**Lunar clearance with calculator and Fuller slide rules. (John Karl Method page 93.)**

**Calculator**

1. **Find RBA.**

***Cos RBA=(cosLDsd-sinHsdsinhsd)/cosHsd.coshsd***

=(cos 52023.2’-(sin 38039.8’xsin30036.3’)/cos 38039.8’xcos30036.3’

=0.61032- ( 0.62474x0.50911=0.31806)/(0.70808x0.8607=0.6720)

0.61032-0.31806=0.29226.

0.29226/0.6720=0.43491=Cos RBA

**RBA =64013.2’**

1. **Find LDo**

***CosLDo=(sinHo.sinho )+(cosHo.cosho.cos RBA)***

= ( sin 38038.7’xsin 31021.4’) + (cos38038.7’xcos 31021.4’)

=(0.62449 x0.5204) +(0.7810 x 0.85349 x0.43491)

= 0.3249 + 0.2899 =0.6148

**0.6148 cos-1  =5203.7’**

**Fuller 2 clearance of Lunars, John Karl page 93**

**Find RBA**

1. Change cos >sin

* Cos LDsd = sin 900-52023.2’=sin 37036.8’
* CosHsd =sin 900-38039.80 =sin 51020.2’
* Coshsd=sin 900-30036.3’ =sin 59023.7’

1. ***Cos RBA = (sin 37036.8’) – (sin 38039.8’ x sin 30036.3’)/(sin 51020.8’ x sin 59023.7’)***

**Fuller 2 operations. (mini Fuller in red)**

S to 38039.8’ read 0.6247 at F S to 0. Inner tube 38039.8’ move to L, L move to red, read 0.6247 at S

A move to 1

S to 30036.3’ read 0.5091 at F Inner tube 30036.3’ move to L. Move L to red. Read 0.31806 at S. Record

Move 0.5091 to B (no need for mini Fuller)

Read 0.31806 at F

S to 37036.8’, read 0.6103 at F. S to 0. Innertube 37036.8’ move to L. Move L to red, read 0.6103 at S

0.31806-0.6103 = 0.29224. Record. Same

A move to 1

S to 51020.2’, read 0.7809 at F S to 0. Innertube 51020.2’ move to L. Move L to red. Read 0.7809 at S A move to 1

S to 59023.7’, read 0.8607 at F . Move inner tube 59023.2’ to L. Move L to red. Read0.6721 at S

Move 0.8607 to B, read 0.6721 at F

0.29224/0.6721= 0.4349= sin RBA =25046.5’ S to 0.2922, move inner tube 0.6721 to L, move L to 0 read 0.4349 at S. Innertube to L, s to 0, read 25046.5’ at L, 900-25046.5’= 640 13.46.5’

900- 25046.5’=**RBA =640 13’**

**Find LDo**

**Cos LDo = SinHox Sinho + CosHo x Cosho  x Cos RBA.**

***Change Cos>Sin***

* CosHo = 900- 38038.7’ = sin 51021.3’
* Cosho =900 – 31021.4’= sin 58038.6’

=(sin 38038.7’ x sin 31021.4’) + (sin 51021.3’ x sin58038.6’x0.4349)

0.6249 0.5204

(0.3249) (0.2899)

**Fuller 2 operations. (mini Fuller in red)**

S to 38038.7’ read 0.6249 at F. S to 0. Innertube 38038.7’ move to L

L move to red, read 0.6249 at S

A to 1

S to 31021.4’,read 0.5204 at F move 31021.4’ to L, move L to red, read 0.3249 at S. Record

Move ).5204 to B, read 0.3249 at F. Record.

S to 51021.3’, read 0.7810 at F. S to 0. Innertube 51021.3’ move to L,

L move to red, read 0.7810 at S

A to 1

S to 58038.6’, read 0.85359 at F 58038.6’ move to L, move L to red, read 0.6666 at S

25046.7’ (sin RBA) to L, move L to red, read 0.2899 at S

Move 0.85359 to B, read 0.6666 at F

A to 1

0.4349 to B, read 0.2899 at F

0.3249 + 0.2899 = 0.6148 0.3249 + 0.2899 = 0.6148

0.6148 to F, read 37056.2’ at S S to 0.6148, move L to red, move S to 0, read 37056.2’ at L

900 – 37056.2’= **LD0 = 5203.8’**