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A study of the Van Orden star

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Abstract

The purpose of the present study was to determine the variations in the star phoric behavior, using the Van Orden Star and a controlled stimulus to accomodation.

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INTRODUCTION

This present study is one of a series utalizing the Van Orden Star. More precisely it is a supplement to a previous work, conducted at the University[1], which attempted to determine the phoric behavior with varying stimuli to accomodation. In the study under consideration, however, the induced prismatic effects have been compensated for.

PURPOSE

The purpose of the present study was to determine the variations in the star phoric behavior, using the Van Orden Star and a controlled stimulus to accomodation.

PROCEDURE

All the following data was obtained by using a wide base stereoscope, the dimensions of which were 18" x 24", to maintain a constant working angle of twenty degrees at the varying test distances.(see diagram 1). A head rest was attached to a stationary aluminum rod, along which the head rest could be moved to the desired testing distance. A septum 7.5" x 4.5" was attached to the head rest to maintain dissociation. A trial frame was also used, in which varying amounts of prism and lenses could be inserted while retaining the individual P.D. of the person under test, thus eliminating induced prismatic effects.

The pencils used were of the same color and length in order to preclude any ahnd favoring other than that of natural hand dominancy.

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1. A Study of the Van Orden Star - Edward Craig, Borbert King- a thesis for Doctor's degree- Pacific University Library

The testing was conducted at two distances, 8# and 16". At the 8" distance a total of fifty stars were drawn by each subject. These were divided into five series of ten stars; each series beingcomposed of five stars drawn with no stimulus to accomodation, which preceeded five stars drawn with varying stimuli to accomodation. These varying stimuli were five one diopter increases in the stimulus to accomodation.

The proceedure was repeated for the 16" test distance where fourty stars were drawn. Here, however, there were only four one diopter increases in the stimulus to accomodation.

A total of ten subjects were used in the study, ranging between 20 and 32 years of age, all of whom were wearing their distance prescriptions during the testing proceedures. There was no fixed time in which a series had to be completed, or the number of series completed in each session; however, once a series was begun, it had to be completed at that session.

The amount of prism necessary to gain dissociation was recorded for each subject and used in the computation of the seperation of the star points. Since each lens was individually centered, there were no residual prismatic effects which had to be taken into consideration. An average seperation was computed for each set of five findings; the prism used to obtain the dissociation was then used to calculate the real seperation of the star points. The mean was then calculated from the data.

RESULTS

Graphs were then drawn. The first had as its abscissae the stimulus to accomodation, and, as its ordinate, convergence

in prism diopters. On this both the 8" and the 16" test distances were plotted. The second and the third graph were plotted with their abscissae as no stimulus to accomodation, after a previous stimulus to accomodation; and their ordinates as convergence in prism diopters.

The mean for the 8" and 16" testing distance, with no previous stimulus to accomodation was taken as the base line. The differance between the means and the base line, for each subsequent return to no stimulus to accomodation, after a previous stimulus were plotted.

1. the effect of minus spheres on the star seperation
   a. the mean for each diopter of stimulus to accomodation was calculated for the group of ten subjects.
   b. this was done for both the 8" and the 16" testing distance.
   c. the calculated means were as follows

testing distance	stimulus	mean
8"	-1.00	14.0
	-2.00	15.9
	-3.00	19.3
	-4.00	22.9
	-5.00	24.9
16"	-1.00	12.6
	-2.00	14.5
	-3.00	18.6
	-4.00	20.9

   d. for the 8" test distance a minus one to minus two diopter stimulus to accomodation produced a slope of 1/3
      - with a minus two to a minus four diopter

stimulus the slope was 1/2.

- with a minus four to a minus five diopter stimulus the slope was again 1/3.

e. for the 16" testing distance a minus one to a minus two diopter stimulus to accomodation produced a slope of 1/3.

- with a minus two to a minus three diopter stimulus the slope was 1/2.

- with a minus three to a minus four diopter stimulus the slope was 1/3.

2. The effect of practice on the star seperation after a previous practice with minus lenses.

a. the means were taken and the first mean was taken as the base line.

b. the differance between the subsequent means were as follows:

distance	stimulus	differances	actual mean
8"	no stimulus	--	13.7
	-1.00	.6 B.I.	13.1
	-2.00	1.4 B.I.	12.3
	-3.00	.2 B.I.	13.5
	-4.00	.5 B.I.	13.2
16"	no stimulus	--	9.8
	-1.00	.6B.O.	10.4
	-2.00	1.0B.O.	10.8
	-3.00	1.6B.O.	11.4

CONCLUSION

1. The effect of minus spheres on the star seperation;

a. it was found that the ACA ratio for the first one

diopter stimulus to accomodation differed from the ACA ratio of the middle range of accomodation.

b. The amount of convergence that was elicited at the beginning of accomodation was smaller than the amount of convergence for the middle range of accomodation.

c. The ACA ratio for the first diopter of accomodation was found to be the same as the last diopter of accomodation.

d. the ACA ratio, rather than being a constant relationship, varies for the range of accomodation being utelized.

e. the above results should be checked by determining the confidence level.

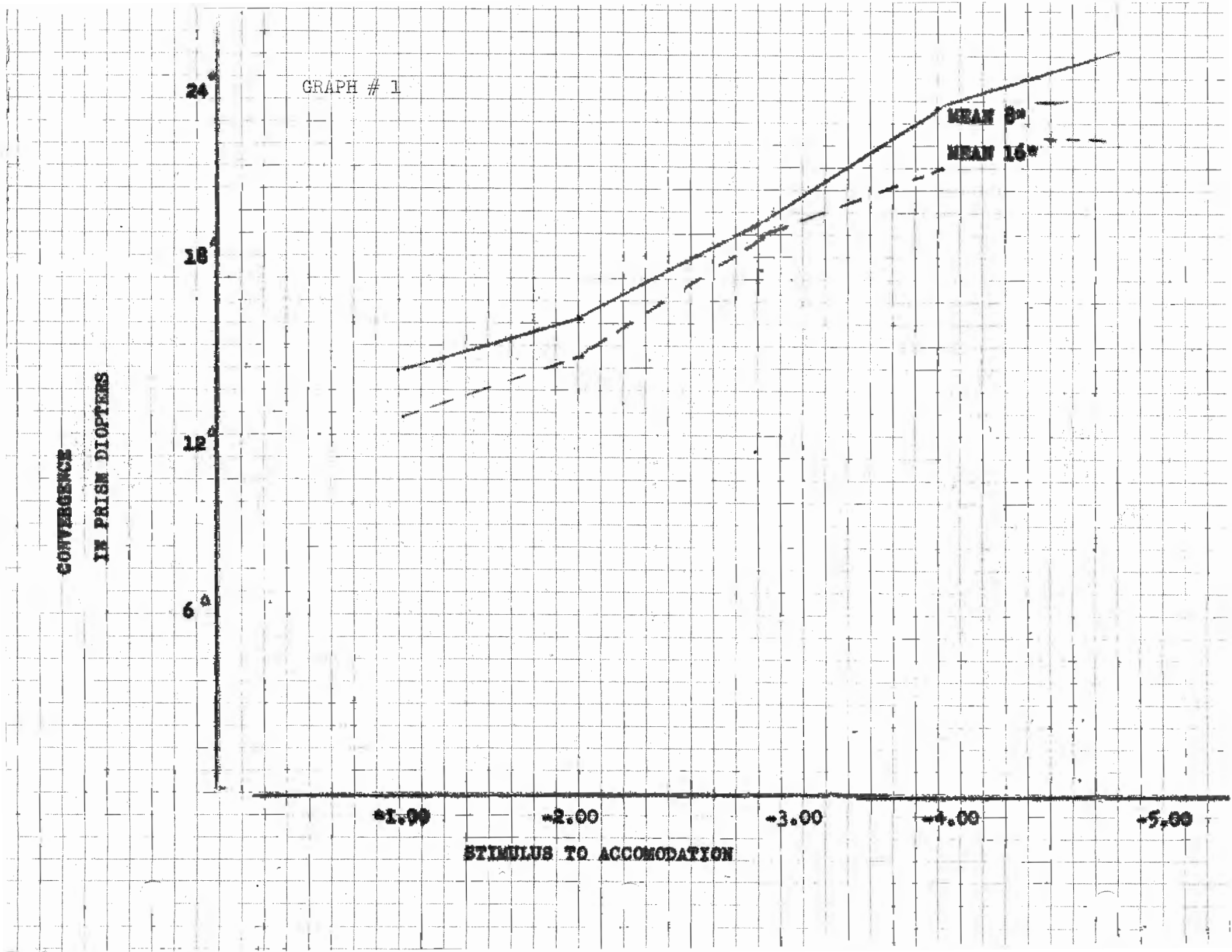
2. The effect of practice on the star seperation, after a previous stimulus to accomodation.

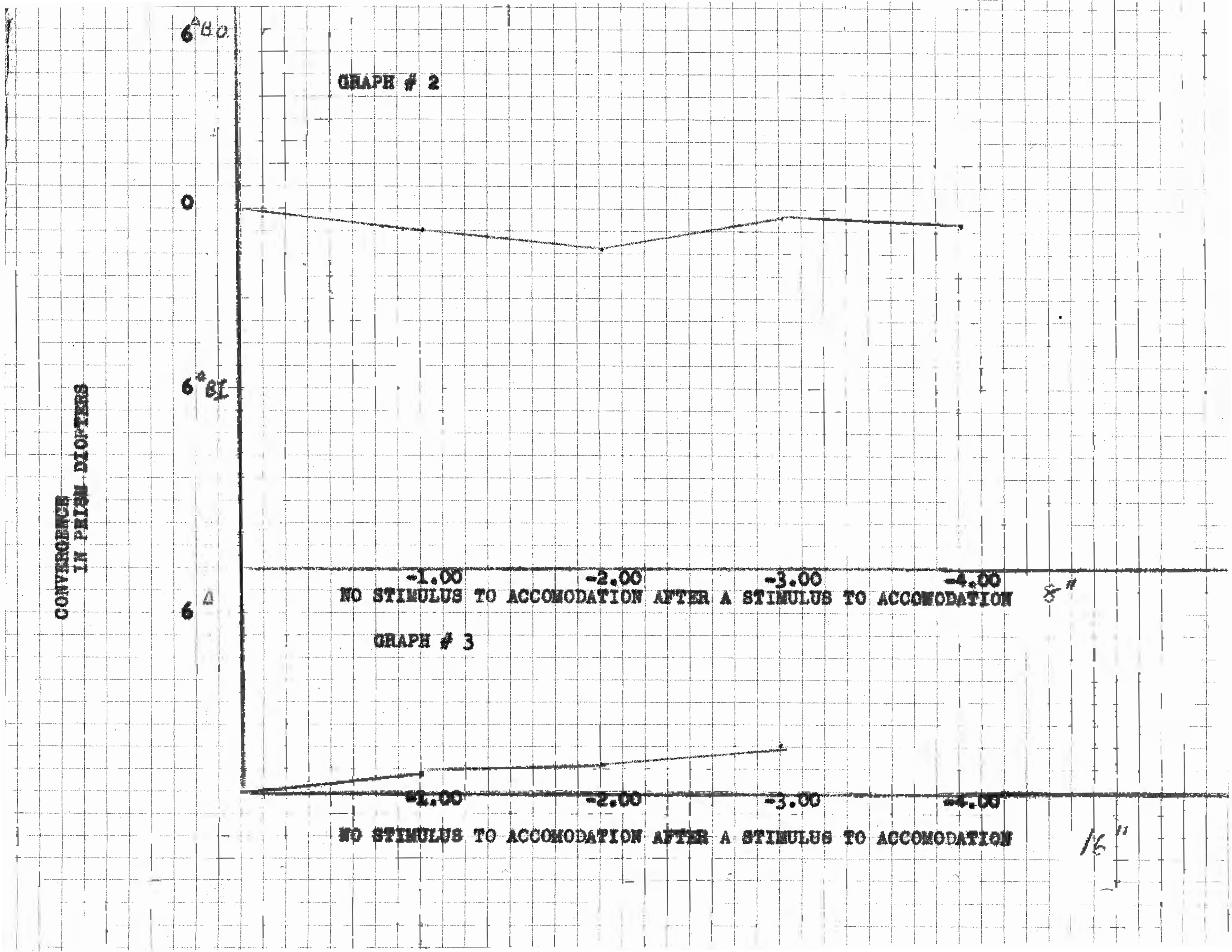
a. practice at the 16" test distance showed an after effect by posturing the star pattern in an increasing esophoric direction.

b. practice at the 8" test distance showed an after effect by the posturing of the star pattern in an exophoric direction.

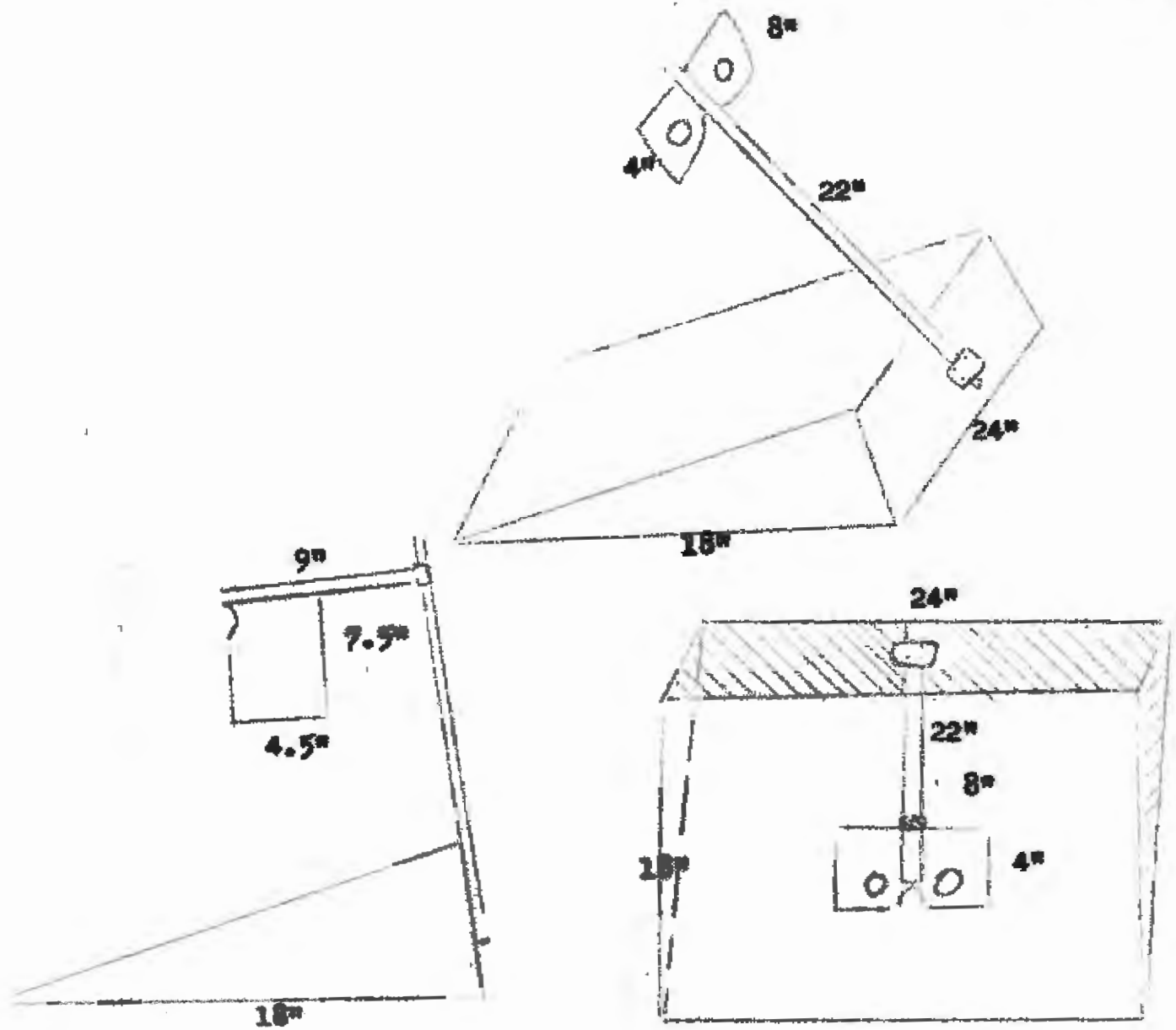
c. the 8" testing distance showed an erratic effect on posturing, turning to a relative esophoric direction at the endpoint of accomodation.

GRAPH # 1


24
18
12
6
CONVERGENCE
IN PRISM DIOPTERS
MEAN 8°
MEAN 16°
-1.00
-2.00
-3.00
-4.00
-5.00
STIMULUS TO ACCOMODATION


CONVERGENCE
IN PRISM DIOPTERS
GRAPH # 2
6 Δ B.O.
0
6 Δ B.I.
6 Δ
-1.00
-2.00
-3.00
-4.00
NO STIMULUS TO ACCOMODATION AFTER A STIMULUS TO ACCOMODATION
8"
GRAPH # 3
-1.00
-2.00
-3.00
-4.00
NO STIMULUS TO ACCOMODATION AFTER A STIMULUS TO ACCOMODATION
16"

DRAWING # 1



APPENDIX

1. Data Measured and Calculated from the Star Pattern Separation

Obs.	PD	Dissociat. Prism		Mean Sep. mm.	Lens	Diff. btw. Mean & PD.	Actual Sep.	
DH	65	16 BO	8"	66.4	5.00	.7	15.3	
				65.8	4.00	.4	15.6	
				67.2	5.00	1.1	14.9	
				64.8	3.00	.1	16.1	
				65.2	5.00	.1	15.9	
				58.6	2.00	4.2	19.2	
				69.6	5.00	2.3	13.7	
				54.6	1.00	5.2	21.2	
				68.2	5.00	1.6	14.4	
				47.2	plano	8.9	24.9	
		12 BO	16"	67.8	2.50	.7	11.3	
				60.4	1.50	1.15	13.15	
				68.2	2.50	.8	11.2	
				44.8	0.50	5.05	17.05	
				60	2.50	1.25	13.25	
		16 BO		54.6	-0.50	2.6	18.6	
		12 BO		63.4	2.50	.4	12.4	
		30 BO		91.2	-1.50	6.55	23.45	
JB	67	12 BO		85.8	5.00	9.25	2.75	
				84.6	4.00	8.8	3.2	
				87	5.00	10.	2.0	
				80.2	3.00	7.6	4.4	
				89.5	5.00	11.25	.75	
				78.6	2.00	5.8	6.2	
		11 BO		82.2	5.00	7.6	3.4	
				66.6	1.00	.2	11.2	
				82.8	5.00	7.9	3.1	
				62.6	plano	2.2	13.2	
		11 BO	16"	108.6	2.50	10.4	.6	
		NONE11 BO		102.4	1.50	8.85	2.25	BO
		None		63.2	2.50	.95	.95	BI
		11 BO		86.8	0.50	4.95	5.05	BO
		None		65.6	2.50	.35	.35	BI
		11 BO		77.4	-0.50	2.6	7.4	BO
		None		63	2.50	1.	1.	BI
				74.7	-1.50	1.85	8.15	BO
EH	62	6 BO	8"	31.8	5.00	15.1	21.1	
				36.2	4.00	12.9	18.9	
				37.4	5.00	12.3	18.3	
				28.2	3.00	16.9	22.9	
				42.2	5.00	9.9	15.9	
				26	2.00	18.0	24.0	
				45.8	5.00	8.1	14.1	
				33	1.00	14.5	20.5	
				45.8	5.00	8.1	14.1	
		12 BO		34.4	plano	13.8	25.8	

Obs.	PD	Dissociat. Prism		Mean Sep. mm.	Lens	Diff. Btw. Mean & PD.	Actual Sep.
EH	62	12 BO	16"	80.4	2.50	4.6	7.4
				66.2	150	1.05	10.95
				76.0	2.50	3.5	8.5
				68.2	0.50	1.5	10.5
				67.8	2.50	1.45	10.55
				47.1	-0.50	3.7	15.7
				75.0	2.50	3.25	8.75
				40.4	-1.50	5.4	17.4
LH	62	12 BO	8"	64.2	5.00	1.1	10.9
				62	4.00	0.0	12.0
				66	5.00	2.0	10.0
				64.8	3.00	1.4	10.6
				67.4	5.00	2.7	9.3
				58.8	2.00	1.6	13.6
				63.4	5.00	.7	11.3
				50.4	1.00	5.8	17.8
				65.4	5.00	1.7	10.3
				45.4	plano	8.3	20.3
			16"	77.8	2.50	3.95	8.05
				77.8	1.50	3.95	8.05
				77.8	250	3.95	8005
				64	0.50	.5	11.5
				75.8	2.50	3.45	8.55
				61	-0.50	.25	12.25
				76	2.50	3.5	8.5
				52	-1.50	2.5	14.5
DD	66	12 BO	8"	63.6	5.00	1.2	13.2
				64	4.00	1.0	13.0
				67.2	5.00	.6	11.4
				53	3.00	6.5	18.5
				65.4	5.00	.3	12.3
				47.8	2.00	9.1	21.1
				65.2	5.00	.4	22.4
				37.2	1.00	14.4	26.4
				61.2	5.00	2.4	14.4
				28	plano	19.0	31.0
			16"	73.4	2.50	1.85	10.15
				51.8	1.50	3.55	15.55
				70.8	2.50	1.2	10.8
				68.2	0.50	.55	11.45
				71.4	2.50	1.35	10.65
		16 BO		52.0	-0.50	3.5	19.5
				82.8	2.50	4.2	11.8
		20 BO		47.2	-1.50	4.7	24.7

Obs.	PD	Dissociat. Prism	Mean Sep. mm.	Lens	Diff. Btw. Mean & PD	Actual Sep.
RG	66	8 BO 8"	70.8	5.00	2.4	5.6
			66.6	4.00	.3	7.7
			73.0	5.00	3.5	4.5
			55.0	3.00	5.5	13.5
			70.0	5.00	2.	6.
			43	2.00	11.5	19.5
		12 BO	66.6	5.00	.3	11.7
			37.2	1.000	14.4	26.4
			65.4	5.00	.3	12.3
			27.8	plano	19.1	31.1
		6 BO 16"	80.4	2.50	3.6	2.4
			64.6	1.50	.35	6.35
			77.4	2.50	2.85	3.15
			45.4	0.50	5.15	11.15
			79.4	2.50	3.35	2.65
		16 BO	42.2	-0.50	5.95	21.95
		6 BO	74.2	2.50	2.5	3.5
		16 BO	42.2	-1.50	5.95	21.95
NG	64	6 BO 8"	30.2	5.00	16.9	22.9
			26	4.00	19	25
			28.6	5.00	17.7	23.7
			27.8	3.90	18.1	24.1
			27.8	5.00	18.1	24.1
			21	2.00	21.5	27.5
			25.8	5.00	19.1	26.1
		8 BO	16.2	1.00	23.9	31.9
		6 BO	34. 2	5.00	14.9	20.9
			10.2	plano	26.9	32.9
		16"	25.2	2,50	9.7	15.7
		16 BO	43	1.50	5.25	21.25
			53.6	2.50	2.6	18.6
		20 BO	47.8	0.50	4.5	24.5
			65	2.50	.25	19.75
		30 BO	66.2	-0.50	.55	29.45
			84.8	2.50	4.2	25.8
			52.4	-1.50	2.9	32.9
DP	66	16 BO 8"	64.4	5.00	.8	16.8
			67.4	4.00	.7	15.3
			67.6	5.00	.8	15.2
			64.2	3.00	2.9	16.9
		12 BO	64	5.00	1.	13
			52.4	2.00	6.8	18.8
			63.6	5.00	1.2	13.2
			49.8	1000	11.5	23.5
			50.2	5.00	2.9	14.9
			36	plano	15.	27.
		16 BO 16"	76	2,50	2.5	13.5
			73.2	1.50	1.8	14.2
			69.2	2.50	.8	15.2
			67.2	0.60	.3	15.7
			77.2	2.50	2.8	13.2

Obs.	PD	Dissociat. Prism	Mean Sep. mm.	Lens	Diff. Btw. Mean & PD	Actual Sep.
DP	66	16 BO 16"	54.8	-0.50	2.8	18.8
			75.4	2.50	2.35	13.65
		30 BO	102.2	-1.50	9.05	20.95
SG	60	6 BO 8"	46.4	5.00	6.8	12.8
			45.4	4.00	7.3	13.3
			48.4	5.00	5.8	11.8
			41.4	3.00	9.3	15.3
			45.4	5.00	7.3	13.3
			33.6	2.00	13.2	19.2
			47	5.00	6.5	12.5
			31	1.00	19.5	25.5
			49	5.000	5.5	11.5
		12 BO	36.1	plano	11.95	23.95
		8 BO 16"	49	2.50	2.75	10.75
		12 BO	56	1.50	1.	13.
			66	2.50	1.5	10.5
			50.4	0.50	2.4	14.4
		16 BO	74.4	2.50	3.6	12.4
		12 BO	36.2	-0.50	5.95	17.95
		16 BO	75.2	2.50	3.8	12.2
			49.8	-1.50	2.55	18.55
KA	67	8 BO 8"	52.4	5.00	7.3	15.3
			51	4.00	8.	16
			51.6	5.00	7.7	15.7
			49.4	3.00	8.8	16.8
			52.4	5.00	7.3	15.3
			36	2.00	15.5	23.5
			50.4	5.00	8.3	16.3
			34	1.000	16.5	24.5
			50.8	5.00	8.1	16.1
		12 BO	27	plano	20.	32.
		16"	44	2.50	5.75	17.75
		16 BO	44.2	1.50	5.7	21.7
			57	2.50	2.5	18.5
			36.6	0.50	7.6	23.6
			60	2.50	1.75	17.75
			33.8	-0.50	8.3	24.3
			57.2	2.50	2.45	18.45
			25.6	-1.50	10.35	26.35