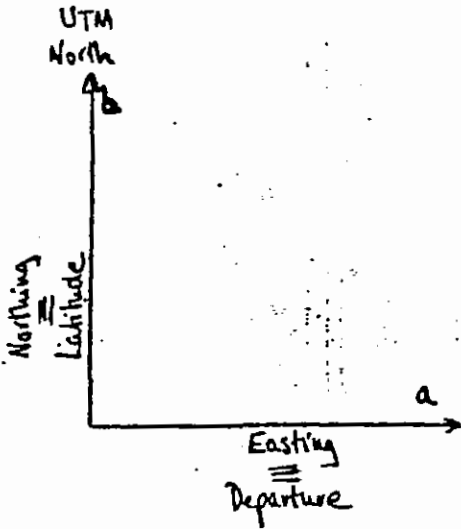


CONVERSION OF U.T.M. COORDINATES
TO K.A. COORDINATES

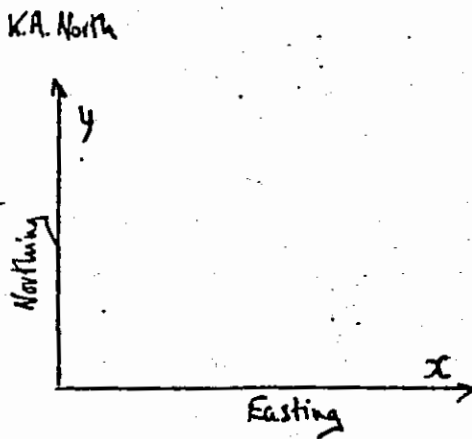


$$y = -877,600.07 + (b \cdot \cos \theta) - (a \cdot \sin \theta)$$

$y =$ K.A. northing

$$x = -609,322.18 + (a \cdot \cos \theta) - (b \cdot \sin \theta)$$

$x =$ K.A. easting



where $\theta = 1^\circ 34' 25'' \approx 1.5736111^\circ$

$\therefore \cos \theta = 0.9996229$

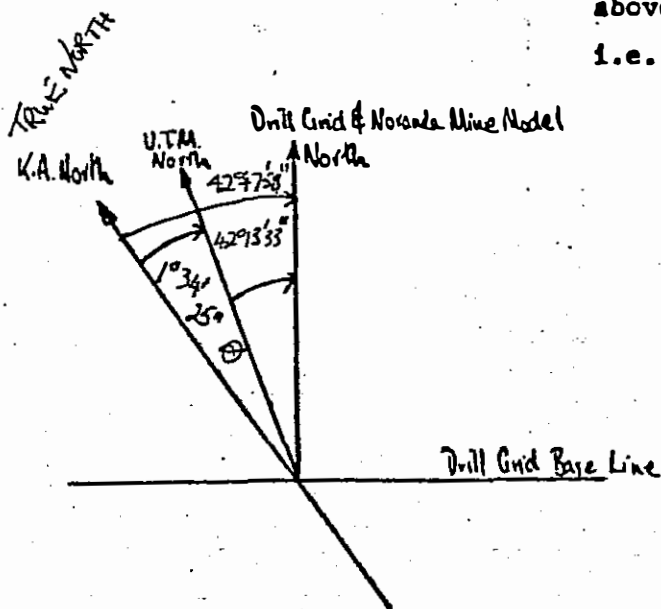
& $\sin \theta = 0.0274612$

1:10,000 accuracy

N.B. for U.T.M. northing

eg. 6,905,000 remove the 6 million for the above formula

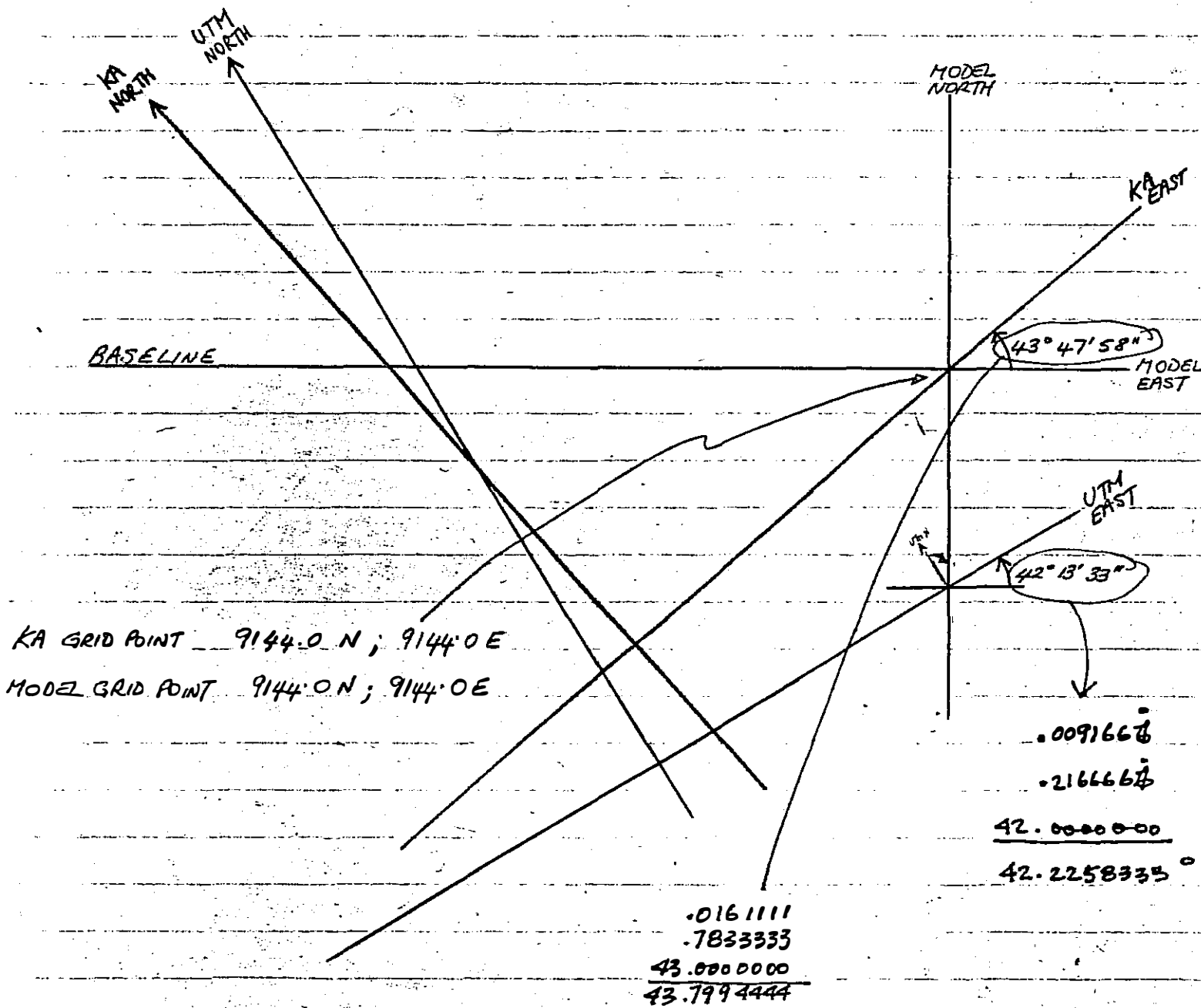
i.e. it reads 905,000



EST 81°

NOT AN EXACT CONVERSION METHOD

UTM, KA AND MODEL GRIDS



43° 47' 58"

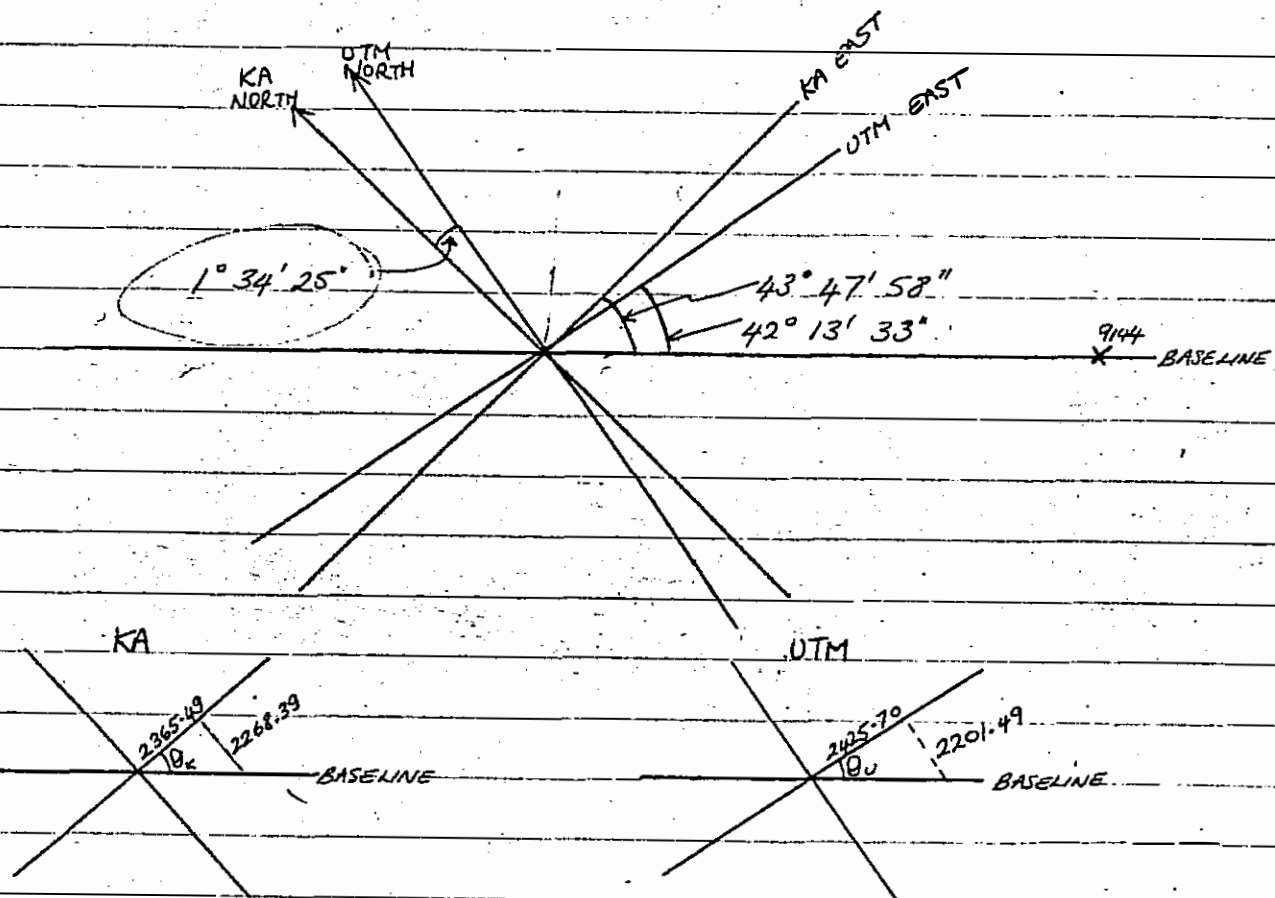
42° 13' 33"

.0091667
 .216667
42.000000
 42.225833°

45.000000
43.799444
 1.200555°

TO CONVERT FROM UTM TO KA.
FROM PAGE 2E

PLOTTED OUT SITUATION IS THIS:



$$\tan \theta_k = \frac{2268.39}{2365.49}$$

$$\theta_k = 43^{\circ} 47' 58''$$

$$\tan \theta_u = \frac{2201.49}{2425.70}$$

$$\theta_u = 42^{\circ} 13' 33''$$

$$\theta_{\text{DIFFERENCE}} = 43^{\circ} 47' 58'' - 42^{\circ} 13' 33''$$

$$= 1^{\circ} 34' 25''$$

$$= 1.5736111^{\circ}$$

$$\cos \theta_D = 0.9996229$$

$$\sin \theta_D = 0.0274612$$

FROM PAGE 2E

TAKING ORIGIN POINT AS REFERENCE THE FOLLOWING EQUATIONS ARE TRUE

$$\begin{aligned} 1) \quad KA_{East} &= \text{Constant} + (\text{UTM East} \times \cos \theta_D) + (\text{UTM North} \times \sin \theta_D) \\ 9144 &= C_1 + (593,880.99 \times 0.9996229) + (903,394.16 \times 0.0274612) \\ \therefore C_1 &= -609,321.33 \end{aligned}$$

$$\begin{aligned} 2) \quad KA_{North} &= \text{Constant} + (\text{UTM North} \times \cos \theta_D) - (\text{UTM East} \times \sin \theta_D) \\ 9144 &= C_2 + (903,394.16 \times 0.9996229) - (593,880.99 \times 0.0274612) \\ \therefore C_2 &= -877,600.80 \end{aligned}$$

CHECK BY CONVERTING UTM 108 W TO KA

$$\begin{aligned} KA_{East} &= -609,321.33 + 591,232.25 + 24,868.74 \\ &= 679.66 \end{aligned}$$

$$\begin{aligned} KA_{North} &= -877,600.80 + 905,254.15 - 16,242.07 \\ &= 11,411.28 \end{aligned}$$

COMPARE WITH PAGE 2E

GOOD ENOUGH FOR PURPOSES OF G.P.S. NEARBY MODEL, AND INTERMEDIATE GRUM MODEL.

$42^{\circ}41'58'' = 42.699444^{\circ}$

ORIGIN OF NORCOMP MODEL GRID in KA-Coordinates

North-KA = $9144.0 - 270.9487 = 8873.0513$
 East-KA = $9144.0 - 12928.78 = -3754.73$

ORIGIN OF NORCOMP MODEL GRID in UTM-Coordinates

North = $N_0 + S * (N_{KA} * \cos \alpha + E_{KA} * \sin \alpha)$
 $= 6,894,007.1169 + 0.99950853 (8873.0513 * 0.9996229 + (-3754.73) * 0.0274612)$
 $= 6,894,007.1169 + 8761.4687$
 $N_{UTM} = 6,902,768.5856$

East = $E_0 + S * (N_{KA} * \sin \alpha + E_{KA} * \cos \alpha)$
 $= 584,995.9086 + 0.99950853 (8873.0513 * 0.0274612 + (-3754.73) * 0.9996229)$
 $= 584,995.9086 - 1018.9226$
 $E_{UTM} = 580,966.9860$

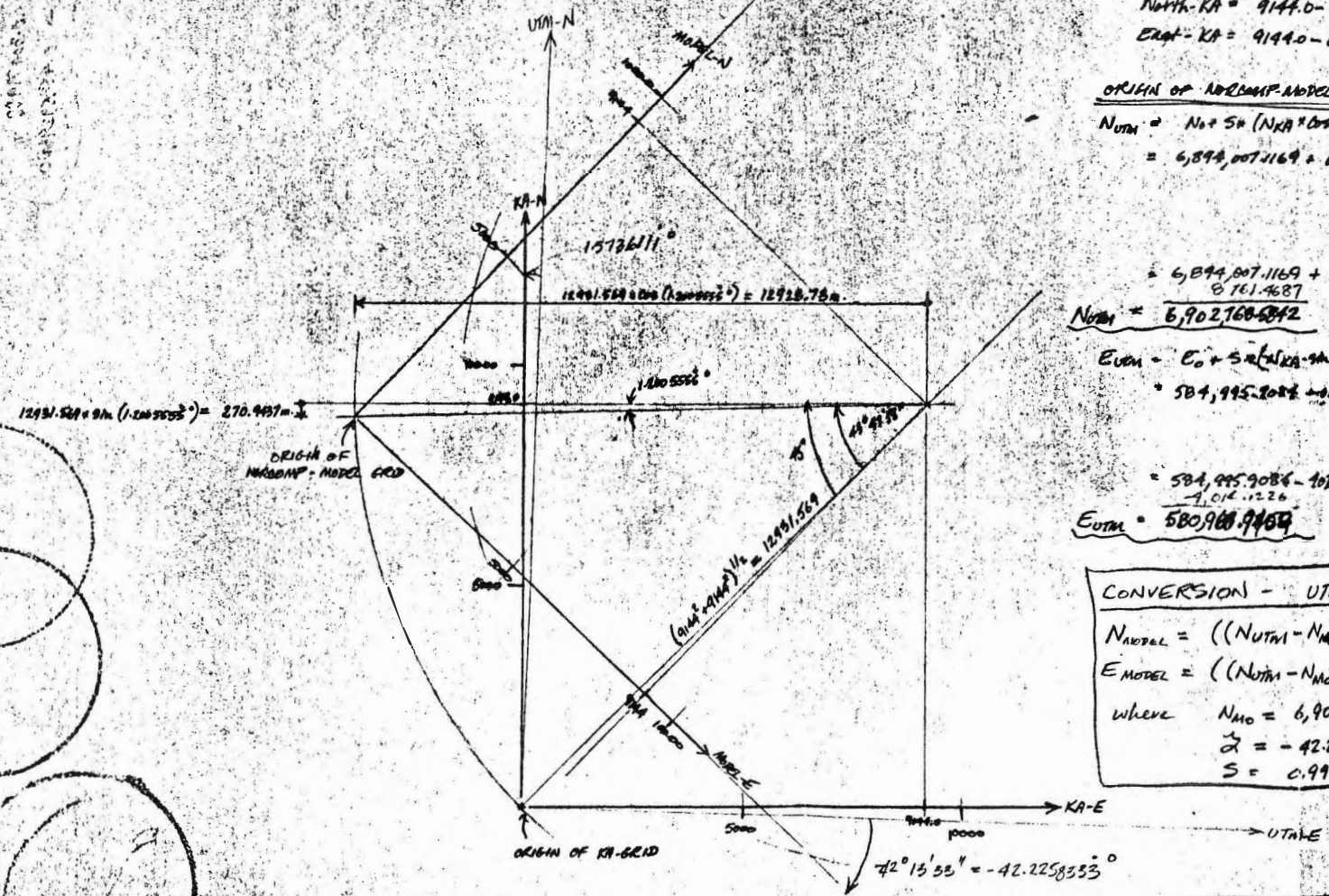
CONVERSION - UTM - NORCOMP MODEL GRID

$N_{MODEL} = ((N_{UTM} - N_{M0}) * \cos \hat{\alpha} - (E_{UTM} - E_{M0}) * \sin \hat{\alpha}) / S$
 $E_{MODEL} = ((N_{UTM} - N_{M0}) * \sin \hat{\alpha} + (E_{UTM} - E_{M0}) * \cos \hat{\alpha}) / S$

where $N_{M0} = 6,902,768.58$ $E_{M0} = 580,966.94$
 $\hat{\alpha} = -42.2258333^{\circ}$
 $S = 0.99950853$

GRUM - MINTEC MODEL GENERATION

15.1.83



Vertical text on the left margin, possibly a page number or reference code.

