 9 10 11 12 13 14 15 16	PC0029+024 PC0029+049 92_309 92_311 92_322 92_245 92_248 92_249 92_250	00:31:50.000 00:42:05.000 00:53:14.000 00:53:14.000 00:53:47.000 00:54:16.000 00:54:31.000 00:54:34.000 00:54:37.000	+02:38:26.00 +05:09:44.00 +00:46:02.00 +00:48:29.00 +00:47:33.00 +00:39:51.00 +00:40:15.00 +00:41:05.00 +00:38:56.00	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	15.268 12.877 13.842 10.595 12.676 13.818 15.346 14.325 13.178	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	1.30 1.24 1.28 1.28 1.28 1.28 1.28 1.28 1.28 1.28	222 221( 213.4 213.4 213.3 213.6 212.9 212.9 212.9
7 8 9 10 11 12 13 14 15 16 17	PC0029+024 PC0029+049 92_309 92_311 92_322 92_245 92_245 92_248 92_249 92_250 92_330	00:31:50.000 00:42:05.000 00:53:14.000 00:53:47.000 00:54:16.000 00:54:31.000 00:54:34.000 00:54:37.000 00:54:44.000	+02:38:26.00 +05:09:44.00 +00:46:02.00 +00:48:29.00 +00:47:33.00 +00:39:51.00 +00:40:15.00 +00:41:05.00 +00:38:56.00 +00:33:26.00	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	15.268 12.877 13.842 10.595 12.676 13.818 15.346 14.325 13.178 15.073	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	1.30 1.24 1.28 1.28 1.28 1.28 1.28 1.28 1.28 1.28	222 221.0 213.4 213.4 213.3 213.0 212.9 212.9 212.9 212.9 212.9

There are currently 6 such files:

- AA2014\_ubvri—Astronomical Almanac for 2014 list of UBVI standards (section H), which is basically the list from Landolt (2009).
- clem07—Clem, Vandenberg, & Stetson (2007): Secondary standard stars for the u'g'r'i'z' photometric system.
   clem13—Clem & Landolt (2013): Faint UBVRI standard star fields
- ٠ hbstand—Farnham, Schleicher, & A'Hearn (2000), The HB narrow band comet filters: standard stars and calibration.
- ٠ landolt09—Landolt (2009): UBVRI photometric standards around the celestial equator.
- landolt92-Landolt (1992): UBVRI photometric standard stars in the Magnitude Range 11.5 < V < 16.0 around the celestial equator. ٠

More may be added soon. Some of these files contain many thousands of sources and take quite a long time to load.

## **Clear Offsets**

The "Clear Offsets" button sends a command to TCS to clear both user and handset offsets on the TCS. This can also be accomplished but asking the operator to clear the offsets. This button is more useful to observers on instruments that were not built at Lowell. The instrument control software for the in-house instruments already includes widgets for sending and clearing offsets.