

APPARENT PLACES OF STARS, 2024

TEN-DAY STARS AT UPPER TRANSIT AT GREENWICH
EQUINOX BASED RIGHT ASCENSION – WHOLE NUTATION

FK5-No.	10		22		44		1039	
HIP-No.	1599		3419		5661		6732	
Name	ζ Tucanae		β Ceti		102 G. Sculptoris		94 Piscium	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	0^h21^m	− 64° 43′	0^h44^m	− 17° 50′	1^h13^m	− 37° 43′	1^h27^m	+ 19° 21′
12 24 ^d 8	19 ^s 1674	83 [′] 432	47 ^s 5291	86 [′] 956	52 ^s 0625	60 [′] 323	59 ^s 5933	56 [′] 974
1 3.7	18.8058	83.006	47.4228	87.520	51.9099	60.962	59.4899	56.730
1 13.7	18.4418	81.887	47.3289	87.767	51.7562	61.125	59.4004	56.362
1 23.7	18.0712	80.413	47.2050	87.967	51.5703	61.048	59.2694	55.635
2 2.6	17.7582	78.558	47.0742	87.992	51.3845	60.596	59.1086	54.774
2 12.6	17.5353	75.901	47.0045	87.427	51.2543	59.404	59.0057	54.126
2 22.6	17.3293	72.926	46.9404	86.685	51.1245	57.928	58.9128	53.298
3 3.6	17.1505	69.953	46.8542	85.984	50.9795	56.377	58.7876	52.208
3 13.5	17.1060	66.448	46.8366	84.743	50.9090	54.182	58.7222	51.463
3 23.5	17.1434	62.672	46.8698	83.146	50.8902	51.606	58.7139	50.914
4 2.5	17.1983	59.004	46.9095	81.529	50.8787	49.030	58.7233	50.276
4 12.5	17.3604	55.295	46.9920	79.661	50.9211	46.193	58.7675	49.897
4 22.4	17.6346	51.614	47.1272	77.538	51.0280	43.132	58.8590	49.829
5 2.4	17.9708	47.925	47.3231	75.156	51.1947	39.912	59.0324	50.078
5 12.4	18.3521	44.574	47.5377	72.799	51.3884	36.807	59.2307	50.472
5 22.3	18.8023	41.710	47.7631	70.544	51.6113	33.888	59.4322	51.061
6 1.3	19.3551	38.863	48.0660	67.965	51.9185	30.769	59.7179	52.227
6 11.3	19.9227	36.425	48.3923	65.449	52.2524	27.878	60.0431	53.590
6 21.3	20.4738	34.782	48.6878	63.359	52.5686	25.556	60.3388	54.894
7 1.2	21.0964	33.449	49.0184	61.231	52.9338	23.313	60.6642	56.611
7 11.2	21.7355	32.506	49.3734	59.165	53.3283	21.301	61.0236	58.621
7 21.2	22.3017	32.264	49.6965	57.537	53.6920	19.909	61.3666	60.529
7 31.2	22.8431	32.643	49.9908	56.274	54.0372	19.003	61.6771	62.440
8 10.1	23.3709	33.537	50.2708	55.284	54.3774	18.495	61.9700	64.467
8 20.1	23.8347	34.738	50.5484	54.480	54.7082	18.333	62.2781	66.573
8 30.1	24.1869	36.534	50.7689	54.186	54.9788	18.809	62.5393	68.411
9 9.0	24.4506	38.965	50.9202	54.450	55.1862	19.920	62.7250	69.988
9 19.0	24.6798	41.354	51.0816	54.708	55.3968	21.100	62.9261	71.738
9 29.0	24.7940	43.907	51.2099	55.232	55.5604	22.633	63.1108	73.299
10 9.0	24.7580	46.910	51.2491	56.348	55.6285	24.791	63.2093	74.349
10 18.9	24.6882	49.708	51.2783	57.462	55.6815	26.914	63.2902	75.419
10 28.9	24.5626	52.218	51.3016	58.535	55.7164	28.976	63.3681	76.464
11 7.9	24.3073	54.613	51.2749	59.831	55.6834	31.230	63.4065	77.116
11 17.9	23.9974	56.706	51.2139	61.173	55.6088	33.414	63.4007	77.536
11 27.8	23.6725	58.383	51.1351	62.434	55.5130	35.374	63.3604	77.846
12 7.8	23.3185	59.345	51.0679	63.405	55.4117	36.916	63.3339	78.105
12 17.8	22.9137	59.836	50.9734	64.315	55.2712	38.242	63.2768	78.050
12 27.7	22.4893	60.029	50.8325	65.279	55.0853	39.418	63.1514	77.632
12 37.7	22.1299	59.338	50.7286	65.730	54.9312	39.873	63.0479	77.339
Mean Place	19.8755	51.673	49.0852	69.058	52.9752	37.971	61.3750	59.874
sec δ , tan δ	+2.343	−2.118	+1.051	−0.322	+1.264	−0.774	+1.060	+0.352
Dble. Trans.	September 26		October 1		October 9		October 12	

Apparent places of ten-day stars

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APPARENT PLACES OF STARS, 2024
 TEN-DAY STARS AT UPPER TRANSIT AT GREENWICH
 EQUINOX BASED RIGHT ASCENSION – WHOLE NUTATION

FK5-No.	1045		80		110		119	
HIP-No.	7513		10642		14240		15510	
Name	<i>v</i> Andromedae		67 Ceti		μ Hor		92 G. Eridani	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	1^h38^m	+ 41°31'	2^h18^m	– 6°18'	3^h04^m	– 59°38'	3^h20^m	– 42°58'
12 24 ^d .8	12 ^s .7225	41 ^{''} .737	11 ^s .3256	45 ^{''} .584	13 ^s .2459	52 ^{''} .899	54 ^s .5326	51 ^{''} .192
1 3.8	12.5665	42.106	11.2467	46.356	12.9758	54.627	54.4073	52.998
1 13.8	12.4274	42.130	11.1672	47.022	12.6503	55.930	54.2507	54.493
1 23.7	12.2411	41.558	11.0397	47.732	12.2701	56.850	54.0384	55.690
2 2.7	12.0124	40.644	10.8833	48.233	11.8803	57.126	53.8003	56.299
2 12.7	11.8475	39.705	10.7714	48.280	11.5004	56.603	53.5811	56.199
2 22.6	11.7036	38.352	10.6544	48.294	11.1018	55.715	53.3432	55.799
3 3.6	11.5268	36.552	10.5021	48.332	10.7007	54.503	53.0798	55.097
3 13.6	11.4140	34.918	10.4035	47.826	10.3594	52.462	52.8629	53.599
3 23.6	11.3736	33.322	10.3500	47.031	10.0640	49.947	52.6829	51.645
4 2.5	11.3675	31.517	10.3034	46.290	09.7877	47.355	52.5104	49.612
4 12.5	11.4023	29.876	10.2919	45.219	09.5841	44.291	52.3836	47.083
4 22.5	11.4932	28.552	10.3294	43.784	09.4693	40.820	52.3187	44.100
5 2.5	11.6852	27.533	10.4352	42.129	09.4196	37.225	52.3154	40.967
5 12.4	11.9142	26.656	10.5655	40.425	09.4309	33.649	52.3507	37.792
5 22.4	12.1462	26.057	10.7102	38.605	09.5252	30.044	52.4313	34.492
6 1.4	12.4745	26.124	10.9403	36.379	09.7190	26.234	52.6008	30.926
6 11.3	12.8580	26.499	11.2084	34.177	09.9698	22.699	52.8175	27.560
6 21.3	13.2129	26.980	11.4584	32.215	10.2632	19.636	53.0487	24.560
7 1.3	13.5947	28.046	11.7509	30.012	10.6416	16.577	53.3436	21.472
7 11.3	14.0175	29.587	12.0830	27.772	11.0789	13.815	53.6899	18.596
7 21.2	14.4312	31.225	12.4033	25.913	11.5227	11.786	54.0397	16.372
7 31.2	14.8052	33.070	12.7058	24.239	11.9921	10.220	54.3982	14.520
8 10.2	15.1536	35.255	13.0056	22.657	12.4940	09.057	54.7768	12.982
8 20.2	15.5242	37.713	13.3218	21.284	12.9914	08.484	55.1687	11.993
8 30.1	15.8470	40.087	13.5967	20.402	13.4517	08.705	55.5298	11.747
9 9.1	16.0795	42.404	13.8123	19.930	13.8840	09.583	55.8558	12.091
9 19.1	16.3236	45.054	14.0474	19.467	14.3042	10.745	56.1921	12.713
9 29.0	16.5545	47.638	14.2632	19.384	14.6633	12.549	56.4967	13.982
10 9.0	16.6894	49.835	14.3989	19.913	14.9344	15.126	56.7273	16.018
10 19.0	16.7925	52.130	14.5236	20.443	15.1668	17.790	56.9387	18.168
10 29.0	16.8869	54.441	14.6437	21.037	15.3451	20.603	57.1262	20.513
11 7.9	16.9403	56.362	14.7179	22.042	15.4192	23.860	57.2462	23.371
11 17.9	16.9346	58.010	14.7498	23.157	15.4198	27.115	57.3122	26.290
11 27.9	16.8761	59.491	14.7512	24.212	15.3674	30.142	57.3385	29.047
12 7.9	16.8292	60.803	14.7560	25.185	15.2461	32.925	57.3334	31.672
12 17.8	16.7463	61.639	14.7222	26.265	15.0411	35.552	57.2677	34.242
12 27.8	16.5759	61.957	14.6232	27.404	14.7720	37.876	57.1365	36.580
12 37.8	16.4183	62.197	14.5405	28.126	14.4806	39.422	56.9975	38.248
Mean Place	14.7503	37.547	12.4718	37.079	11.6593	36.320	54.3388	38.564
sec δ , tan δ	+1.336	+0.886	+1.006	–0.111	+1.979	–1.707	+1.367	–0.932
Dble. Trans.	October 15		October 25		November 6		November 10	

APPARENT PLACES OF STARS, 2024

TEN-DAY STARS AT UPPER TRANSIT AT GREENWICH
EQUINOX BASED RIGHT ASCENSION – WHOLE NUTATION

FK5-No.	120		153		1116		173	
HIP-No.	15863		19095		19513		22361	
Name	α Persei		174 G. Eridani		44 Tauri		Groombridge 848	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	$3^{\text{h}}26^{\text{m}}$	$+ 49^{\circ}56'$	$4^{\text{h}}06^{\text{m}}$	$- 27^{\circ}34'$	$4^{\text{h}}12^{\text{m}}$	$+ 26^{\circ}32'$	$4^{\text{h}}52^{\text{m}}$	$+ 75^{\circ}58'$
12 24 ^d 9	03 ^s 5668	54 ^{''} 992	37 ^s 9699	74 ^{''} 815	18 ^s 5477	39 ^{''} 689	10 ^s 3804	62 ^{''} 272
1 3.9	03.4741	56.514	37.9223	76.697	18.5456	40.220	10.2898	65.319
1 13.8	03.3740	57.637	37.8500	78.452	18.5322	40.518	10.1109	67.965
1 23.8	03.1862	58.208	37.7143	80.018	18.4399	40.549	09.6893	70.122
2 2.8	02.9208	58.536	37.5365	81.058	18.2833	40.639	09.0543	72.083
2 12.7	02.7018	58.679	37.3751	81.557	18.1590	40.750	08.4384	73.667
2 22.7	02.4751	58.204	37.1897	81.869	18.0117	40.490	07.7450	74.443
3 3.7	02.1831	57.226	36.9615	81.902	17.7989	40.009	06.8803	74.621
3 13.7	01.9445	56.237	36.7670	81.218	17.6246	39.723	06.0743	74.516
3 23.6	01.7698	54.994	36.6012	80.142	17.4886	39.344	05.3593	73.817
4 2.6	01.6186	53.269	36.4357	79.010	17.3534	38.619	04.6718	72.346
4 12.6	01.5047	51.534	36.2994	77.363	17.2414	38.031	04.0478	70.588
4 22.6	01.4526	49.926	36.2095	75.219	17.1741	37.655	03.5504	68.656
5 2.5	01.5178	48.274	36.1811	72.937	17.1905	37.212	03.2921	66.288
5 12.5	01.6274	46.554	36.1814	70.544	17.2333	36.726	03.1443	63.578
5 22.5	01.7506	45.059	36.2095	67.881	17.2858	36.514	03.0654	60.937
6 1.4	02.0010	44.016	36.3236	64.898	17.4363	36.571	03.2723	58.448
6 11.4	02.3306	43.055	36.4849	62.033	17.6515	36.588	03.6799	55.794
6 21.4	02.6464	42.203	36.6515	59.358	17.8526	36.646	04.1235	53.203
7 1.4	03.0179	41.945	36.8746	56.464	18.1074	37.162	04.7338	51.120
7 11.3	03.4621	42.083	37.1511	53.672	18.4241	37.875	05.5474	49.317
7 21.3	03.9202	42.287	37.4371	51.406	18.7503	38.445	06.4539	47.581
7 31.3	04.3574	42.828	37.7284	49.355	19.0667	39.193	07.3836	46.285
8 10.3	04.7935	43.858	38.0390	47.466	19.3932	40.234	08.3771	45.598
8 20.2	05.2817	45.150	38.3788	46.070	19.7668	41.261	09.5263	45.219
8 30.2	05.7356	46.460	38.6975	45.322	20.1146	42.105	10.6601	45.034
9 9.2	06.1081	47.999	38.9824	45.020	20.4068	43.017	11.6896	45.395
9 19.1	06.5169	49.989	39.2933	44.984	20.7418	44.138	12.8234	46.367
9 29.1	06.9255	51.974	39.5926	45.600	21.0797	45.040	13.9816	47.513
10 9.1	07.2349	53.823	39.8290	46.931	21.3417	45.671	14.9711	48.885
10 19.1	07.5192	56.015	40.0568	48.395	21.5991	46.523	15.9168	50.886
10 29.0	07.7994	58.367	40.2770	50.118	21.8630	47.410	16.8483	53.270
11 8.0	08.0314	60.453	40.4497	52.437	22.0894	47.944	17.6691	55.657
11 18.0	08.1897	62.511	40.5761	54.890	22.2653	48.468	18.3176	58.321
11 28.0	08.2796	64.670	40.6656	57.248	22.3976	49.147	18.7979	61.384
12 7.9	08.3701	66.722	40.7396	59.646	22.5350	49.743	19.2257	64.483
12 17.9	08.3977	68.395	40.7603	62.128	22.6205	50.088	19.4708	67.377
12 27.9	08.3018	69.803	40.7084	64.446	22.6094	50.388	19.4190	70.274
12 37.8	08.1974	71.209	40.6484	66.254	22.5974	50.869	19.2780	73.233
Mean Place	05.1169	46.643	38.0919	70.165	19.6813	34.296	10.8859	51.715
sec δ , tan δ	+1.554	+1.189	+1.128	-0.522	+1.118	+0.500	+4.128	+4.005
Dble. Trans.	November 11		November 22		November 23		December 3	

APPARENT PLACES OF STARS, 2024
 TEN-DAY STARS AT UPPER TRANSIT AT GREENWICH
 EQUINOX BASED RIGHT ASCENSION – WHOLE NUTATION

FK5-No.	201		203		210		223	
HIP-No.	25336		25769		26311		27628	
Name	γ Orionis		17 Cam		ϵ Orionis		β Col	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	5^h26^m	+ 6°22'	5^h32^m	+ 63°04'	5^h37^m	- 1°10'	5^h51^m	- 35°45'
12 25 ^d 0	26 ^s 0874	17''564	28 ^s 7115	72''321	26 ^s 8913	71''367	49 ^s 8422	31''817
1 3.9	26.1493	16.879	28.8014	74.893	26.9572	72.516	49.8753	34.577
1 13.9	26.1927	16.060	28.8430	77.161	27.0031	73.780	49.8714	37.395
1 23.9	26.1567	15.244	28.7274	79.122	26.9709	74.984	49.7911	40.003
2 2.9	26.0565	14.777	28.4799	81.065	26.8755	75.777	49.6487	42.019
2 12.8	25.9731	14.470	28.2482	82.722	26.7932	76.360	49.4976	43.642
2 22.8	25.8540	14.034	27.9470	83.712	26.6743	76.996	49.3069	45.064
3 3.8	25.6654	13.694	27.5164	84.274	26.4874	77.448	49.0594	46.032
3 13.7	25.4996	13.726	27.1182	84.632	26.3200	77.460	48.8182	46.301
3 23.7	25.3540	13.826	26.7567	84.462	26.1698	77.330	48.5867	46.154
4 2.7	25.1960	13.754	26.3803	83.591	26.0065	77.297	48.3472	45.840
4 12.7	25.0498	13.986	26.0266	82.487	25.8533	76.891	48.1188	44.893
4 22.6	24.9361	14.543	25.7364	81.224	25.7305	76.098	47.9211	43.326
5 2.6	24.8878	15.014	25.5749	79.475	25.6695	75.354	47.7771	41.624
5 12.6	24.8566	15.509	25.4566	77.377	25.6248	74.537	47.6579	39.659
5 22.6	24.8342	16.318	25.3648	75.337	25.5895	73.364	47.5629	37.188
6 1.5	24.9038	17.351	25.4487	73.338	25.6426	71.958	47.5467	34.407
6 11.5	25.0219	18.269	25.6379	71.083	25.7432	70.658	47.5829	31.661
6 21.5	25.1324	19.214	25.8302	68.845	25.8386	69.330	47.6363	28.859
7 1.4	25.2986	20.505	26.1308	67.006	25.9884	67.670	47.7472	25.751
7 11.4	25.5258	21.821	26.5550	65.316	26.1982	66.008	47.9204	22.695
7 21.4	25.7679	22.842	27.0243	63.584	26.4245	64.672	48.1243	20.061
7 31.4	26.0114	23.936	27.5074	62.210	26.6546	63.293	48.3484	17.497
8 10.3	26.2759	25.168	28.0380	61.336	26.9073	61.823	48.6060	14.998
8 20.3	26.5911	26.112	28.6716	60.615	27.2103	60.711	48.9125	13.070
8 30.3	26.8925	26.714	29.2924	60.001	27.5024	59.995	49.2228	11.734
9 9.3	27.1582	27.273	29.8556	59.876	27.7631	59.378	49.5217	10.722
9 19.2	27.4735	27.761	30.5088	60.223	28.0727	58.917	49.8598	10.142
9 29.2	27.7989	27.803	31.1856	60.645	28.3932	58.976	50.2079	10.336
10 9.2	28.0673	27.468	31.7628	61.267	28.6610	59.474	50.5189	11.223
10 19.1	28.3425	27.181	32.3437	62.459	28.9363	59.999	50.8296	12.401
10 29.1	28.6308	26.748	32.9409	63.977	29.2243	60.739	51.1415	14.039
11 8.1	28.8904	25.838	33.4817	65.482	29.4851	62.018	51.4223	16.446
11 18.1	29.1106	24.885	33.9383	67.300	29.7082	63.382	51.6610	19.117
11 28.0	29.2975	24.090	34.3178	69.565	29.8991	64.622	51.8605	21.812
12 8.0	29.4888	23.144	34.6891	71.886	30.0927	66.051	52.0410	24.828
12 18.0	29.6309	22.021	34.9572	74.096	30.2377	67.662	52.1652	28.071
12 28.0	29.6865	21.051	35.0516	76.464	30.2991	69.100	52.2096	31.138
12 37.9	29.7373	20.357	35.1148	78.987	30.3536	70.253	52.2255	33.890
Mean Place	26.8000	11.666	29.4751	63.134	27.4783	77.407	49.4866	37.566
sec δ , tan δ	+1.006	+0.112	+2.209	+1.970	+1.000	-0.021	+1.232	-0.720
Dble. Trans.	December 12		December 13		December 15		December 18	

APPARENT PLACES OF STARS, 2024

TEN-DAY STARS AT UPPER TRANSIT AT GREENWICH
EQUINOX BASED RIGHT ASCENSION – WHOLE NUTATION

FK5-No.	1166		243		245		254	
HIP-No.	29134		30324		30438		32246	
Name	ν Doradus		β Canis Majoris		α Carinae		ϵ Geminorum	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	6^h08^m	– 68° 50'	6^h23^m	– 17° 57'	6^h24^m	– 52° 42'	6^h45^m	+ 25° 06'
12 25. ^d 0	38 ^s 8800	46 ^{''} 420	46 ^s 5008	61 ^{''} 943	31 ^s 1255	25 ^{''} 780	25 ^s 5095	25 ^{''} 157
1 4.0	38.7946	49.779	46.5935	64.140	31.1597	29.105	25.6677	25.383
1 13.9	38.5901	53.223	46.6604	66.469	31.1345	32.559	25.8042	25.457
1 23.9	38.2770	56.437	46.6492	68.643	31.0232	35.803	25.8453	25.588
2 2.9	37.8708	59.021	46.5717	70.295	30.8361	38.443	25.8077	26.074
2 12.9	37.3689	61.198	46.4948	71.700	30.6107	40.730	25.7810	26.545
2 22.8	36.7999	63.112	46.3762	73.018	30.3356	42.781	25.7009	26.787
3 3.8	36.1890	64.482	46.1892	73.956	30.0037	44.295	25.5292	27.092
3 13.8	35.5355	65.093	46.0090	74.351	29.6557	45.092	25.3705	27.536
3 23.8	34.8712	65.207	45.8361	74.467	29.3054	45.417	25.2191	27.823
4 2.7	34.2196	65.060	45.6471	74.511	28.9501	45.487	25.0386	27.794
4 12.7	33.5885	64.188	45.4608	74.032	28.6007	44.846	24.8571	27.867
4 22.7	33.0037	62.606	45.2971	73.034	28.2782	43.501	24.6991	28.049
5 2.6	32.4735	60.824	45.1865	72.006	28.0055	41.970	24.6031	27.890
5 12.6	32.0155	58.690	45.0901	70.773	27.7668	40.077	24.5143	27.599
5 22.6	31.6481	55.964	45.0029	69.052	27.5651	37.567	24.4268	27.523
6 1.6	31.3624	52.889	44.9953	67.091	27.4372	34.717	24.4381	27.434
6 11.5	31.1763	49.798	45.0342	65.183	27.3736	31.831	24.4985	27.090
6 21.5	31.1018	46.589	45.0749	63.163	27.3532	28.784	24.5482	26.779
7 1.5	31.1219	43.053	45.1681	60.822	27.3964	25.392	24.6577	26.926
7 11.5	31.2456	39.560	45.3210	58.505	27.5128	22.019	24.8321	26.607
7 21.4	31.4730	36.480	45.4983	56.521	27.6846	19.018	25.0333	26.245
7 31.4	31.7911	33.467	45.6869	54.511	27.8976	16.043	25.2400	26.050
8 10.4	32.1983	30.537	45.9040	52.465	28.1607	13.112	25.4774	26.073
8 20.3	32.6754	28.229	46.1755	50.905	28.4840	10.783	25.7813	25.854
8 30.3	33.2165	26.549	46.4471	49.807	28.8350	09.038	26.0780	25.465
9 9.3	33.8139	25.232	46.7005	48.872	29.1989	07.607	26.3459	25.276
9 19.3	34.4321	24.439	47.0043	48.285	29.6012	06.695	26.6839	25.093
9 29.2	35.0651	24.501	47.3260	48.365	30.0235	06.621	27.0450	24.617
10 9.2	35.7024	25.324	47.6094	48.978	30.4297	07.268	27.3549	24.062
10 19.2	36.3062	26.540	47.9031	49.796	30.8305	08.310	27.6875	23.704
10 29.2	36.8671	28.318	48.2114	51.005	31.2255	09.922	28.0482	23.331
11 8.1	37.3689	30.959	48.4994	52.895	31.5909	12.395	28.3890	22.686
11 18.1	37.7882	33.950	48.7538	54.987	31.9075	15.228	28.6969	22.185
11 28.1	38.1181	37.043	48.9774	57.059	32.1728	18.177	28.9777	21.999
12 8.0	38.3360	40.551	49.2002	59.466	32.3968	21.579	29.2726	21.719
12 18.0	38.4405	44.338	49.3754	62.102	32.5522	25.285	29.5164	21.378
12 28.0	38.4356	47.972	49.4704	64.546	32.6201	28.849	29.6659	21.359
12 38.0	38.3018	51.337	49.5499	66.758	32.6284	32.196	29.8120	21.583
Mean Place	34.8365	54.335	46.7620	71.005	29.7679	35.616	26.3183	16.620
sec δ , tan δ	+2.771	–2.585	+1.051	–0.324	+1.651	–1.313	+1.104	+0.469
Dble. Trans.	December 23		December 26		December 27		January 2	

APPARENT PLACES OF STARS, 2024

TEN-DAY STARS AT UPPER TRANSIT AT GREENWICH
EQUINOX BASED RIGHT ASCENSION – WHOLE NUTATION

FK5-No.	306		323		348		354	
HIP-No.	39429		42452		45238		46390	
Name	ζ Puppis		Groombridge 1460		β Carinae		α Hydrae	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	8^h04^m	− 40° 04′	8^h41^m	+ 52° 37′	9^h13^m	− 69° 48′	9^h28^m	− 8° 45′
12 25 ^d .1	26 ^s .7632	04 [′] .505	05 ^s .1707	29 [′] .195	28 ^s .8756	37 [′] .579	46 ^s .4353	40 [′] .415
1 4.1	26.9485	07.747	05.5487	30.283	29.2735	40.876	46.7017	42.638
1 14.0	27.1026	11.329	05.8899	31.427	29.6021	44.759	46.9605	45.108
1 24.0	27.1740	14.790	06.1025	32.921	29.8145	48.708	47.1430	47.345
2 3.0	27.1619	17.777	06.2169	34.921	29.8698	52.405	47.2521	49.122
2 12.9	27.1254	20.704	06.3256	36.864	29.8135	56.322	47.3610	50.958
2 22.9	27.0373	23.493	06.3326	38.673	29.6723	60.217	47.4173	52.669
3 3.9	26.8706	25.751	06.2022	40.646	29.4187	63.642	47.3836	53.880
3 13.9	26.6788	27.523	06.0658	42.549	29.0432	66.779	47.3368	54.852
3 23.8	26.4730	28.948	05.9010	44.110	28.5994	69.639	47.2737	55.673
4 2.8	26.2445	30.104	05.6586	45.276	28.1284	72.178	47.1705	56.324
4 12.8	25.9955	30.618	05.3899	46.293	27.5795	74.102	47.0389	56.582
4 22.7	25.7453	30.482	05.1281	47.088	26.9738	75.364	46.8970	56.476
5 2.7	25.5349	30.215	04.9068	47.211	26.3918	76.432	46.7869	56.471
5 12.7	25.3308	29.517	04.6661	46.954	25.8159	76.931	46.6614	56.221
5 22.7	25.1246	28.096	04.4192	46.629	25.2227	76.562	46.5118	55.470
6 1.6	24.9792	26.406	04.2825	45.834	24.6561	75.866	46.4219	54.753
6 11.6	24.8803	24.579	04.1852	44.498	24.1630	74.835	46.3587	54.058
6 21.6	24.7914	22.351	04.0704	43.041	23.7255	73.138	46.2746	53.037
7 1.6	24.7452	19.733	04.0437	41.491	23.3177	70.936	46.2261	51.841
7 11.5	24.7597	17.035	04.1041	39.607	22.9943	68.473	46.2264	50.704
7 21.5	24.8183	14.474	04.1881	37.406	22.7953	65.866	46.2469	49.672
7 31.5	24.8993	11.737	04.2974	35.275	22.6645	62.876	46.2713	48.471
8 10.4	25.0170	08.880	04.4701	33.232	22.6046	59.589	46.3210	47.178
8 20.4	25.2066	06.512	04.7363	30.873	22.6816	56.617	46.4381	46.312
8 30.4	25.4243	04.485	05.0064	28.463	22.8798	53.755	46.5656	45.604
9 9.4	25.6471	02.523	05.2740	26.400	23.1529	50.766	46.6836	44.789
9 19.3	25.9312	01.078	05.6565	24.327	23.5178	48.266	46.8764	44.420
9 29.3	26.2594	00.357	06.0813	22.131	24.0061	46.375	47.1133	44.552
10 9.3	26.5833	00.132	06.4679	20.215	24.5844	44.837	47.3362	44.855
10 19.3	26.9269	00.341	06.9191	18.639	25.1940	43.809	47.5985	45.444
10 29.2	27.2967	01.165	07.4301	17.225	25.8507	43.469	47.9066	46.469
11 8.2	27.6726	02.818	07.9315	15.909	26.5766	43.979	48.2314	48.003
11 18.2	28.0258	04.880	08.4189	15.049	27.2877	45.036	48.5522	49.721
11 28.1	28.3497	07.159	08.9041	14.763	27.9461	46.503	48.8671	51.494
12 8.1	28.6748	10.094	09.4190	14.617	28.5870	48.864	49.2163	53.761
12 18.1	28.9590	13.440	09.8754	14.753	29.1822	51.825	49.5426	56.225
12 28.1	29.1632	16.706	10.2324	15.569	29.6679	54.901	49.8018	58.434
12 38.0	29.3330	20.052	10.5951	16.745	30.0334	58.405	50.0625	60.721
Mean Place	26.7484	23.859	05.7427	25.159	27.5193	66.104	47.4750	57.325
sec δ, tan δ	+1.307	−0.841	+1.647	+1.309	+2.899	−2.721	+1.012	−0.154
Dble. Trans.	January 22		January 31		February 8		February 12	

APPARENT PLACES OF STARS, 2024

TEN-DAY STARS AT UPPER TRANSIT AT GREENWICH
EQUINOX BASED RIGHT ASCENSION – WHOLE NUTATION

FK5-No.	363		1260		1275		422	
HIP-No.	47594		49339		52098		54872	
Name	Groombridge 1564		193 G. Hydrae		37 LMi		δ Leonis	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	9^h44^m	+ 69°07'	10^h05^m	- 24°23'	10^h40^m	+ 31°50'	11^h15^m	+ 20°23'
12 25 ^d .1	18 ^s 4770	26 ^{''} 605	27 ^s 7515	55 ^{''} 821	04 ^s 3634	57 ^{''} 936	23 ^s 0030	27 ^{''} 438
1 4.1	19.1683	27.708	28.0453	58.502	04.7324	56.937	23.3542	25.794
1 14.1	19.7915	29.036	28.3363	61.569	05.0969	56.063	23.7107	24.211
1 24.1	20.2389	30.918	28.5553	64.502	05.3808	55.757	23.9988	23.161
2 3.0	20.5672	33.415	28.6967	67.091	05.5995	56.074	24.2272	22.675
2 13.0	20.8577	35.919	28.8339	69.850	05.8239	56.447	24.4660	22.218
2 23.0	20.9706	38.440	28.9212	72.494	05.9767	57.083	24.6449	22.086
3 4.0	20.8843	41.246	28.9183	74.628	06.0237	58.260	24.7271	22.552
3 13.9	20.7624	43.952	28.8922	76.564	06.0603	59.536	24.7989	23.140
3 23.9	20.5555	46.318	28.8448	78.307	06.0658	60.804	24.8432	23.816
4 2.9	20.1952	48.344	28.7588	79.776	06.0023	62.125	24.8261	24.686
4 12.8	19.7739	50.153	28.6355	80.791	05.9012	63.549	24.7703	25.749
4 22.8	19.3381	51.618	28.4909	81.361	05.7835	64.950	24.6931	26.883
5 2.8	18.9016	52.318	28.3741	81.915	05.6790	65.932	24.6280	27.734
5 12.8	18.4067	52.559	28.2381	82.078	05.5378	66.822	24.5255	28.635
5 22.7	17.9039	52.581	28.0685	81.612	05.3655	67.773	24.3847	29.694
6 1.7	17.5245	51.917	27.9479	81.092	05.2541	68.233	24.2942	30.338
6 11.7	17.1668	50.585	27.8518	80.430	05.1510	68.311	24.2082	30.733
6 21.7	16.7911	49.025	27.7329	79.277	05.0123	68.377	24.0818	31.224
7 1.6	16.5465	47.150	27.6391	77.870	04.9183	68.193	23.9871	31.495
7 11.6	16.4156	44.760	27.5894	76.404	04.8713	67.592	23.9297	31.413
7 21.6	16.3143	41.980	27.5640	74.892	04.8291	66.695	23.8741	31.121
7 31.5	16.2743	39.155	27.5409	73.117	04.7915	65.746	23.8155	30.800
8 10.5	16.3533	36.267	27.5393	71.182	04.7886	64.653	23.7810	30.326
8 20.5	16.5596	32.976	27.6091	69.611	04.8526	63.049	23.8085	29.358
8 30.5	16.7874	29.633	27.6972	68.118	04.9174	61.304	23.8358	28.284
9 9.4	17.0622	26.608	27.7791	66.480	04.9789	59.674	23.8536	27.280
9 19.4	17.5145	23.490	27.9368	65.325	05.1335	57.645	23.9572	25.778
9 29.4	18.0315	20.290	28.1488	64.661	05.3309	55.319	24.1050	23.948
10 9.4	18.5332	17.477	28.3593	64.171	05.5127	53.120	24.2409	22.195
10 19.3	19.1618	15.002	28.6111	64.086	05.7588	50.858	24.4369	20.236
10 29.3	19.8937	12.728	28.9136	64.545	06.0685	48.439	24.6953	18.006
11 8.3	20.6236	10.713	29.2465	65.595	06.3966	45.971	24.9797	15.640
11 18.2	21.3681	09.273	29.5814	66.976	06.7378	43.719	25.2806	13.353
11 28.2	22.1511	08.491	29.9117	68.588	07.0990	41.753	25.6020	11.190
12 8.2	22.9771	07.973	30.2818	70.871	07.5115	39.722	25.9799	08.829
12 18.2	23.7292	07.932	30.6375	73.494	07.9062	37.957	26.3501	06.641
12 28.1	24.3819	08.743	30.9288	76.016	08.2468	36.832	26.6736	04.973
12 38.1	25.0510	09.997	31.2183	78.825	08.6136	35.919	27.0258	03.379
Mean Place sec δ , tan δ	18.2250 +2.806	27.203 +2.622	28.9440 +1.098	77.768 -0.454	05.5761 +1.177	53.661 +0.621	24.4870 +1.067	20.707 +0.372
Dble. Trans.	February 16		February 21		March 1		March 10	

APPARENT PLACES OF STARS, 2024

TEN-DAY STARS AT UPPER TRANSIT AT GREENWICH

EQUINOX BASED RIGHT ASCENSION – WHOLE NUTATION

FK5-No.	423		426		1307		455	
HIP-No.	54879		55282		57939		59747	
Name	ϑ Leonis		δ Crateris		Groombridge 1830		δ Crucis	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	11^h15^m	+ 15° 17'	11^h20^m	- 14° 54'	11^h54^m	+ 37° 32'	12^h16^m	- 58° 52'
12 25 ^d .2	29 ^s .8796	51 ^{''} .388	32 ^s .3265	22 ^{''} .553	21 ^s .4442	36 ^{''} .901	24 ^s .6848	36 ^{''} .403
1 4.2	30.2215	49.608	32.6549	24.910	21.8614	35.224	25.2063	38.159
1 14.2	30.5703	47.839	32.9958	27.569	22.2851	33.796	25.7641	40.597
1 24.1	30.8521	46.560	33.2746	30.018	22.6426	33.076	26.2604	43.247
2 3.1	31.0737	45.812	33.4855	32.167	22.9494	33.009	26.6510	46.058
2 13.1	31.3061	45.065	33.7051	34.522	23.2664	33.084	27.0358	49.489
2 23.0	31.4817	44.627	33.8784	36.698	23.5138	33.618	27.3762	53.045
3 4.0	31.5624	44.782	33.9611	38.356	23.6601	34.823	27.6008	56.366
3 14.0	31.6325	45.060	34.0256	39.935	23.7942	36.161	27.7617	59.926
3 24.0	31.6767	45.441	34.0674	41.369	23.8895	37.603	27.8759	63.508
4 2.9	31.6630	46.036	34.0638	42.496	23.9069	39.271	27.9425	66.824
4 12.9	31.6108	46.851	34.0179	43.283	23.8789	41.071	27.9200	69.905
4 22.9	31.5369	47.776	33.9435	43.771	23.8230	42.835	27.8169	72.705
5 2.9	31.4770	48.456	33.8893	44.291	23.7628	44.255	27.7269	75.415
5 12.8	31.3811	49.232	33.8036	44.471	23.6516	45.635	27.5844	77.638
5 22.8	31.2461	50.217	33.6711	44.164	23.4984	47.005	27.3434	79.217
6 1.8	31.1603	50.833	33.5803	43.957	23.3890	47.798	27.1113	80.703
6 11.7	31.0801	51.252	33.5003	43.646	23.2701	48.222	26.8870	81.767
6 21.7	30.9597	51.816	33.3813	42.888	23.1045	48.589	26.6057	82.050
7 1.7	30.8684	52.204	33.2781	42.039	22.9726	48.540	26.2996	81.993
7 11.7	30.8134	52.286	33.2078	41.211	22.8734	47.974	26.0157	81.605
7 21.6	30.7613	52.196	33.1482	40.297	22.7675	47.094	25.7643	80.697
7 31.6	30.7047	52.109	33.0797	39.164	22.6604	46.043	25.4935	79.246
8 10.6	30.6698	51.899	33.0236	37.947	22.5831	44.678	25.2195	77.388
8 20.6	30.6969	51.212	33.0332	37.056	22.5645	42.741	25.0456	75.473
8 30.5	30.7250	50.441	33.0521	36.145	22.5434	40.652	24.9187	73.178
9 9.5	30.7404	49.759	33.0576	35.067	22.5225	38.561	24.7869	70.435
9 19.5	30.8401	48.546	33.1408	34.462	22.5943	35.942	24.7580	67.961
9 29.4	30.9851	47.002	33.2781	34.200	22.7087	33.028	24.8401	65.588
10 9.4	31.1188	45.518	33.4130	33.956	22.8162	30.237	24.9685	63.037
10 19.4	31.3101	43.800	33.5981	34.102	22.9980	27.263	25.1657	60.868
10 29.4	31.5626	41.775	33.8429	34.725	23.2517	24.079	25.4574	59.169
11 8.3	31.8423	39.572	34.1266	35.749	23.5343	20.910	25.8558	57.864
11 18.3	32.1376	37.397	34.4245	37.022	23.8461	17.938	26.2953	56.983
11 28.3	32.4513	35.296	34.7317	38.508	24.1957	15.183	26.7478	56.571
12 8.3	32.8213	32.939	35.0967	40.579	24.6098	12.396	27.2960	57.012
12 18.2	33.1847	30.700	35.4612	42.862	25.0216	09.974	27.8778	57.974
12 28.2	33.5007	28.928	35.7741	45.001	25.4004	08.211	28.4022	59.189
12 38.2	33.8439	27.177	36.1045	47.460	25.8207	06.653	28.9322	61.204
Mean Place sec δ , tan δ	31.4034 +1.037	42.984 +0.273	34.0726 +1.035	41.231 -0.266	23.0624 +1.261	33.862 +0.769	27.6696 +1.935	66.255 -1.657
Dble. Trans.	March 10		March 12		March 20		March 26	

APPARENT PLACES OF STARS, 2024

TEN-DAY STARS AT UPPER TRANSIT AT GREENWICH
EQUINOX BASED RIGHT ASCENSION – WHOLE NUTATION

FK5-No.	464		468		479		1357	
HIP-No.	60823		61084		62131		67057	
Name	σ Centauri		γ Crucis		330 G. Hydrae		83 Vir	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	12^h29^m	- 50° 21'	12^h32^m	- 57° 14'	12^h45^m	- 28° 27'	13^h45^m	- 16° 17'
12 25 ^d .3	19 ^s .6768	30'' 323	29 ^s .2279	31'' 378	16 ^s .6804	08'' 459	46 ^s .6208	52'' 108
1 4.2	20.1281	32.094	29.7389	32.993	17.0457	10.448	46.9601	53.998
1 14.2	20.6168	34.480	30.2920	35.269	17.4452	12.840	47.3431	56.103
1 24.2	21.0505	37.017	30.7883	37.754	17.7960	15.174	47.6889	58.023
2 3.2	21.3963	39.681	31.1853	40.424	18.0822	17.470	47.9859	59.879
2 13.1	21.7498	42.916	31.5850	43.722	18.3890	20.154	48.3171	62.006
2 23.1	22.0647	46.221	31.9440	47.143	18.6608	22.728	48.6206	63.888
3 4.1	22.2752	49.261	32.1900	50.346	18.8427	24.911	48.8430	65.340
3 14.0	22.4425	52.525	32.3797	53.820	19.0052	27.213	49.0585	66.900
3 24.0	22.5747	55.791	32.5265	57.334	19.1447	29.437	49.2568	68.342
4 3.0	22.6620	58.773	32.6257	60.587	19.2402	31.317	49.4112	69.379
4 13.0	22.6763	61.528	32.6390	63.639	19.2833	32.959	49.5188	70.229
4 22.9	22.6264	64.029	32.5739	66.449	19.2836	34.385	49.5877	70.961
5 2.9	22.5925	66.450	32.5223	69.179	19.3005	35.764	49.6699	71.639
5 12.9	22.5103	68.405	32.4163	71.440	19.2747	36.744	49.7058	71.974
5 22.9	22.3415	69.769	32.2103	73.096	19.1807	37.261	49.6724	72.020
6 1.8	22.1899	71.086	32.0139	74.687	19.1145	37.859	49.6643	72.255
6 11.8	22.0427	72.017	31.8213	75.864	19.0484	38.200	49.6470	72.300
6 21.8	21.8369	72.221	31.5658	76.276	18.9253	37.982	49.5638	71.933
7 1.7	21.6140	72.150	31.2841	76.381	18.7978	37.671	49.4728	71.657
7 11.7	21.4106	71.802	31.0205	76.165	18.6886	37.262	49.3910	71.412
7 21.7	21.2257	70.975	30.7819	75.418	18.5817	36.542	49.2971	70.924
7 31.7	21.0172	69.659	30.5183	74.137	18.4500	35.508	49.1698	70.271
8 10.6	20.8030	67.997	30.2469	72.463	18.3139	34.321	49.0306	69.634
8 20.6	20.6729	66.310	30.0701	70.709	18.2417	33.252	48.9421	69.146
8 30.6	20.5711	64.264	29.9324	68.549	18.1763	31.948	48.8468	68.449
9 9.6	20.4544	61.811	29.7833	65.936	18.0878	30.381	48.7198	67.604
9 19.5	20.4299	59.649	29.7350	63.572	18.0786	29.203	48.6655	67.173
9 29.5	20.4949	57.586	29.7923	61.270	18.1311	28.179	48.6615	66.838
10 9.5	20.5862	55.342	29.8893	58.752	18.1859	27.015	48.6509	66.344
10 19.4	20.7398	53.481	30.0552	56.598	18.2958	26.242	48.6943	66.286
10 29.4	20.9775	52.076	30.3154	54.888	18.4763	25.907	48.8007	66.507
11 8.4	21.3018	51.023	30.6800	53.520	18.7159	25.857	48.9683	66.891
11 18.4	21.6612	50.363	31.0871	52.552	18.9830	26.110	49.1657	67.512
11 28.3	22.0357	50.148	31.5106	52.048	19.2682	26.719	49.3889	68.453
12 8.3	22.5005	50.732	32.0344	52.364	19.6333	27.973	49.6978	69.874
12 18.3	22.9943	51.775	32.5951	53.175	20.0185	29.504	50.0334	71.403
12 28.3	23.4372	53.029	33.1025	54.237	20.3619	31.084	50.3390	72.918
12 38.2	23.8981	55.035	33.6244	56.105	20.7370	33.229	50.6923	74.899
Mean Place	22.5678	57.772	32.4181	60.322	19.2472	28.948	49.4145	65.030
sec δ , tan δ	+1.568	-1.207	+1.849	-1.555	+1.137	-0.542	+1.042	-0.292
Dble. Trans.	March 29		March 30		April 2		April 17	

APPARENT PLACES OF STARS, 2024

TEN-DAY STARS AT UPPER TRANSIT AT GREENWICH
EQUINOX BASED RIGHT ASCENSION – WHOLE NUTATION

FK5-No.	509		529		1396		564	
HIP-No.	67301		70069		73996		74785	
Name	η Ursae Majoris		ν Cen		45 Bootis		β Librae	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	13^h48^m	+ 49°10'	14^h21^m	- 56°29'	15^h08^m	+ 24°46'	15^h18^m	- 9°28'
12 25 ^d .3	28 ^s .3858	83 ^{''} .077	58 ^s .6594	32 ^{''} .023	20 ^s .0934	26 ^{''} .287	16 ^s .5713	14 ^{''} .185
1 4.3	28.8170	80.559	59.1575	32.346	20.3914	23.414	16.8628	15.935
1 14.3	29.2772	78.455	59.7393	33.182	20.7381	20.791	17.2123	17.720
1 24.2	29.7065	77.180	60.2907	34.241	21.0695	18.756	17.5413	19.264
2 3.2	30.1197	76.538	60.7712	35.680	21.3847	17.062	17.8398	20.808
2 13.2	30.5544	76.199	61.3008	37.789	21.7426	15.558	18.1894	22.500
2 23.2	30.9328	76.609	61.8127	40.048	22.0798	14.755	18.5260	23.825
3 4.1	31.2303	77.842	62.2208	42.272	22.3564	14.663	18.7955	24.747
3 14.1	31.5172	79.320	62.6043	44.987	22.6387	14.768	19.0729	25.761
3 24.1	31.7578	81.139	62.9616	47.889	22.9044	15.289	19.3430	26.595
4 3.0	31.9124	83.484	63.2717	50.606	23.1217	16.474	19.5755	26.946
4 13.0	32.0130	86.070	63.5013	53.384	23.3002	17.962	19.7687	27.158
4 23.0	32.0700	88.678	63.6524	56.210	23.4448	19.577	19.9273	27.334
5 3.0	32.0911	91.183	63.8180	59.017	23.5835	21.359	20.0987	27.367
5 12.9	32.0391	93.799	63.9130	61.513	23.6688	23.464	20.2221	27.078
5 22.9	31.9288	96.345	63.8845	63.713	23.6909	25.616	20.2732	26.679
6 1.9	31.8266	98.323	63.8618	66.003	23.7242	27.435	20.3445	26.501
6 11.9	31.6813	100.046	63.8195	67.934	23.7284	29.293	20.3975	26.132
6 21.8	31.4707	101.662	63.6740	69.253	23.6627	31.220	20.3742	25.495
7 1.8	31.2689	102.685	63.4826	70.463	23.5859	32.692	20.3341	25.105
7 11.8	31.0685	103.119	63.2837	71.416	23.5022	33.801	20.2904	24.818
7 21.7	30.8368	103.238	63.0709	71.768	23.3864	34.830	20.2192	24.318
7 31.7	30.5907	103.006	62.7968	71.658	23.2340	35.605	20.1014	23.803
8 10.7	30.3598	102.208	62.4826	71.231	23.0666	35.890	19.9577	23.476
8 20.7	30.1631	100.784	62.2402	70.539	22.9249	35.744	19.8490	23.262
8 30.6	29.9547	99.147	62.0003	69.270	22.7613	35.500	19.7179	22.858
9 9.6	29.7503	97.249	61.7121	67.515	22.5687	34.963	19.5416	22.462
9 19.6	29.6275	94.649	61.5184	65.828	22.4342	33.761	19.4261	22.467
9 29.6	29.5410	91.731	61.4140	63.893	22.3296	32.319	19.3481	22.475
10 9.5	29.4607	88.824	61.3232	61.501	22.2141	30.827	19.2525	22.327
10 19.5	29.4651	85.509	61.3064	59.313	22.1542	28.792	19.2071	22.581
10 29.5	29.5495	81.861	61.3917	57.332	22.1566	26.328	19.2253	23.149
11 8.4	29.6781	78.250	61.5857	55.326	22.2026	23.818	19.2934	23.671
11 18.4	29.8629	74.717	61.8372	53.536	22.2886	21.159	19.3920	24.408
11 28.4	30.1161	71.206	62.1260	52.133	22.4187	18.229	19.5255	25.505
12 8.4	30.4534	67.679	62.5526	51.293	22.6340	15.108	19.7526	26.898
12 18.3	30.8183	64.586	63.0442	50.750	22.8839	12.207	20.0161	28.262
12 28.3	31.1938	62.056	63.5046	50.476	23.1336	09.519	20.2630	29.649
12 38.3	31.6389	59.694	64.0296	51.004	23.4497	06.717	20.5741	31.436
Mean Place sec δ , tan δ	30.2196 +1.530	89.924 +1.158	63.3717 +1.812	52.334 -1.511	22.6749 +1.101	29.959 +0.462	19.7226 +1.014	18.428 -0.167
Dble. Trans.	April 18		April 27		May 8		May 11	

APPARENT PLACES OF STARS, 2024
 TEN-DAY STARS AT UPPER TRANSIT AT GREENWICH
 EQUINOX BASED RIGHT ASCENSION – WHOLE NUTATION

FK5-No.	560		588		603		622	
HIP-No.	74946		77622		79593		81377	
Name	γ Trianguli A		ϵ Ser		δ Ophiuchi		ζ Ophiuchi	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	15^h 21^m	– 68° 45′	15^h 51^m	+ 4° 24′	16^h 15^m	– 3° 45′	16^h 38^m	– 10° 36′
12 25 ^d .4	06 ^s .7099	47 [″] .424	59 ^s .3291	18 [″] .793	34 ^s .6728	21 [″] .447	27 ^s .1815	55 [″] .038
1 4.4	07.3558	46.589	59.5891	16.549	34.9190	23.274	27.4158	56.427
1 14.3	08.1467	46.195	59.9080	14.416	35.2294	25.025	27.7192	57.753
1 24.3	08.9295	46.083	60.2141	12.646	35.5290	26.504	28.0139	58.878
2 3.3	09.6446	46.502	60.5005	10.963	35.8091	28.007	28.2898	60.116
2 13.2	10.4533	47.639	60.8409	09.306	36.1490	29.545	28.6316	61.432
2 23.2	11.2630	49.020	61.1727	08.180	36.4856	30.633	28.9745	62.368
3 4.2	11.9524	50.554	61.4470	07.558	36.7659	31.323	29.2625	63.004
3 14.2	12.6245	52.744	61.7342	06.980	37.0632	32.046	29.5717	63.739
3 24.1	13.2701	55.269	62.0169	06.716	37.3609	32.517	29.8857	64.283
4 3.1	13.8585	57.734	62.2642	07.050	37.6274	32.441	30.1720	64.334
4 13.1	14.3396	60.463	62.4773	07.597	37.8617	32.217	30.4279	64.304
4 23.1	14.7077	63.450	62.6595	08.222	38.0662	31.963	30.6554	64.302
5 3.0	15.0866	66.490	62.8509	09.075	38.2850	31.477	30.9015	64.071
5 13.0	15.3585	69.361	62.9950	10.274	38.4580	30.663	31.1026	63.547
5 23.0	15.4449	72.144	63.0711	11.528	38.5603	29.823	31.2307	63.040
6 1.9	15.5185	75.095	63.1636	12.559	38.6808	29.178	31.3787	62.713
6 11.9	15.5430	77.739	63.2337	13.761	38.7801	28.327	31.5060	62.166
6 21.9	15.4031	79.879	63.2282	15.126	38.8001	27.303	31.5504	61.454
7 1.9	15.1751	81.995	63.2050	16.144	38.7993	26.593	31.5715	61.042
7 11.8	14.9080	83.867	63.1733	16.968	38.7885	26.021	31.5808	60.729
7 21.8	14.5957	85.091	63.1087	17.898	38.7426	25.276	31.5525	60.198
7 31.8	14.1753	85.871	62.9966	18.697	38.6440	24.621	31.4664	59.732
8 10.8	13.6729	86.334	62.8568	19.144	38.5119	24.265	31.3417	59.528
8 20.7	13.2438	86.374	62.7426	19.379	38.4045	24.021	31.2402	59.350
8 30.7	12.7986	85.717	62.6011	19.679	38.2659	23.642	31.1036	58.982
9 9.7	12.2689	84.516	62.4141	19.788	38.0747	23.408	30.9074	58.721
9 19.6	11.8520	83.197	62.2803	19.398	37.9345	23.580	30.7606	58.779
9 29.6	11.5454	81.407	62.1755	18.929	37.8224	23.743	30.6401	58.747
10 9.6	11.2520	78.991	62.0506	18.498	37.6855	23.816	30.4903	58.573
10 19.6	11.0584	76.610	61.9723	17.585	37.5925	24.316	30.3821	58.767
10 29.5	11.0049	74.236	61.9523	16.310	37.5568	25.121	30.3304	59.201
11 8.5	11.1086	71.591	61.9769	15.045	37.5664	25.859	30.3242	59.506
11 18.5	11.3062	69.016	62.0352	13.586	37.6081	26.773	30.3494	59.960
11 28.5	11.5707	66.741	62.1279	11.762	37.6813	28.063	30.4045	60.762
12 8.4	12.0450	64.838	62.3108	09.701	37.8480	29.582	30.5546	61.770
12 18.4	12.6353	63.116	62.5315	07.746	38.0552	31.016	30.7486	62.708
12 28.4	13.2120	61.681	62.7440	05.801	38.2525	32.510	30.9319	63.748
12 38.3	13.9068	61.025	63.0245	03.569	38.5207	34.341	31.1897	65.147
Mean Place sec δ , tan δ	14.0374 +2.761	62.655 –2.574	62.3627 +1.003	20.107 +0.077	37.9197 +1.002	20.294 –0.066	30.6311 +1.017	53.190 –0.187
Dble. Trans.	May 12		May 19		May 25		May 31	

APPARENT PLACES OF STARS, 2024

TEN-DAY STARS AT UPPER TRANSIT AT GREENWICH

EQUINOX BASED RIGHT ASCENSION – WHOLE NUTATION

FK5-No.	625		635		1456		660	
HIP-No.	82273		83613		84862		86670	
Name	α Trianguli A		60 Herculis		72 Herculis		κ Scorpii	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	16^h51^m	- 69°03'	17^h06^m	+ 12°42'	17^h21^m	+ 32°25'	17^h44^m	- 39°02'
12 25 ^d .4	08 ^s 6985	65 ^{''} 379	27 ^s 8092	25 ^{''} 490	31 ^s 6722	67 ^{''} 436	06 ^s 6102	29 ^{''} 912
1 4.4	09.1995	63.586	28.0015	22.981	31.8432	64.120	06.8287	29.292
1 14.4	09.8750	61.968	28.2599	20.676	32.0823	61.077	07.1416	28.608
1 24.4	10.5685	60.550	28.5193	18.717	32.3363	58.459	07.4536	27.919
2 3.3	11.2386	59.692	28.7726	16.792	32.5983	55.958	07.7523	27.595
2 13.3	12.0561	59.393	29.0893	15.024	32.9229	53.753	08.1458	27.489
2 23.3	12.9025	59.290	29.4120	13.871	33.2596	52.305	08.5549	27.275
3 4.3	13.6541	59.455	29.6931	13.204	33.5682	51.464	08.9086	27.121
3 14.2	14.4434	60.301	29.9978	12.681	33.9004	50.921	09.3025	27.335
3 24.2	15.2411	61.532	30.3085	12.587	34.2372	50.966	09.7160	27.648
4 3.2	15.9920	62.781	30.5950	13.186	34.5513	51.838	10.1076	27.757
4 13.1	16.6674	64.463	30.8568	14.052	34.8420	53.109	10.4727	28.101
4 23.1	17.2593	66.608	31.0940	15.044	35.1063	54.621	10.8116	28.757
5 3.1	17.8747	68.852	31.3429	16.427	35.3709	56.638	11.1823	29.332
5 13.1	18.3840	71.119	31.5494	18.211	35.5909	59.142	11.5040	29.845
5 23.0	18.7127	73.609	31.6907	20.006	35.7468	61.701	11.7381	30.615
6 2.0	19.0440	76.378	31.8442	21.682	35.9011	64.196	11.9994	31.614
6 12.0	19.3112	78.982	31.9727	23.600	36.0211	66.964	12.2360	32.463
6 22.0	19.3869	81.359	32.0241	25.607	36.0649	69.795	12.3669	33.255
7 1.9	19.3736	83.913	32.0509	27.245	36.0772	72.233	12.4646	34.351
7 11.9	19.3033	86.363	32.0606	28.699	36.0620	74.450	12.5422	35.486
7 21.9	19.1429	88.281	32.0295	30.235	36.0004	76.675	12.5656	36.306
7 31.8	18.8419	89.944	31.9435	31.536	35.8837	78.572	12.5080	37.129
8 10.8	18.4316	91.463	31.8193	32.377	35.7260	79.897	12.3911	38.093
8 20.8	18.0557	92.511	31.7072	33.022	35.5687	80.922	12.2918	38.803
8 30.8	17.6091	92.896	31.5585	33.653	35.3739	81.808	12.1371	39.129
9 9.7	17.0325	92.858	31.3551	33.915	35.1296	82.162	11.8940	39.392
9 19.7	16.5453	92.576	31.1901	33.667	34.9141	81.881	11.6993	39.620
9 29.7	16.1225	91.671	31.0428	33.326	34.7108	81.380	11.5253	39.438
10 9.7	15.6596	90.081	30.8678	32.888	34.4857	80.624	11.3016	38.865
10 19.6	15.2837	88.367	30.7291	31.908	34.2955	79.200	11.1180	38.345
10 29.6	15.0325	86.448	30.6391	30.542	34.1506	77.283	10.9944	37.750
11 8.6	14.9074	83.984	30.5881	29.174	34.0448	75.260	10.9191	36.720
11 18.5	14.8704	81.392	30.5681	27.553	33.9758	72.900	10.8767	35.635
11 28.5	14.9104	78.947	30.5806	25.487	33.9462	70.024	10.8674	34.754
12 8.5	15.1745	76.530	30.6808	23.247	34.0018	66.952	10.9767	33.816
12 18.5	15.5624	74.048	30.8231	21.119	34.1060	63.992	11.1388	32.710
12 28.4	15.9559	71.778	30.9652	18.890	34.2257	60.924	11.2897	31.750
12 38.4	16.5173	70.066	31.1806	16.415	34.4216	57.661	11.5401	31.134
Mean Place	16.8544	68.315	30.9282	31.959	34.6567	75.460	11.0749	24.220
sec δ , tan δ	+2.799	-2.614	+1.025	+0.226	+1.185	+0.636	+1.287	-0.811
Dble. Trans.	June 3		June 7		June 11		June 17	

APPARENT PLACES OF STARS, 2024
 TEN-DAY STARS AT UPPER TRANSIT AT GREENWICH
 EQUINOX BASED RIGHT ASCENSION – WHOLE NUTATION

FK5-No.	671		691		700		699	
HIP-No.	87585		90422		90647		91262	
Name	ξ Draconis		α Telescopii		Groombridge 2655		α Lyrae	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	17^h53^m	+ 56°51'	18^h28^m	- 45°57'	18^h28^m	+ 77°33'	18^h37^m	+ 38°47'
12 25 ^d .5	54 ^s .0355	60 ^{''} .704	42 ^s .5507	18 ^{''} .925	28 ^s .3317	43 ^{''} .597	42 ^s .9953	78 ^{''} .873
1 4.5	54.1502	56.895	42.7287	17.705	28.2481	39.862	43.0686	75.536
1 14.4	54.3515	53.363	43.0108	16.307	28.3409	36.339	43.2180	72.420
1 24.4	54.6120	50.230	43.2983	14.897	28.6673	33.090	43.3977	69.556
2 3.4	54.9199	47.202	43.5822	13.873	29.1880	29.833	43.5958	66.652
2 13.3	55.2986	44.544	43.9771	13.001	29.8269	26.915	43.8662	64.065
2 23.3	55.7150	42.702	44.3965	12.050	30.6127	24.742	44.1698	62.177
3 4.3	56.1407	41.495	44.7659	11.251	31.5465	23.114	44.4658	60.771
3 14.3	56.5942	40.692	45.1908	10.837	32.5298	21.878	44.7965	59.709
3 24.2	57.0536	40.590	45.6462	10.573	33.5310	21.344	45.1476	59.294
4 3.2	57.4986	41.412	46.0843	10.192	34.5549	21.726	45.4970	59.731
4 13.2	57.9222	42.733	46.5040	10.136	35.5618	22.616	45.8355	60.614
4 23.2	58.3103	44.401	46.9055	10.490	36.4924	23.888	46.1556	61.823
5 3.1	58.6718	46.716	47.3454	10.802	37.3027	25.891	46.4857	63.719
5 13.1	58.9795	49.612	47.7371	11.165	38.0206	28.520	46.7826	66.188
5 23.1	59.2158	52.620	48.0410	11.924	38.6208	31.300	47.0191	68.758
6 2.0	59.4098	55.683	48.3780	12.939	39.0234	34.254	47.2500	71.478
6 12.0	59.5412	59.104	48.6881	13.880	39.2542	37.657	47.4497	74.620
6 22.0	59.5881	62.602	48.8840	14.896	39.3502	41.182	47.5746	77.854
7 2.0	59.5741	65.747	49.0455	16.271	39.2599	44.444	47.6575	80.817
7 11.9	59.4976	68.711	49.1830	17.727	38.9664	47.628	47.7041	83.703
7 21.9	59.3538	71.681	49.2549	18.926	38.5179	50.888	47.7004	86.668
7 31.9	59.1432	74.285	49.2351	20.199	37.9413	53.826	47.6323	89.319
8 10.9	58.8718	76.275	49.1471	21.654	37.2113	56.208	47.5078	91.435
8 20.8	58.5678	77.949	49.0679	22.816	36.3238	58.364	47.3706	93.364
8 30.8	58.2192	79.410	48.9182	23.615	35.3582	60.331	47.1884	95.136
9 9.8	57.8242	80.224	48.6650	24.385	34.3389	61.646	46.9432	96.290
9 19.7	57.4306	80.349	48.4544	25.023	33.2199	62.335	46.7067	96.882
9 29.7	57.0366	80.179	48.2534	25.180	32.0582	62.754	46.4716	97.262
10 9.7	56.6348	79.618	47.9869	24.923	30.9354	62.742	46.2066	97.259
10 19.7	56.2631	78.293	47.7560	24.608	29.8268	61.964	45.9586	96.557
10 29.6	55.9310	76.391	47.5813	24.097	28.7435	60.604	45.7411	95.338
11 8.6	55.6467	74.284	47.4476	23.033	27.7529	59.003	45.5571	93.937
11 18.6	55.4182	71.735	47.3440	21.810	26.8951	56.892	45.4024	92.080
11 28.6	55.2487	68.567	47.2742	20.693	26.1723	54.089	45.2768	89.577
12 8.5	55.1691	65.160	47.3288	19.348	25.5771	51.011	45.2308	86.850
12 18.5	55.1657	61.803	47.4395	17.741	25.1761	47.892	45.2374	84.111
12 28.5	55.2221	58.244	47.5407	16.262	25.0015	44.442	45.2627	81.047
12 38.4	55.3708	54.481	47.7538	14.999	24.9930	40.724	45.3631	77.733
Mean Place	57.2066	70.019	47.3208	0 8.179	33.1695	51.743	46.1337	87.992
sec δ, tan δ	+1.830	+1.532	+1.438	-1.034	+4.644	+4.535	+1.283	+0.804
Dble. Trans.	June 19		June 28		June 28		June 30	

APPARENT PLACES OF STARS, 2024
 TEN-DAY STARS AT UPPER TRANSIT AT GREENWICH
 EQUINOX BASED RIGHT ASCENSION – WHOLE NUTATION

FK5-No. HIP-No. Name	725 94834 ω Aql		1517 97290 56 Sagittarii		748 98495 ϵ Pavonis		1533 101101 69 Aquilae	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	19^h18^m	+ 11° 38'	19^h47^m	– 19° 42'	20^h03^m	– 72° 50'	20^h30^m	– 2° 48'
12 25. ^d 5	54 ^s 8043	17 ^{''} 494	43 ^s 8389	17 ^{''} 112	15 ^s 2296	54 ^{''} 392	52 ^s 6132	24 ^{''} 186
1 4.5	54.8658	15.433	43.9008	17.290	15.2353	51.718	52.6235	25.227
1 14.5	54.9990	13.596	44.0456	16.972	15.4303	48.592	52.7033	25.970
1 24.5	55.1429	11.893	44.1727	16.924	15.6786	45.391	52.7870	26.650
2 3.4	55.2884	10.021	44.3141	16.925	16.0010	42.530	52.8688	27.567
2 13.4	55.5116	08.389	44.5451	16.748	16.5614	39.636	53.0354	28.215
2 23.4	55.7624	07.275	44.8019	16.252	17.2018	36.720	53.2331	28.470
3 4.4	55.9913	06.415	45.0277	15.747	17.8190	34.142	53.4093	28.657
3 14.3	56.2621	05.747	45.3075	15.268	18.6000	31.958	53.6378	28.694
3 24.3	56.5619	05.537	45.6236	14.616	19.4783	30.059	53.9062	28.387
4 3.3	56.8629	05.971	45.9388	13.627	20.3469	28.284	54.1838	27.624
4 13.2	57.1590	06.657	46.2531	12.695	21.2393	27.051	54.4669	26.745
4 23.2	57.4478	07.496	46.5674	11.918	22.1541	26.461	54.7552	25.827
5 3.2	57.7687	08.910	46.9255	10.828	23.1346	25.993	55.0908	24.408
5 13.2	58.0655	10.732	47.2592	09.634	24.0460	25.887	55.4124	22.744
5 23.1	58.3070	12.513	47.5363	08.758	24.8458	26.509	55.6871	21.264
6 2.1	58.5692	14.416	47.8506	07.932	25.7094	27.498	55.9978	19.645
6 12.1	58.8171	16.676	48.1542	06.958	26.5065	28.665	56.3049	17.757
6 22.1	58.9919	18.949	48.3760	06.153	27.1030	30.250	56.5421	15.998
7 2.0	59.1388	20.964	48.5771	05.696	27.6489	32.339	56.7595	14.484
7 12.0	59.2661	22.937	48.7643	05.351	28.1305	34.660	56.9648	13.005
7 22.0	59.3497	25.025	48.9019	04.921	28.4467	36.922	57.1277	11.464
7 31.9	59.3686	26.837	48.9674	04.767	28.5853	39.440	57.2239	10.228
8 10.9	59.3343	28.203	48.9776	05.002	28.5889	42.246	57.2661	09.408
8 20.9	59.2996	29.541	48.9901	05.122	28.5376	44.725	57.3080	08.522
8 30.9	59.2155	30.821	48.9408	05.184	28.3007	46.933	57.2929	07.705
9 9.8	59.0557	31.595	48.8017	05.587	27.8540	49.183	57.1913	07.383
9 19.8	58.9130	32.033	48.6856	06.048	27.4250	51.086	57.1031	07.207
9 29.8	58.7711	32.440	48.5655	06.293	26.9340	52.383	57.0075	06.965
10 9.8	58.5816	32.605	48.3803	06.521	26.2699	53.215	56.8488	06.936
10 19.7	58.4050	32.284	48.2091	06.904	25.6343	53.700	56.6935	07.202
10 29.7	58.2563	31.653	48.0677	07.275	25.0521	53.691	56.5572	07.598
11 8.7	58.1313	31.017	47.9435	07.331	24.4752	52.858	56.4322	07.879
11 18.6	58.0209	30.067	47.8288	07.403	23.9318	51.579	56.3090	08.347
11 28.6	57.9251	28.601	47.7275	07.711	23.4567	50.103	56.1893	09.186
12 8.6	57.9072	27.068	47.7120	07.789	23.1750	47.972	56.1414	09.896
12 18.6	57.9276	25.578	47.7311	07.635	22.9846	45.313	56.1223	10.497
12 28.5	57.9419	23.755	47.7353	07.677	22.8204	42.618	56.0853	11.415
12 38.5	58.0272	21.723	47.8233	07.766	22.8925	39.789	56.1176	12.395
Mean Place sec δ , tan δ	58.0019 +1.021	28.547 +0.206	47.3405 +1.062	0 1.049 –0.358	22.8972 +3.390	31.839 –3.239	55.7478 +1.001	0 9.031 –0.049
Dbble. Trans.	July 11		July 18		July 22		July 29	

APPARENT PLACES OF STARS, 2024
 TEN-DAY STARS AT UPPER TRANSIT AT GREENWICH
 EQUINOX BASED RIGHT ASCENSION – WHOLE NUTATION

FK5-No.	777		1546		1577		855	
HIP-No.	102098		102978		108036		112029	
Name	α Cygni		ω Capricorni		μ Capricorni		ζ Pegasi	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	20^h42^m	+ 45°21'	20^h53^m	- 26°49'	21^h54^m	- 13°26'	22^h42^m	+ 10°57'
12 25 ^d 6	12 ^s 8442	62''159	13 ^s 4285	54''168	34 ^s 9487	26''971	38 ^s 5325	23''952
1 4.6	12.7433	59.407	13.4274	53.891	34.8992	27.366	38.4403	22.851
1 14.5	12.7220	56.694	13.5002	53.179	34.9111	27.355	38.4029	21.933
1 24.5	12.7403	53.854	13.5734	52.373	34.9199	27.289	38.3620	20.855
2 3.5	12.7760	50.688	13.6451	51.743	34.9260	27.386	38.3092	19.506
2 13.5	12.8952	47.762	13.8161	50.781	35.0297	27.097	38.3321	18.496
2 23.4	13.0771	45.263	14.0177	49.540	35.1309	26.502	38.3913	17.716
3 4.4	13.2759	42.922	14.1939	48.372	35.2343	25.916	38.4373	16.844
3 14.4	13.5263	40.901	14.4350	47.173	35.3976	25.136	38.5383	16.244
3 24.4	13.8270	39.475	14.7229	45.819	35.6100	24.065	38.6926	16.034
4 3.3	14.1661	38.766	15.0171	44.232	35.8390	22.701	38.8781	16.181
4 13.3	14.5192	38.489	15.3223	42.751	36.0853	21.292	39.0847	16.540
4 23.3	14.8739	38.621	15.6410	41.467	36.3516	19.894	39.3125	17.121
5 3.2	15.2710	39.610	16.0137	39.906	36.6785	18.070	39.6091	18.324
5 13.2	15.6656	41.216	16.3713	38.361	37.0036	16.161	39.9167	19.807
5 23.2	16.0125	43.016	16.6835	37.241	37.2958	14.546	40.1972	21.254
6 2.2	16.3644	45.313	17.0444	36.158	37.6398	12.773	40.5280	23.147
6 12.1	16.7074	48.228	17.4016	35.023	37.9919	10.859	40.8785	25.402
6 22.1	16.9868	51.312	17.6820	34.213	38.2833	09.244	41.1811	27.556
7 2.1	17.2180	54.421	17.9493	33.772	38.5668	07.868	41.4732	29.732
7 12.1	17.4126	57.747	18.2077	33.485	38.8483	06.565	41.7660	32.067
7 22.0	17.5632	61.301	18.4154	33.232	39.0911	05.334	42.0330	34.448
8 1.0	17.6400	64.669	18.5506	33.346	39.2706	04.489	42.2418	36.574
8 11.0	17.6403	67.714	18.6306	33.891	39.3999	04.070	42.3988	38.430
8 20.9	17.6179	70.827	18.7082	34.329	39.5285	03.586	42.5582	40.411
8 30.9	17.5434	73.821	18.7157	34.806	39.5950	03.281	42.6656	42.194
9 9.9	17.3804	76.212	18.6257	35.699	39.5692	03.520	42.6830	43.423
9 19.9	17.1979	78.288	18.5514	36.567	39.5518	03.785	42.7006	44.613
9 29.8	17.0018	80.220	18.4616	37.220	39.5172	03.988	42.7041	45.753
10 9.8	16.7563	81.646	18.2923	37.915	39.4051	04.460	42.6361	46.436
10 19.8	16.4928	82.455	18.1270	38.656	39.2859	05.075	42.5491	46.849
10 29.8	16.2304	82.803	17.9810	39.280	39.1742	05.682	42.4594	47.110
11 8.7	15.9860	82.863	17.8371	39.539	39.0571	06.127	42.3646	47.260
11 18.7	15.7455	82.333	17.6913	39.725	38.9270	06.645	42.2485	47.090
11 28.7	15.5015	81.047	17.5507	40.024	38.7880	07.366	42.1083	46.512
12 8.6	15.3188	79.493	17.4869	39.919	38.7083	07.761	42.0144	46.013
12 18.6	15.1818	77.681	17.4486	39.501	38.6435	07.968	41.9311	45.416
12 28.6	15.0474	75.219	17.3893	39.226	38.5492	08.417	41.8098	44.337
12 38.6	14.9724	72.412	17.4116	38.821	38.5179	08.701	41.7325	43.253
Mean Place	16.0712	67.894	16.7212	33.154	37.7414	0 7.420	41.0904	35.544
sec δ , tan δ	+1.423	+1.013	+1.121	-0.506	+1.028	-0.239	+1.019	+0.194
Dble. Trans.	August 1		August 4		August 19		September 1	