

MICROMETRIC MEASUREMENTS OF DOUBLE STARS - POP PAIRS (Series 47)

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SUMMARY: The results of 402 measurements of 133 G. M. Popović's double or multiple stars performed at the Belgrade Observatory with Zeiss 65/1055 cm refractor are presented.

These measurements comprise an observational period of 10 years and they were performed in the framework of observing G. M. Popović's pairs. The observations were carried out simultaneously with those of double and multiple stars from the standard programmes adopted previously, but unlike those of the standard stars the measurements of the stars designated as POP have not been published since 1984. The last time they were published as Series No 37 in Bulletin de l'Observatoire astronomique de Belgrade, No 134., (Popović, G. M., 1984). The 402 measurements include 133 systems being 67% of all the POP pairs. The structure of the pairs with respect to the angular separation is the following:

Separation	n
$\rho < 1''$	16
$1'' \leq \rho < 2''$	19
$2'' \leq \rho < 3''$	21
$\rho > 3''$	77

In this series the earlier designation of Popović's pairs GP is changed for the new one, adopted inter-

nationally, POP. Following a proposal by D. Olević presented are also three pairs discovered through common work on the instrument, heretofore designated as GPO 12, GPO 13 and GPO 21, but having now new designations:

GPO 12 = POP 209
GPO 13 = POP 210
GPO 21 = POP 211

There are 356 measurements by G. M. Popović and 46 by D. J. Zulević in the series. The means of the position angle and of the angular separation are calculated as the weighted means where the weight W includes the image quality and that of the measurements (column W in Table 1). The list of the measurements is presented in Table 1. Its columns contain:

1. star designation
2. multiplicity
3. pair coordinates for epochs 1900, 1950, 2000
4. BD reference or other designation (ADS, NGC) followed by the differences in right ascension, resp. declination, with respect to the reference (where only BD is given, the pair is identified with the BD star)
5. epoch of the observation

Table 1. Micrometric Measurements of Double Stars

Disc.	Mult.	1900		BD	Epoch	Θ°	ρ''	m or Δm	W	Obs.	N
		α	δ								
POP 198		00000N4326		+43.4624(8.1)	89.811	26.0	3.06	9.5-10.0	1	1	2
		00026N4342		+19 s	89.936	24.3	2.44	10.0-11.0	1	1	2
		00052N4358		+0.5	89.874	25.2	2.75	9.8-10.5	2n	POP	*
					89.936	24.2	2.56	10.5-11.5	1	1	2
					89.936	24.2	2.56	10.5-11.5	1n	ZUL	
POP 35		00143N3511		+34.33 (9.4)	86.709	303.8	0.61	0.4	1	1	2
		00169N3528			86.712	300.6	0.66	1.0	2	2	4
		00195N3544			86.728	298.7	0.59	0.4	2	2	4
					86.777	298.9	0.59	9.5-10.5	2	1	3
					86.731	300.1	0.61	0.7	4n	ZUL	
					86.709	294.8	0.65	0.7	2	1	3
					86.712	295.8	0.66	1.0	2	2	4
					86.728	294.7	0.70	10.0-11.0	3	1	4
					86.777	296.2	0.68	10.0-11.0	2	1	3
					88.732	293.6	0.81	10.0-11.0	3	1	4
					87.174	295.0	0.70	1.0	5n	POP	
POP 36		00145N3428		+34.34(9.5)	86.728	105.9	0.49	10.0-10.5	3	1	4
		00170N3444			86.777	106.4	0.47	10.5-10.8	2	2	4
		00196N3501			86.752	106.2	0.48	10.2-10.6	2n	POP	
					86.728	107.5	0.54	9.5- 9.7	2	2	4
					86.777	105.3	0.48	10.0-10.4	2	2	4
			86.752	106.5	0.51	9.5- 9.5	2n	ZUL			
POP 38		00267N3504		+34.72(9.2)	86.780	105.1	2.11	9.5-13.0	1	1	2
		00294N3521			86.780	105.1	2.11	9.5-13.0	1n	POP	
		00320N3538			86.780	100.9	2.32	9.0-12.0	1	1	2
					86.780	100.9	2.32	9.0-12.0	1n	ZUL	
POP 52 BC		00288N3512		+34.75(9.5)	86.725	320.9	7.57	1.0	1	1	2
		00314N3529		0 s	86.780	321.7	8.13	11.0-12.0	1	1	2
		00340N3546		+3 arc min.	86.752	321.3	7.85	1.0	2n	POP	*
POP 46 A-B BC		01027N3502		+34.189(9.3)	83.740	221.9	28.76	9.0-11.0	1	1	2
		01055N3518			83.740	221.9	28.76	9.0-11.0	1n	POP	
		01082N3534			83.740	155.4	3.92	11.0-12.5	1	2	3
					83.740	155.4	3.92	11.0-12.5	1n	POP	
POP 47		01029N3503		+34.189(9.3)	83.740	219.6	4.01	11.0-12.5	1	2	3
		01057N3519		+10 s	84.007	218.6	3.58	12.0-14.0	1	1	2
		01085N3535		+0.5 arc min.	83.847	219.2	3.84	11.5-13.2	2n	POP	
POP 54 AB AC		01158N3409		+33.214(9.5)	88.732	43.8	1.22	10.0-11.5	1	2	3
		01186N3425			88.732	43.8	1.22	10.0-11.5	1n	POP	
		01214N3440			88.732	196.3	22.63	-	1	1	2
					88.732	196.3	22.63	-	1n	POP	
POP 178 AB		01214N4254		+42 307(9.5)	89.797	268.1	1.44	11.0-11.0	2	1	3
		01243N4310		-18 s	89.808	258.9	1.44	-0.3	1	1	2
		01260N4326		-2 arc min.	89.801	264.4	1.44	-0.1	2n	POP	
					89.797	265.1	1.32	-0.3	3	1	4
					89.808	265.9	1.60	+0.3	1	1	2
					89.801	265.4	1.41	-0.2	2n	ZUL	

MICROMETRIC MEASUREMENTS OF DOUBLE STARS - POP PAIRS

Table 1. (continued)

Disc.	Mult.	1900		BD $\Delta\alpha$ $\Delta\delta$	Epoch		Θ°	ρ''	m or Δm	W	Obs.	N
		α	δ		1950	2000						
POP 173		03223N3953		+39.790(7.3)	89.953	79.5	3.50	14.0-14.0	1	1	2	*
		03256N4004		-2 s	89.953	79.5	3.50	14.0-14.0	1n		POP	*
		03288N4014		+2 arc min.								
POP 83		03291N3508		+34.685(8.0)	83.740	264.0	0.64	8.0- 8.5	3	2	5	
		03322N3518			83.794	263.7	0.66	1.5	3	3	6	
		03354N3528			83.769	263.8	0.65	1.0	2n		POP	*
POP 126		03598N4258		+42.889(9.0)	89.140	342.2	1.47	0.2	1	1	2	
		04032N4307		-4 s	89.140	342.2	1.47	0.2	1n		POP	
		04066N4315		+1.5 arc min.								
POP 140		05073N3648		+36.1049(7.7)	83.740	155.0	0.41	0.1	3	3	6	
		05106N3652			83.740	155.0	0.41	0.1	1n		POP	*
		05140N3656										
POP 70		05136N3555		+35.1056(9.5)	91.097	9.0	1.32	9.5- 9.7	1	1	2	
		05169N3559			91.097	9.0	1.32	9.5- 9.7	1n		POP	
		05202N3603										
POP 108		05160N3657		+37.1163(9.2)	91.097	150.8	2.76	12.0-13.0	1	1	2	
		05195N3703		-1 s	91.097	150.8	2.76	12.0-13.0	1n		POP	
		05228N3703		-6 arc min.								
POP 107		05180N3610		+36.1122(6.8)	88.102	136.9	3.19	13.0-13.2	1	1	2	*
		05313N3614		-4 s	89.140	145.2	2.49	13.0-13.5	1	1	2	
		05248N3617		+4 arc min.	91.095	141.7	3.06	12.0-12.5	1	1	2	
					91.097	137.1	2.37	12.5-13.0	1	1	2	
					89.858	140.2	2.78	12.6-13.1	4n		POP	
POP 169		05294N4304		+43.1312(9.4)	88.012	41.2	0.68	11.0-11.2	3	2	5	
		05330N4306			88.012	41.2	0.68	11.0-11.2	1n		POP	
		05366N4309										
POP 205		05304S0531		ADS 4186	90.101	303.3	7.95	14.0-15.0	2	1	3	
		05329S0529		-	90.216	305.6	7.98	13.1-13.0	1	1	2	
		05353S0527		+4 arc min.	90.170	304.7	7.97	13.5-14.0	2n		POP	*
POP 84		07060N3522		+35.1573(9.5)	89.124	189.3	2.10	0.0	1	1	2	
		07094N3517			90.216	185.2	1.79	10.5-10.5	2	2	4	
		07127N3513			89.852	186.6	1.89	0.0	2n		POP	
					90.216	185.6	1.94	11.0-11.1	2	2	4	
					90.216	185.6	1.94	11.0-11.1	1n		ZUL	
POP 74		07174N3439		+34.1592(9.2)	90.178	146.4	8.81	11.0-12.0	1	1	2	
		07207N3434		+63 s	90.180	145.6	9.58	10.0-11.5	2	2	4	
		07240N3428		+2 arc min.	90.179	145.9	9.32	10.3-11.7	2n		POP	
POP 207		07174N3429		+34.1592(9.2)	90.178	106.7	5.11	9.5- 9.8	1	1	2	
		07207N3423		0 s	90.180	107.6	5.31	9.0- 9.3	3	2	5	
		07240N3418		+10 arc min.	90.216	106.4	5.19	10.0-10.5	2	2	4	
					90.193	107.0	5.23	9.4- 9.8	3n		POP	*
					90.178	109.0	5.02	9.8-10.0	1	1	2	
					90.180	109.3	5.45	9.0- 9.2	1	1	2	
					90.216	109.5	5.47	12.0-12.0	3	3	6	
					90.201	109.4	5.38	11.0-11.0	3n		ZUL	

Table 1. (continued)

Disc.	Mult.	1900 α 1950 δ 2000	BD $\Delta\alpha$ $\Delta\delta$	Epoch 1900+	θ°	ρ''	m or Δm	W Obs. N
POP 75	AB	07250N3407	+34.1624(9.4)	90.177	212.3	6.53	9.5-12.0	1 2 3
		07283N3401		90.180	212.6	6.43	9.5-12.0	2 1 3
	07315N3346	90.216		211.5	6.40	9.5-11.5	1 1 2	
		90.188		212.2	6.46	9.5-11.9	3n POP *	
AC	90.180	208.6	48.60	9.5-12.5	2 1 3			
	90.180	208.6	48.60	9.5-12.5	1n POP			
POP 105		07259N3555	+36.1643(9.2)	90.136	51.3	0.74	9.5- 9.6	2 2 4
		07292N3549		90.180	61.6	0.78	10.5-10.7	1 1 2
		07325N3542		90.151	54.7	0.75	9.8-10.0	2n POP
				90.136	43.3	0.61	10.1-10.1	2 2 4
90.136	43.3	0.61	10.1-10.1	1n ZUL				
POP 109		08042N3500	+35.1771(8.6)	91.254	24.8	2.14	11.0-11.5	1 1 2
		08075N3451		91.254	24.8	2.14	11.0-11.5	1n POP
08107N3443			-12 s -1 arc min.					
POP 133		08047N3545	+35.1773(9.3)	86.229	36.0	8.68	-	1 1 2
		08079N3537		86.246	36.7	9.63	10.0-11.0	1 1 2
		08112N3528		86.238	36.4	9.16	10.0-11.0	2n POP
				86.229	36.7	9.17	9.5-10.5	1 1 2
86.229	36.7	9.17	9.5-10.5	1n ZUL				
91.251	36.7	8.82	10.0-11.0	1 1 2				
91.253	37.0	8.51	10.0-11.5	1 1 2				
91.252	36.9	8.63	10.0-11.2	2n POP				
POP 106		09158N3338	+33.1845(9.2)	90.172	72.8	1.49	9.5-10.0	1 1 2
		09189N3325		90.213	68.2	1.51	10.0-10.2	1 1 2
		09219N3313		90.192	70.5	1.50	9.8-10.1	2n POP
POP 56		09266N3504	+35.2020(9.2)	91.306	221.2	4.55	11.0-11.0	1 1 2
		09296N3452		91.306	221.2	4.55	11.0-11.0	1n POP
		09327N3439						
POP 115		09556N4356	+44.1943(9.4)	90.137	268.9	1.70	10.0-11.0	1 2 3
		09586N4342		90.137	268.9	1.70	10.0-11.0	1n POP
		10017N4327		90.137	269.5	1.66	9.5-10.0	1 1 2
90.137	269.5	1.66	9.5-10.0	1n ZUL				
POP 85		10054N3416	+34.2095(9.5)	85.245	45.8	6.22	0.7	1 1 2
		10084N3402		85.245	45.8	6.22	0.7	1n POP
		10113N3347						
POP 117		10123N4416	+44.1972(7.7)	single				3
		10154N4401		single				1n POP *
		10185N4346						
POP 73		10511N3351	+34.2186(9.4)	92.373	206.8	0.76	0.1	1 1 2
		10538N3335		92.398	202.1	0.83	0.2	2 2 4
		10560N3318		92.396	203.7	0.81	0.2	2n POP
POP 113		11245N3336	+33.2119(9.1)	84.289	54.2	0.97	0.1	3 2 5
		11272N3319		87.298	47.7	1.03	9.8-10.0	1 1 2
		11299N3303		85.149	52.3	0.99	0.1	2n POP

MICROMETRIC MEASUREMENTS OF DOUBLE STARS - POP PAIRS

Table 1. (continued)

Disc.	Mult.	1900		BD $\Delta\alpha$ $\Delta\delta$	Epoch		Θ°	ρ''	m or Δm	W	Obs.	N				
		α	δ		1900+	1900+										
POP 57		12229N3458		+35.2339(9.5)	85.363	351.9	9.91	10.5-11.0	1 2 3			*				
		12254N3441			85.365	351.9		9.64					-	1 2 3		
		12279N3424			85.364	351.9		9.78					10.5-11.0	2n	POP	
POP 72		13119N3504		+35.2430(9.5)	84.289	312.1	1.75	2.0	1 1 2							
		13142N3448			+4 s	84.369		320.7					1.78	-	1 1 2	
		13166N3432			+8 arc min.	84.443		317.8					1.48	10.0-11.5	1 1 2	
						84.367		316.8					1.67	1.7	3n	POP
						92.373		321.0					1.43	1.0	1 1 2	
						92.398		323.4					1.53	1.0	1 1 2	
		92.386	322.2	1.48	1.0	2n	POP									
POP 119		13187N4101		+41.2389(9.1)	85.363	15.8	0.62	9.5-10.0	3 2 5							
		13209N4045			85.363	15.8		0.62					9.5-10.0	1n	POP	
		13232N4030														
POP 153		13495N4134		+41.2438(8.8)	81.382	353.1	0.90	11.0-11.0	1 1 2							
		13516N4119			-41 s	84.470		355.0					1.07	10.0-10.0	1 1 2	
		13538N4104			-8 arc min.	85.363		351.8					0.90	10.0-10.2	1 2 3	
						83.970		353.1					0.95	10.3-10.4	3n	POP
POP 209		15081N3442		+34.2613(9.2)	86.252	169.5	4.38	10.0-11.0	1 2 3			*				
		15101N3431			-41 s	87.298		168.9					4.49	10.0-11.0	1 1 2	
		15121N3420			+5 arc min.	87.434		170.0					4.14	10.0-10.5	1 1 2	
						86.889		169.5					4.34	10.0-10.8	3n	POP
						92.398		169.9					3.38	10.0-10.7	1 1 2	
		92.398	169.9	3.38	10.0-10.7	1n	POP									
POP 118		15122N4215		+42.2580(9.4)	83.484	345.8	2.67	-	1 2 3							
		15140N4204			+8 s	84.383		344.9					2.71	0.1	1 2 3	
		15158N4152			+3 arc min.	84.388		345.3					2.56	9.5- 9.7	1 2 3	
						84.443		343.4					2.96	0.1	1 2 3	
						84.174		344.8					2.72	0.1	4n	POP
						90.375		345.6					2.47	9.5- 9.6	1 2 3	
						90.509		344.5					2.57	10.0-10.2	1 2 3	
						90.520		343.7					2.80	10.0-10.2	2 2 4	
		90.473	344.5	2.63	9.9-10.0	2n	POP									
POP 103		16103N3525		+35.2793(8.0)	83.484	56.2	3.18	10.0-13.0	1 1 2							
		16122N3516			+34 s	84.388		54.4					3.04	9.0-12.0	1 1 2	
		16141N3508			-2 arc min.	85.363		53.1					2.91	10.0-12.0	2 2 4	
						84.650		54.2					3.01	9.8-12.2	3n	POP
POP 1		16235N3432 AB		+34.2788(9.5)	86.629	180.6	2.21	10.0-12.0	1 2 3							
		16254N3425				86.640		183.2					2.43	11.0-13.0	2 2 4	
		16271N3418				86.635		182.1					2.34	10.7-12.7	2n	POP
					AC	86.640		203.3					39.54	11.0-13.2	3 1 4	
						86.640		203.3					39.54	11.0-13.2	1n	POP *
POP 89		16296N3548		+35.2833(9.5)	84.462	171.1	3.02	12.5-13.0	1 1 2							
		16315N3542			+3.5 s	87.448		171.6					2.90	13.0-14.0	1 1 2	
		16332N3535			-3 arc min.	87.522		171.1					2.43	13.5-13.8	1 1 2	
						86.477		171.3					2.78	13.0-13.6	3n	POP

Table 1. (continued)

Disc.	Mult.	1900 α 1950 δ 2000	BD $\Delta\alpha$ $\Delta\delta$	Epoch 1900+	Θ°	ϱ''	m or Δm	W Obs. N
POP	2	16334N3403 16353N3356 16371N3350	+34.2817(9.5) -21 s -1 arc min.	84.462	134.2	4.03	-	1 2 3
				86.457	134.6	4.07	11.0-13.0	1 2 3
				86.471	135.6	3.96	10.5-12.0	1 1 2
				85.712	134.7	4.03	10.8-12.5	3n POP
				86.471	133.6	4.63	10.0-10.5	1 1 2
				86.471	133.6	4.63	10.0-10.5	1n ZUL
POP	5	16413N3406 16431N3400 16450N3353	+34.2834(9.3)	84.462	131.8	0.67	10.0-10.3	2 1 3
				85.521	140.8	0.68	-	2 1 3
				86.471	140.1	0.60	10.0-10.7	2 1 3
				85.485	137.6	0.65	10.0-10.5	3n POP
				85.521	140.5	0.63	0.2	2 2 4
				86.471	137.3	0.61	9.0- 9.4	1 1 2
				85.838	139.4	0.62	0.3	2n ZUL
POP	166	17064N4047 17080N4043 17097N4039	+40.3109(5.2) +6 s -7 arc min.	87.448	282.2	5.51	10.0-14.0	1 1 2
				87.626	279.7	4.69	9.0-13.0	2 1 3
				89.488	279.8	5.43	9.0-13.0	1 1 2
				89.611	281.0	5.44	9.5-13.5	1 1 2
				88.441	280.6	5.20	9.3-13.3	4n POP
POP	76	17111N3455 17130N3452 17148N3448	+34.2928(7.0) -53 s +6 arc min.	86.640	110.5	1.64	10.5-11.0	1 1 2
				86.648	109.9	1.92	10.5-11.5	1 1 2
				86.644	110.2	1.78	10.5-11.2	2n POP
POP	131 AB	17123N4446 17138N4443 17153N4440	+44.2678(8.7) -11 s +1 arc min.	86.651	136.5	3.60	11.5-12.0	2 2 4
				86.654	137.0	3.52	10.5-11.0	1 1 2
				86.652	136.7	3.57	11.2-11.7	2n POP
	AC			86.651	323.1	27.9	11.5-11.8	1 1 2
				86.651	323.1	27.9	11.5-11.8	1n POP
	AP			86.651	104.8	19.88	11.5-12.7	1 2 3
				86.651	104.8	19.88	11.5-12.7	1n POP
POP	77 AB	17129N3455 17147N3451 17165N3448	+34.2930(9.2) +9 s +1 arc min.	86.457	320.0	4.17	10.0-12.0	1 1 2
				86.648	322.2	4.72	11.0-13.0	1 1 2
				86.552	321.1	4.44	10.5-12.5	2n POP
	AC			86.648	343.0	126.9	-	1 1 2
				86.648	343.0	126.9	-	1n POP
	CD			86.648	80.7	10.63	11.2-13.5	1 1 2
				86.648	80.7	10.63	11.2-13.5	1n POP
POP	203	17166N3445 17184N3441 17202N3438	+34.2947(9.0) -22 s -1 arc min.	87.626	209.8	3.61	13.0-13.0	2 1 3
				87.626	209.8	3.61	13.0-13.0	1n POP
POP	132	17268N4451 17283N4447 17298N4444	+44.2720(9.4)	83.482	153.2	15.90	9.5- 9.8	2 2 4
				83.583	153.6	16.11	0.1	1 2 3
				84.388	153.3	15.80	9.5- 9.7	1 2 3
				83.784	153.4	15.93	0.2	3n POP
POP	20	17276N3537 17294N3548 17312N3400	+35.2992(9.5) +12 s -7 arc min.	87.626	9.2	9.49	14.0-15.0	2 1 3
				89.646	7.6	9.29	13.5-15.0	1 1 2
				88.434	8.6	9.41	13.8-15.0	2n POP

MICROMETRIC MEASUREMENTS OF DOUBLE STARS - POP PAIRS

Table 1. (continued)

Disc.	Mult.	1900		BD	Epoch	Θ°	ϱ''	m or Δm	W	Obs.	N	
		α	δ									$\Delta\alpha$
POP 175		17280N3538		+35.2994(9.1)	87.626	32.5	6.30	10.0-13.0	1	1	2	
		17298N3535		-4 s	89.646	32.2	6.03	10.0-13.0	1	1	2	
		17316N3533		-3 arc min.	88.636	32.4	6.16	10.0-13.0	2n		POP	
POP 12		17368N3449		+34.3021(9.5)	85.363	302.1	2.69	0.1		1	1	2
		17386N3448		-18 s	86.730	302.9	3.69	0.2		1	1	2
		17404N3447		-3 arc min.	86.046	302.5	3.19	0.2		2n		POP
POP 10	AB	17537N3542		+35.3112(7.0)	86.714	219.1	1.95	0.2		1	1	2
		17555N3542		-9 s	86.714	219.1	1.95	0.2		1n		ZUL
		17573N3541		0 arc min.								
					86.714	220.8	2.44	11.5-12.0	1	1	2	
					87.628	210.8	1.64	10.0-10.5	1	2	3	
					89.488	213.1	2.14	10.0-10.3	1	1	2	
					89.619	212.8	1.74	10.0-10.2	1	1	2	
					88.281	214.0	1.95	10.4-10.8	4n		POP	*
		AC			87.628	338.8	8.20	10.0-13.0	1	2	3	
				89.488	343.8	8.29	10.0-13.0	1	1	2		
			89.619	345.3	8.28	10.0-14.0	1	1	2			
		88.728	342.1	8.25	10.0-13.3	3n		POP	*			
POP 123		17556N4231		+42.2972(8.3)	85.716	231.7	3.29	11.0-11.3	1	2	3	
		17571N4231		-4 s	85.716	231.7	3.29	11.0-11.3	1n		POP	
		17586N4231		-3 arc min.								
					89.611	232.7	3.02	0.3	1	1	2	
					89.619	229.1	2.83	11.0-11.3	1	2	3	
				88.153	231.0	3.05	0.3	2n		POP		
POP 110		17575N3558		+35.3127(9.0)	89.619	131.7	2.64	13.0-13.2	1	1	2	
		17593N3558		-6 s	90.509	139.0	2.28	12.5-12.7	1	1	2	
		18010N3558		0 arc min.	90.520	135.0	2.38	13.0-13.0	1	1	2	
					90.216	135.2	2.43	12.8-13.0	3n		POP	*
POP 111		18025N3449		+34.3129(9.5)	90.509	295.2	1.69	12.0-13.0	1	1	2	
		18063N3449		-12 s	90.520	295.3	2.45	13.0-14.0	1	1	2	
		18081N3449		0 arc min.	90.514	295.2	2.07	12.5-13.5	2n		POP	*
POP 78		18078N3505		+35.3173(9.5)	89.627	249.9	14.13	10.0-10.5	1	2	3	
		18096N3506			90.509	250.7	14.23	10.0-10.2	1	1	2	
		18113N3506			90.520	250.7	14.09	10.0-10.7	1	2	3	
					90.182	250.4	14.14	10.0-10.5	3n		POP	
POP 134	AB	18244N4351		+43.2980(9.4)	84.383	61.4	7.65	9.5-11.0	1	2	3	
		18259N4353			89.627	64.5	7.28	9.0-10.5	1	1	2	
		18274N4354			86.481	62.6	7.50	9.2-10.8	2n		POP	
	AC				89.627	284.8	65.25	9.0-10.5	1	2	3	
					89.627	284.8	65.25	9.0-10.5	1n		POP	
	CD				84.383	249.9	3.88	11.0-13.0	1	2	3	
					89.627	248.1	4.12	10.5-14.0	1	1	2	
					86.481	249.2	3.98	10.8-13.5	2n		POP	
POP 152		18277N3443		+34.3225(8.7)	91.642	319.4	2.05	14.0-14.2	1	1	2	
		18295N3445		+2 s	91.642	319.4	2.05	14.0-14.2	1n		POP	
		18313N3447		-2 arc min								

Table 1. (continued)

Disc.	Mult.	α	1900 1950 δ 2000	BD $\Delta\alpha$ $\Delta\delta$	Epoch 1900+	Θ°	ϱ''	m or Δm	W Obs.	N
POP 15	15		18308N3458	+35.3292(8.7)	84.580	313.5	8.00	12.0-13.0	2 2 4	
			18325N3501	+4 s	85.639	311.6	8.26	11.0-12.0	1 2 3	
			18343N3503	-6 arc min.	85.716	310.3	8.41	11.0-12.0	1 1 2	
					85.185	312.2	8.18	11.5-12.5	3n	POP
					91.642	314.6	8.36	11.0-12.5	1 2 3	
				91.642	314.6	8.36	11.0-12.5	1n	POP	
POP 16	16		18343N3500	+34.3267(8.5)	84.580	309.5	8.01	10.0-13.0	2 2 4	
			18361N3502	-1 s	85.639	310.2	8.48	10.0-12.5	1 2 3	
			18379N3505	-1 arc min.	85.645	312.3	8.44	10.0-12.0	1 1 2	
					85.732	310.2	8.40	9.0-12.0	1 1 2	
					87.629	307.2	8.79	10.0-12.5	1 1 2	
					85.634	309.8	8.36	9.8-12.5	5n	POP *
					91.642	310.0	7.72	10.0-12.0	1 1 2	
					91.670	312.4	7.86	9.0-12.0	2 1 3	
				91.659	311.4	7.80	9.3-12.0	2n	POP *	
POP 17	17		18354N3456	+34.3271(9.0)	84.580	21.0	7.26	14.0-14.0	1 2 3	
			18372N3459	+21 s	85.732	17.2	8.48	14.0-14.2	1 2 3	
			18390N3502	-0.5 arc min.	85.156	19.1	7.87	14.0-14.1	2n	POP
					91.670	16.7	6.81	15.0-15.1	1 1 2	
					91.670	16.7	6.81	15.0-15.1	1n	POP
POP 45	45		18389N3426	+34.3288(8.3)	84.580	275.2	6.97	13.0-13.0	1 2 3	
			18407N3428	+9 s	85.729	278.8	-	-	2 1 3	
			18425N3431	-2 arc min.	85.732	275.5	6.58	12.2-12.0	1 1 2	
					85.299	276.6	6.81	12.6-12.5	3/2n	POP
POP 43	43		18447N3425	+34.3323(8.0)	86.637	276.3	2.37	13.0-14.0	1 1 2	*
			18465N3429	-17 s	86.640	275.5	3.00	13.0-14.0	1 1 2	
			18484N3432	+5 arc min.	86.638	275.9	2.68	13.0-14.0	2n	POP
POP 44	44		18459N3505	+35.3368(9.5)	86.629	231.2	9.40	9.0-10.0	1 2 3	
			18477N3508		86.632	230.6	9.48	9.0-10.0	1 1 2	
			18495N3511		86.630	231.0	9.43	9.0-10.0	2n	POP
POP 192	192		18496N3255	NGC 6720	89.717	31.0	2.45	12.5-13.0	1 1 2	
			18515N3259	-16 s	90.539	37.8	2.43	1.0	1 1 2	
			18533N3302	+1 arc min.	90.128	34.4	2.44	0.8	2n	POP
POP 41	41		18532N3438	+34.3366(9.0)	86.638	353.3	5.84	13.0-14.0	1 1 2	
			18550N3441	-10 s	86.640	354.0	5.49	13.0-14.0	1 1 2	
			18567N3445	-1 arc min.	86.639	353.6	5.66	13.0-14.0	2n	POP
POP 196	196		18532N3436	+34.3361(9.2)	86.654	352.3	5.24	13.0-14.0	1 2 3	
			18550N3440	+2 s	87.629	353.6	4.59	14.0-14.5	1 1 2	
			18568N3443	+3 arc min.	87.044	352.8	4.98	13.5-14.2	2n	POP *
POP 194	194		18533N3459	+34.3369(9.5)	86.640	121.9	3.03	10.0-11.0	1 1 2	
			18551N3502	-27 s	86.654	122.7	3.16	9.5-10.5	2 2 4	
			18569N3505	0 arc min.	86.649	122.4	3.12	9.7-10.7	2n	POP *

MICROMETRIC MEASUREMENTS OF DOUBLE STARS - POP PAIRS

Table 1. (continued)

Disc.	Mult.	1900		BD $\Delta\alpha$ $\Delta\delta$	Epoch		Θ°	ρ''	m or Δm	W Obs. N								
		α	δ		1900	1900+												
POP 130	AB	18538N3459		+34.3369(9.5)	86.638	125.3	55.78	9.5-11.0	1 2 3	1n	POP							
		18556N3502			86.638	125.3						55.78	9.5-11.0					
		BC				86.638	270.6	8.35	11.0-12.0	1 1 2								
					86.640	273.4	8.65	10.0-11.0	1 1 2									
					86.654	271.8	8.65	10.0-10.8	1 1 2									
					86.644	271.9	8.55	10.3-11.3	3n	POP								
POP 29		18539N3446		+34.3370(9.2) -19 s -1 arc min.	86.638	174.2	2.28	10.0-11.0	1 1 2	1n	POP *							
		18557N3450			86.640	167.2						2.22	10.0-10.5	1 1 2				
		18575N3454			86.639	170.7						2.25	10.0-10.8	2n				
POP 40	AB	18583N3427		+34.3398(9.3) - +1 arc min.	86.790	77.0	6.27	12.0-13.0	1 1 2	1n	POP							
		19002N3431			87.629	76.1						5.72	10.0-11.0	1 1 2				
		19020N3436			89.685	76.2						5.27	11.0-12.0	1 1 2				
		CD				88.035	76.4	5.75	11.0-12.0	3n								
						86.790	355.7	3.01	15.0-15.0	1 1 2								
					87.629	346.6	3.33	12.0-12.0	1 1 2									
					89.685	349.1	3.05	12.5-12.5	1 1 2									
					88.035	350.5	3.13	13.2-13.2	3n	POP								
POP 30		19051N3412		+34.3434(9.3) +11 s -1 arc min.	85.770	315.9	2.31	10.0-10.7	3 2 5	1n	POP							
		19069N3416			86.651	314.6						2.06	10.0-10.7	1 1 2				
		19087N3421			86.022	315.5						2.24	10.0-10.7	2n				
					85.770	317.6						2.24	11.5-12.0	1 1 2				
					85.770	317.6						2.24	11.5-12.0	1n	ZUL			
POP 32		19164N3425		+34.3499(9.5)	86.654	164.8	3.59	-	1 1 2	1n	POP							
		19182N3430			89.646	159.7						4.00	9.5-10.2	1 2 3				
		19201N3435			90.746	159.8						3.65	9.5-10.0	2 2 4				
					90.747	160.9						3.57	9.5-10.0	2 2 4				
					91.640	166.2						3.23	10.0-10.8	1 2 3				
					91.645	167.1						3.75	9.5-10.5	1 2 3				
					90.425	162.7						3.63	9.6-10.2	6n				
POP 204		19166N3430		+34.3499(9.5) +10 s +5 arc min.	89.647	181.8	8.17	9.5- 9.5	1 2 3	1n	POP *							
		19184N3435			90.746	181.2						8.00	9.7- 9.7	1 2 3				
		19202N3440			90.747	183.8						8.03	9.5- 9.5	2 2 4				
					91.640	184.3						7.76	10.2-10.0	1 2 3				
					91.645	183.4						7.38	10.0-10.3	1 2 3				
					90.876	183.0						7.88	9.7- 9.8	5n				
POP 33		19231N3445		+34.3549(9.4)	83.638	233.9	0.63	0.2	3 2 5	1n	POP							
		19249N3450			83.638	233.9						0.63	0.2	1n				
		19268N3456											86.709	233.5	0.77	10.5-10.7	2 2 4	
													86.711	228.8	0.92	0.2	2 1 3	
													86.710	231.5	0.83	0.2	2n	POP
													86.709	233.4	0.59	-	2 2 4	
													86.711	232.0	0.71	9.5- 9.8	2 2 4	
					86.710	232.7	0.65	9.5- 9.8	2n	ZUL								

Table 1. (continued)

Disc.	Mult.	1900 α 1950 δ 2000	BD $\Delta\alpha$ $\Delta\delta$	Epoch 1900+	Θ°	ρ''	m or Δm	W Obs. N	
POP 34	AB	19252N3503 19271N3509 19289N3525	+34.3568(9.5)	83.482	48.9	3.21	9.5-13.0	1 2 3	
				83.621	42.1	3.27	9.0-13.0	1 2 3	
				83.635	43.1	3.67	9.5-12.0	1 1 2	
				83.657	46.3	3.30	9.5-13.0	2 1 3	
				83.731	42.2	3.02	10.0-13.0	1 1 2	
				83.742	43.0	2.93	-	2 2 4	
				83.824	45.5	2.63	9.5-12.0	1 1 2	
				83.665	44.5	3.14	9.5-12.7	7n POP *	
				84.683	43.8	3.64	10.0-13.0	1 2 3	
				84.760	46.1	3.50	10.0-13.0	1 2 3	
				84.722	45.0	3.57	10.0-13.0	2n POP *	
				86.629	39.1	3.39	9.5-12.0	1 1 2	
				86.651	39.3	3.12	9.5-13.0	1 1 2	
				86.640	39.2	3.26	9.5-12.5	2n POP *	
	87.830	36.2	2.86	10.0-12.0	1 2 3				
	87.830	36.2	2.86	10.0-12.0	1n POP *				
	88.745	35.2	3.33	9.5-12.0	1 1 2				
	89.625	35.1	3.09	10.0-13.0	1 2 3				
	89.641	34.9	3.52	-	2 2 4				
	89.437	35.0	3.33	9.8-12.5	3n POP *				
	AC				86.651	2.9	34.69	9.5-11.0	1 2 3
					88.745	2.3	35.09	9.5-10.5	1 1 2
					89.625	2.7	34.89	10.0-12.0	1 2 3
					88.290	2...	34.87	9.8-11.2	3n POP *
	POP 135		19253N3456 19272N3502 19289N3525	+34.3568(9.5) +2 s -7 arc min.	83.657	36.7	1.97	1.0	1 1 2
					83.742	33.3	1.88	11.0-12.0	1 2 3
					83.824	37.8	1.92	-	1 1 2
83.741					35.6	1.92	1.0	3n POP	
88.745					38.5	2.22	-	1 1 2	
89.641					34.8	1.81	-	2 2 4	
89.342					36.0	1.95	-	2n POP	
POP 154		19259N3329 19278N3335 19296N3341	+33.3475(9.4) -3 s +10 arc min.	86.629	230.4	3.94	12.5-12.7	1 2 3	
				86.651	229.2	4.31	11.0-11.2	1 2 3	
				86.640	229.8	4.12	11.7-11.9	2n POP	
POP 155		19260N3458	+34.3572(8.5) +33 s -1 arc min.	83.482	95.5	3.58	3.0	1 1 2	
				83.586	95.2	3.76	10.0-12.0	1 1 2	
				83.621	97.6	4.03	10.0-12.5	1 2 3	
				83.657	95.7	3.95	10.0-13.0	2 1 3	
				83.751	98.4	3.98	10.0-13.0	1 1 2	
				83.742	95.7	4.06	-	1 1 2	
				83.824	94.0	3.38	10.0-12.0	1 1 2	
				84.683	95.6	4.19	10.0-12.0	1 1 2	
				83.774	96.0	3.88	2.6	8n POP	
				89.641	93.8	3.77	10.0-12.0	1 1 2	
89.641	93.8	3.77	10.0-12.0	1n POP					
POP 195 BC		19260N3319 19278N3325 19297N3331	+33.3475(9.4)	86.651	248.4	4.89	10.0-12.0	1 1 2	
				86.651	248.4	4.89	10.0-12.0	1n POP *	
POP 79		19274N3509 19293N3515 19311N3521	+35.3661(8.9) -3 s -3 arc min.	83.622	325.3	4.22	0.1	1 2 3	
				83.622	325.3	4.22	0.1	1n POP	

MICROMETRIC MEASUREMENTS OF DOUBLE STARS - POP PAIRS

Table 1. (continued)

Disc.	Mult.	1900		BD $\Delta\alpha$ $\Delta\delta$	Epoch 1900+	Θ°	ρ''	m or Δm	W Obs. N		
		α	1950 δ 2000								
POP 42	42	19285N3402		+33.3492(9.5)	83.622	285.3	4.40	10.0-11.5	1	2 3	
		19304N3408		+5 s	83.731	284.7	4.57	1.0	1	1 2	
		19322N3414		0 arc min.	83.666	285.1	4.47	1.2		2n	POP
					86.774	286.1	4.29	11.0-13.0	1	1 2	
					91.670	288.7	4.36	11.0-12.0	1	2 3	
			87.712	287.7	4.33	11.0-12.5		2n	POP		
POP 96	96	19327N3419		+34.3628(9.2)	91.670	125.6	1.09	-	1	1 2	
		19344N3426		-6 s	91.670	125.6	1.09	-		1n	POP
		19363N3433		+5 arc min.							
POP 206 AB	AB	19328N3413		+34.3628(9.2)	91.670	78.4	3.30	13.0-13.3	1	1 2	
		19346N3427		+6 s	91.670	78.4	3.30	13.0-13.3		1n	POP
		19365N3427		-1 arc min.							
AC					91.670	198.2	~12.	-	1	1 2	
					91.670	198.2	~12.	-		1n	POP
POP 59	59	19375N3514		+35.3748(9.3)	90.681	258.9	5.39	10.0-12.0	1	1 2	
		19393N3520		-15 s	90.684	256.3	5.45	10.0-11.0	1	1 2	
		19412N3527		-1 arc min.	90.689	262.0	5.45	10.0-12.5	2	2 4	
					90.686	259.8	5.44	10.0-12.0		3n	POP
POP 121	121	19417N3641		+36.3687(9.2)	85.754	324.8	1.60	9.5-10.0	3	3 6	
		19436N3648			86.648	322.9	1.58	10.0-10.3	3	2 5	
		19454N3656			86.712	324.1	1.65	10.0-10.3	3	2 5	
					86.333	324.0	1.61	9.8-10.2		3n	POP
					85.754	325.8	1.51	10.0-10.0	3	3 6	
			86.711	326.7	1.47	9.5- 9.7	3	3 6			
			86.232	326.2	1.49	0.1		2n	ZUL		
POP 122	122	19419N3654		+36.3689(9.4)	86.711	84.2	2.50	0.2	1	1 2	
		19437N3701		-6 s	86.711	84.2	2.50	0.2		1n	ZUL
		19455N3708		-4 arc min.							
					86.648	89.7	2.62	11.0-11.5	1	1 2	
			86.711	87.5	2.73	12.0-12.2	1	1 2			
			86.680	88.6	2.67	11.5-11.8		2n	POP		
										*	
POP 100	100	19456N3527		+35.3820(9.5)	90.689	286.6	2.05	13.5-14.0	1	1 2	
		19475N3534		-4 s	90.689	286.6	2.05	13.5-14.0		1n	POP
		19493N3541		0 arc min.							
POP 101	101	19459N3530		+35.3821(9.5)	90.681	134.7	4.70	11.0-13.0	1	1 2	
		19477N3537		+3 s	90.689	134.1	5.14	12.0-13.5	2	1 3	
		19496N3545		-6 arc min.	90.777	135.2	5.09	11.0-13.0	1	1 2	
					90.712	134.6	5.00	11.5-13.2		3n	POP
POP 102 AB	AB	19460N3532		+35.3821(9.5)	90.681	133.1	2.91	13.0-13.5	1	1 2	
		19479N3539		+12 s	90.690	139.3	3.63	13.0-13.5	1	2 3	
		19497N3547		-4 arc min.	90.777	140.0	4.08	11.5-12.5	1	1 2	
					90.712	137.7	3.55	12.5-13.2		3n	POP
AC					90.690	81.6	-	-	1	2 3	
					90.690	81.6	-	-		1n	POP

Table 1. (continued)

Disc.	Mult.	1900		BD $\Delta\alpha$ $\Delta\delta$	Epoch		Θ°	ρ''	m or Δm	W Obs.	N
		α	δ		1900	1900+					
POP 104		19461N3543		+35.3822(9.5)	90.690	55.5	4.33	10.0-11.0	2 1 3		*
		19480N3551		+9 s	90.777	52.9	4.84	10.0-11.0	2 1 3		
		19498N3558		+2 arc min.	90.733	54.2	4.58	10.0-11.0	2n	POP	
POP 13	AB	19471N3414		+34.3751(9.3)	90.690	359.1	3.17	13.0-14.0	1 1 2		
		19490N3421		+5 s	90.690	359.1	3.17	13.0-14.0	1n	POP	
	AC	19509N3429		-1 arc min.	90.690	272.7	9.06	13.0-13.5	1 1 2		*
					90.690	272.7	9.06	13.0-13.5	1n	POP	
POP 37		19494N3501		+34.3771(9.5)	86.774	335.4	2.20	9.5- 9.8	1 2 3		
		19513N3509			86.777	331.1	2.67	11.0-11.3	1 1 2		
		19532N3516			86.775	333.7	2.39	10.2-10.6	2n	POP	
					86.774	332.7	2.31	10.5-10.8	1 1 2		
					86.777	333.4	2.39	0.2	1 1 2		
					86.776	333.0	2.35	0.4	2n	ZUL	
POP 61		19564N3413		+34.3831(9.5)	91.640	27.7	5.74	-	1 1 2		*
		19583N3421		-1 s	91.640	27.7	5.74	-	1n	POP	
		20002N3429		-4 arc min.							
POP 62	AB	19568N3501		+34.3834(9.5)	91.640	161.2	31.84	9.5-13.0	1 1 2		
		19587N3509			91.640	161.2	31.84	9.5-13.0	1n	POP	
	BC	20006N3517			91.640	69.1	3.69	13.0-14.0	1 1 2		*
					91.640	69.1	3.69	13.0-14.0	1n	POP	
POP 193		20009N3434		+34.3862(8.6)	87.711	94.6	4.24	10.0-13.0	1 1 2		
		20028N3442		0 s	87.711	94.6	4.24	10.0-13.0	1n	POP	
		20047N3451		-7 arc min.							
POP 64		20009N3441		+34.3862(8.6)	85.705	124.5	4.73	12.0-12.2	1 1 2		*
		20028N3449		+11 s	87.711	127.5	4.46	12.0-12.2	1 1 2		
		20047N3458		-2 arc min.	86.708	126.0	4.60	12.0-12.2	2n	POP	
POP 65		20024N3433		+34.3869(9.3)	87.711	221.4	5.92	-	1 1 2		
		20043N3441		+9 s	87.711	221.4	5.92	-	1n	POP	
		20043N3441		0 arc min.							
POP 66		20025N3437		+34.3874(8.5)	87.711	356.1	5.57	10.0-12.0	1 1 2		*
		20044N3445		-22 s	87.711	356.1	5.57	10.0-12.0	1n	POP	
		20063N3454		-0.5 arc min.							
POP 189		20037N3721		+37.3774(8.3)	85.749	327.3	-	12.0-13.0	1 1 2		
		20055N3729		-8 s	85.749	327.3	-	12.0-13.0	1n	ZUL	
		20073N3738		-0.5 arc min.							
					91.642	330.0	7.18	10.0-12.5	1 1 2		
					91.642	330.0	7.18	10.0-12.5	1n	POP	*
POP 191		20038N3734		+37.3774(8.3)	89.718	65.0	3.92	11.5-13.0	1 1 2		
		20056N3743		0 s	89.718	65.0	3.92	11.5-13.0	1n	POP	
		20074N3751		+13 arc min.							

MICROMETRIC MEASUREMENTS OF DOUBLE STARS - POP PAIRS

Table 1. (continued)

Disc.	Mult.	1900 α 1950 δ 2000	BD $\Delta\alpha$ $\Delta\delta$	Epoch 1900+	Θ°	e''	m or Δm	W Obs.	N
POP 187		20038N3802 20056N3810 20074N3819	+38.3910(8.9) +5 s -9 arc min.	89.718 89.718 89.718 89.718	89.3 89.3 89.2 89.2	4.79 4.79 6.41 6.41	10.5-11.2 10.5-11.2 11.0-12.5 11.0-12.5	1 1 2 1n 1 1 2 1n	POP ZUL
POP 138		20107N4521 20123N4530 20139N4539	+45.3102(9.1)	85.519 85.522 85.521 85.519 85.522 85.521	37.8 31.5 34.2 29.1 35.1 32.7	0.53 0.48 0.50 0.47 0.47 0.47	0.2 0.2 0.2 0.1 0.1 0.1	2 1 3 3 1 4 2n 1 1 2 2 1 3 2n	POP ZUL
POP 200		20140N2855 20160N2864 20180N2873	ADS 13665(8.7) -8 s +1 arc min.	89.720 89.720	207.3 207.3	6.70 6.70	13.0-14.0 13.0-14.0	2 1 3 1n	POP *
POP 94		20203N3437 20203N3437 20242N3456	+34.4000(9.5) +6 s -4 arc min.	87.626 89.647 88.300	149.8 149.3 149.6	2.53 2.73 2.60	11.5-12.0 11.0-11.3 11.3-11.8	2 2 4 1 1 2 2n	POP
POP 80		20204N3448 20224N3456 20243N3506	+34.3998(9.3) +34 s 0 arc min.	87.626 90.747 89.186	330.6 327.4 329.0	2.30 2.32 2.31	- 12.5-13.0 12.5-13.0	1 1 2 1 1 2 2n	POP
POP 202		20207N3452 20226N3501 20245N3511	+34.4003(9.3)	87.626 89.647 90.747 89.541	27.7 29.4 25.1 27.1	4.22 4.53 4.73 4.53	9.0-11.0 9.0-12.0 9.0-12.0 9.0-11.7	1 1 2 1 1 2 1 2 3 3n	POP *
POP 199 AB		20221N3944 20240N3954 20258N4004	+39.4183(9.2)	89.649 90.746 90.774 90.780 90.393 90.774 90.780 90.777	208.4 207.3 207.4 206.7 207.6 205.9 206.3 206.1	8.24 7.91 8.10 8.32 8.14 7.68 7.98 7.83	8.0-10.0 8.0-10.5 8.0-10.5 8.0-11.0 8.0-10.4 8.5-10.5 9.0-11.5 8.8-11.0	2 2 4 1 2 3 1 2 3 1 1 2 4n 1 1 2 1 1 2 2n	POP ZUL
	AC			89.649 90.746 90.198	244.8 245.2 245.0	59.79 59.85 59.82	8.0-10.0 8.0-10.0 8.0-10.0	2 1 3 1 2 3 2n	POP
POP 51		20453N3408 20473N3419 20493N3430	+33.4037(9.5) +16 s -0.5 arc min.	91.642 91.642	353.7 353.7	4.95 4.95	12.0-12.7 12.0-12.7	1 1 2 1n	POP
POP 82		20544N3549 20563N3600 20583N3611	+35.4342(9.0) -15 s -4 arc min.	86.630 86.638 86.634	25.5 27.1 26.3	4.54 4.43 4.48	10.5-12.0 11.0-12.5 10.8-12.2	1 1 2 1 1 2 2n	POP
POP 27		20552N3412 20573N3424 20593N3435	+34.4228(9.5)	86.630 86.649 86.728 86.677 86.728 86.728	154.4 160.3 162.1 159.4 153.2 153.2	1.95 1.48 1.37 1.57 1.53 1.53	- 10.0-10.3 10.0-10.5 10.0-10.4 11.0-11.2 11.0-11.2	1 1 2 1 1 2 2 1 3 3n 1 1 2 1n	POP ZUL

Table 1. (continued)

Disc.	Mult.	1900 α 1950 δ 2000	BD $\Delta\alpha$ $\Delta\delta$	Epoch 1900+	Θ°	ϱ''	m or Δm	W Obs. N
POP	28	20553N3407 20573N3418 20593N3430	+33.4112(8.0) +13 s +2 arc min.	86.649 86.654 86.652	3.3 3.8 3.6	2.68 2.46 2.57	13.0-13.5 12.5-13.0 12.8-13.2	1 1 2 1 1 2 2n POP
POP	24	21019N3435 21039N3447 21059N3459	+34.4278(9.5)	83.881 85.713 90.758 86.784	246.2 245.7 245.3 245.7	7.17 7.86 7.77 7.60	9.5-13.0 9.5-12.5 10.0-12.5 9.7-12.7	1 1 2 1 1 2 1 1 2 3n POP
POP	25	21021N3435 21041N3447 21061N3459	+34.4278(9.5) +13 s 0 arc min.	85.713 85.713	301.6 301.6	- -	- -	1 1 2 1/0n POP *
POP	22 AB.	21025N3412 21045N3424 21066N3456	+34.4283(9.5)	83.635 83.807 83.813 83.881 83.767	97.6 99.0 99.0 96.7 98.0	6.06 5.55 5.13 5.52 5.62	9.5-11.5 9.5-11.0 9.5-11.0 9.5-11.0 9.5-11.1	1 2 3 1 1 2 1 1 2 1 1 2 4n POP
				85.522 85.522	98.0 98.0	6.67 6.67	- -	2 1 3 1n ZUL
				85.522 85.713 85.618	97.3 98.2 97.8	6.39 6.25 6.32	1.5 9.5-11.0 1.5	2 1 3 1 2 3 2n POP
				89.619 89.641 89.630	97.3 99.9 98.6	6.38 6.17 6.28	10.0-11.5 9.0-10.5 9.7-11.2	2 1 3 1 2 3 2n POP
				91.651 91.651	99.5 99.5	5.61 5.61	9.5-11.0 9.5-11.0	1 2 3 1n POP *
	AC			83.635 83.807 83.721	17.6 17.6 17.6	- 32.0 32.0	- 9.5-10.8 9.5-10.8	1 1 2 1 1 2 2/1n POP
				89.641 91.651 90.646	16.9 16.9 16.9	31.54 31.10 31.32	9.0-10.0 9.5-10.0 9.2-10.0	1 1 2 1 1 2 2n POP *
POP	26	21051N3507 21072N3519 21092N3531	+34.4304(9.5) 0 s +4.5 arc min.	90.758 90.758	244.4 244.4	4.20 4.20	10.0-11.0 10.0-11.0	1 1 2 1n POP
POP	201	21164N3204 21185N3217 21206N3230	ADS 14889 -10 s	88.743 88.743	204.1 204.1	7.30 7.30	12.5-13.0 12.5-13.0	1 1 2 1n POP *
POP	137	21275N4429 21296N4442 21313N4455	+44.3848(9.4) 0 s +1 arc min.	86.709 86.862 86.786	106.9 104.0 105.4	1.90 2.10 2.00	11.5-11.5 0.3 0.2	1 1 2 1 1 2 2n POP
				86.709 86.862 86.786	102.3 102.8 102.6	1.60 1.68 1.64	0.1 0.1 0.1	1 1 2 1 1 2 2n ZUL
POP	88	21510N3410 21531N3424 21553N3438	+33.4383(9.3) -8 s -2 arc min.	83.824 86.654 85.239	240.4 242.5 241.4	2.88 3.16 3.02	10.5-11.5 11.0-12.5 10.8-12.0	1 1 2 1 1 2 2n POP

MICROMETRIC MEASUREMENTS OF DOUBLE STARS - POP PAIRS

Table 1. (continued)

Disc.	Mult.	1900		BD $\Delta\alpha$ $\Delta\delta$	Epoch		Θ°	ρ''	m or Δm	W Obs.	N	
		α	δ		1950	2000						1900+
POP 91	AB	21546N3427		+33.4395(8.7)	86.654	296.5	2.58	9.5-14.0	1 1 2			
		21567N3440		+24 s	86.654	296.5	2.58	9.5-14.0	1n	POP *		
		21589N3454		+16 arc min.								
	AC					86.654	320.1	20.04	9.5-10.7	1 2 3		
						86.654	320.1	20.04	9.5-10.7	1n	POP	
POP 145	AB	22005N4604		+45.3785(9.2)	83.635	105.9	1.78	-	1 1 2			
		22025N4618		-23 s	86.654	104.4	2.21	10.0-10.8	2 1 3			
		22045N4632		0 arc min.	89.797	101.6	1.90	10.0-10.5	2 2 4			
					90.747	100.4	2.46	10.0-11.0	1 1 2			
					87.992	102.9	2.06	10.0-10.7	4n	POP		
					89.797	103.1	2.05	10.5-10.8	2 2 4			
	CD					89.797	103.1	2.05	10.5-10.8	1n	ZUL	
						86.654	30.2	1.44	10.0-10.5	2 1 3		
						89.797	31.9	1.34	10.3-10.8	1 2 3		
						90.747	23.0	1.91	11.0-11.5	1 1 2		
						88.856	29.0	1.52	10.3-10.8	4n	POP	
						89.797	32.6	1.61	11.0-11.5	2 2 4		
POP 60					89.797	32.6	1.61	11.0-11.5	1n	ZUL		
	POP 60		22146N3442		+34.4650(9.0)	87.626	1.4	4.46	11.0-11.5	1 1 2		
			22168N3457		+10 s	89.942	5.3	3.80	11.5-12.0	1 2 3		
			22190N3512		-6 arc min.	89.016	3.7	4.06	11.2-11.8	2n	POP	
	POP 93		22227N3446		+34.4688(9.0)	86.725	284.5	5.79	11.5-12.0	1 1 2		
			22249N3501		-8 s	89.942	282.4	5.25	12.5-13.0	1 1 2		
			22271N3516		-2 arc min.	88.333	283.4	5.52	12.0-12.5	2n	POP *	
POP 90		22239N3503		+34.4693(9.5)	86.725	284.8	6.63	-0.1	1 2 3			
		22262N3518		+8 s	86.774	284.9	6.65	0.0	1 1 2			
		22284N3533		0 arc min.	86.777	284.4	6.81	9.5- 9.5	2 2 4			
					86.759	284.6	6.71	0.0	3n	POP		
					89.942	283.7	6.35	10.0-10.0	1 2 3			
					89.942	283.7	6.35	10.0-10.0	1n	POP		
POP 99		22242N3443		+34.4695(9.5)	86.649	294.0	1.74	10.0-10.2	1 1 2			
		22264N3458		-8 s	86.774	291.2	1.72	0.3	1 1 2			
		22286N3513		-4 arc min.	86.777	290.5	1.68	10.5-11.0	1 1 2			
					86.733	291.9	1.71	0.3	3n	POP		
					86.774	289.4	1.82	0.3	1 1 2			
					86.777	290.2	1.86	10.8-11.0	1 1 2			
POP 39					86.776	289.8	1.84	0.2	2n	ZUL		
POP 39		22280N3429		+34.4710(9.3)	83.731	90.5	0.55	-0.3	2 1 3			
		22303N3444			83.731	90.5	0.55	-0.3	1n	POP		
		22325N3500										
					85.522	96.0	0.62	-0.3	2 1 3			
					85.768	91.6	0.49	10.2-10.0	2 1 3			
					85.645	93.8	0.55	-0.2	2n	POP *		
POP 39					85.522	97.2	0.47	0.2	2 2 4			
					85.768	96.8	0.48	-	2 2 4			
					85.645	97.0	0.48	0.2	2n	ZUL		

Table 1. (continued)

Disc.	Mult.	1900	BD $\Delta\alpha$ $\Delta\delta$	Epoch		Θ°	ρ''	m or Δm	W Obs. N
		α 1950 δ 2000		1900+					
POP 68	AB	23158N3548	+35.5010(9.4)	83.739	320.8	0.93	-0.1	2 1 3	
		23181N3604		85.817	322.1	1.27	-0.1	2 2 4	
		23205N3604		84.926	321.5	1.12	-0.1	2n	POP
	AC			85.817	165.9	7.69	9.5-13.0	2 2 4	
				85.817	165.9	7.69	9.5-13.0	1n	POP
POP 67		23169N3550	+35.5015(8.4)	83.739	307.5	3.21	9.5-11.5	2 1 3	
		23193N3607	-3 s	85.817	306.7	3.07	10.0-12.0	3 2 5	
		23217N3623	-12 arc min.	85.038	307.0	3.12	9.8-11.8	2n	POP
POP 21		23223N2953	+29.4929(9.5)	85.754	30.8	0.78	0.1	2 1 3	
		23247N3010		85.768	29.6	0.87	-	1 1 2	
		23272N3026		85.760	30.3	0.82	0.1	2n	POP *
				85.754	26.9	0.70	0.1	1 1 2	
				85.768	30.7	0.60	0.1	1 1 2	
				85.761	28.8	0.65	0.1	2n	ZUL
POP 120		23223N2947	+29.4929(9.5)	80.714	253.1	4.56	-	2 1 3	
		23247N3004	-3 s	80.714	253.1	4.56	-	1n	POP *
		23271N3020	-6 arc min.						
POP 3		23224N2941	+29.4929(9.5)	85.754	116.1	4.12	12.0-12.0	1 1 2	
		23248N2958	+3 s	85.768	120.3	3.82	-0.1	1 1 2	
		23272N3014	-12 arc min.	85.761	118.2	3.97	0.0	2n	POP
				85.755	120.0	4.36	12.0-12.0	1 1 2	
				85.768	118.9	4.22	-	1 1 2	
				85.762	119.4	4.29	12.0-12.0	2n	ZUL
POP 197		23436N6422	ADS 17020(6.4)	86.728	280.7	1.66	13.0-13.0	1 1 2	
		23460N6438	-9 s	86.728	280.7	1.66	13.0-13.0	1n	POP
		23484N6455	+2 arc min.						

MICROMETRIC MEASUREMENTS OF DOUBLE STARS - POP PAIRS

Table 2. Notes marked with "*" in Table 1.

POP 198	First publishing. At magnification 480x (f=21 mm) visible together with pair ADS 39.
POP 52	Reference star BD +34.75 is not A component of system POP 52.
POP 173	Hardly visible. Reference star BD +39.790 (m=7.3) is pair ADS 2553.
POP 83	POP 83 = COU 1080. Both designations have been accepted.
POP 140	Direct motion: approximately one degree per year. In 1986 observed interferometrically: 1986.8837, 158.8 deg., 0.265 arc sec.
POP 107	On the limit of measuring possibilities.
POP 205	First publishing.
POP 207	This pair brighter than m=9.5, but not in the BD chart.
POP 75	The A component several times suspected of duplicity.
POP 115	There is also C component at position angle of about 16 deg.
POP 117	Popovic's previous measuring: 1983.183, 259.2 deg., 0.53 arc sec.
POP 57	There is also C comp.: approximately m=11.
POP 209	Earlier designation: GPO 12.
POP 1	C is not seen as point like source, whereas the images of A and B appear as perfect points.
POP 203	First publishing; reference star BD +34.2947 (m=9.0) is wide binary.
POP 20	Hardly visible; on the limit of measuring possibilities.
POP 10 AC	Direct motion of position angle.
POP 110	Earlier designation GPO 13; retrograde motion.
POP 111	Earlier designation GPO 21.
POP 78	Still uncertain if A comp. is double, position angle about 246 deg.
POP 16	From CdC estimated position of this pair for August 17, 1939 - about 291 deg and about 6 arc sec; conclusion: direct orbital motion.
POP 43	On the limit of measuring possibilities.
POP 196	First publishing.
POP 194	First publishing.
POP 29	At the centre of a star family containing about 13 members.
POP 204	First publishing; reference star to this pair POP 32.
POP 34 AB	Rectilinear trajectory (Popovic, Trajkovska, 1988): 1983.665 -1.53 deg. +0.04 arc sec. 1984.722 1.00 0.42 1986.640 -1.32 -0.01 1987.830 -2.27 -0.21 1989.437 -0.80 -0.10
POP 34 AC	Retrograde motion.
POP 195	First publishing.
POP 96	Unclear image, seems to be extended; no C comp. at separation of about 5 arc sec. There is a faint component at position angle of about 337 deg. and sep. of about 50 arc sec.
POP 206	First publishing.
POP 121	Like POP 29 also in centre of star family (16 members).
POP 122	Direct motion.
POP 100	On the limit of measuring possibilities.
POP 13 AC	Separation significantly enlarged compared to estimate from 1980.

Table 2. (continued)

POP 61	On the limit of measuring possibilities.
POP 62 BC	On the limit of measuring possibilities.
POP 64	In a group with 7 other stars.
POP 66	Retrograde motion.
POP 189	Belongs to a moving group of about ten stars where A comp. occupies third place in brightness.
POP 200	First publishing. ADS 13665 = BD +28.3698.
POP 202	Surely not pair ES 2303 = BD +34.4002. First publishing.
POP 25	Separation not measured because of clouds.
POP 22 AB	According to CdC its estimated position for Sept. 12, 1920 - p. a. about 80 deg., sep. about 7.5 arc sec. Their changes indicate direct orbital motion.
POP 22 AC	C is brighter than B.
POP 201	First publishing.
POP 91 AB	Due to faintness of B its duplicity has been doubted. Now its reality is certain.
POP 93	Not star ADS 15 969
POP 39	Slow direct motion.
POP 21	Compared to earlier measurements quadrant of position angle corrected.
POP 120	Its reference star is BD +29.4929 = POP 21.
POP 197	First publishing.

6. position angle Θ
7. angular separation ρ
8. estimated m or Δm
9. the qualities of the image and measurement and the resulting weight
10. observer
11. note

In Table 2 are listed notes indicated by the asterisks in Table 1.

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МИКРОМЕТАРСКА МЕРЕЊА ДВОЈНИХ ЗВЕЗДА - ПОР ПАРОВИ

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