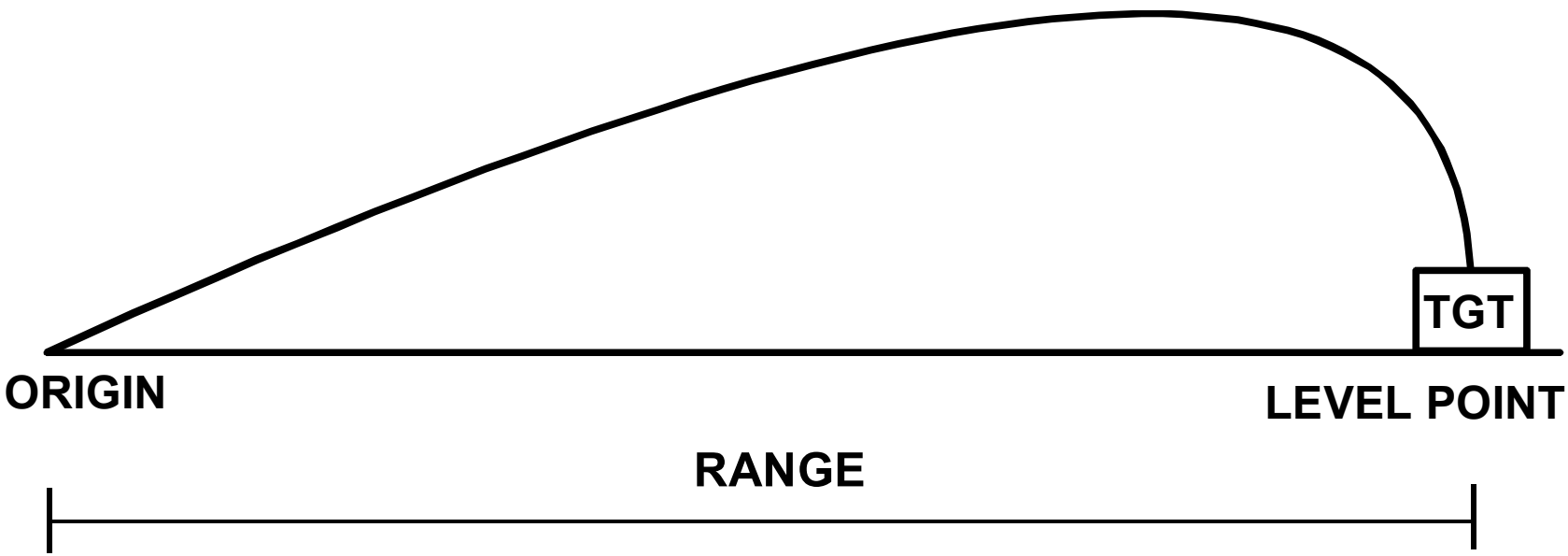
THE KING OF BATTLE

STANDARD CONDITIONS

POSITION

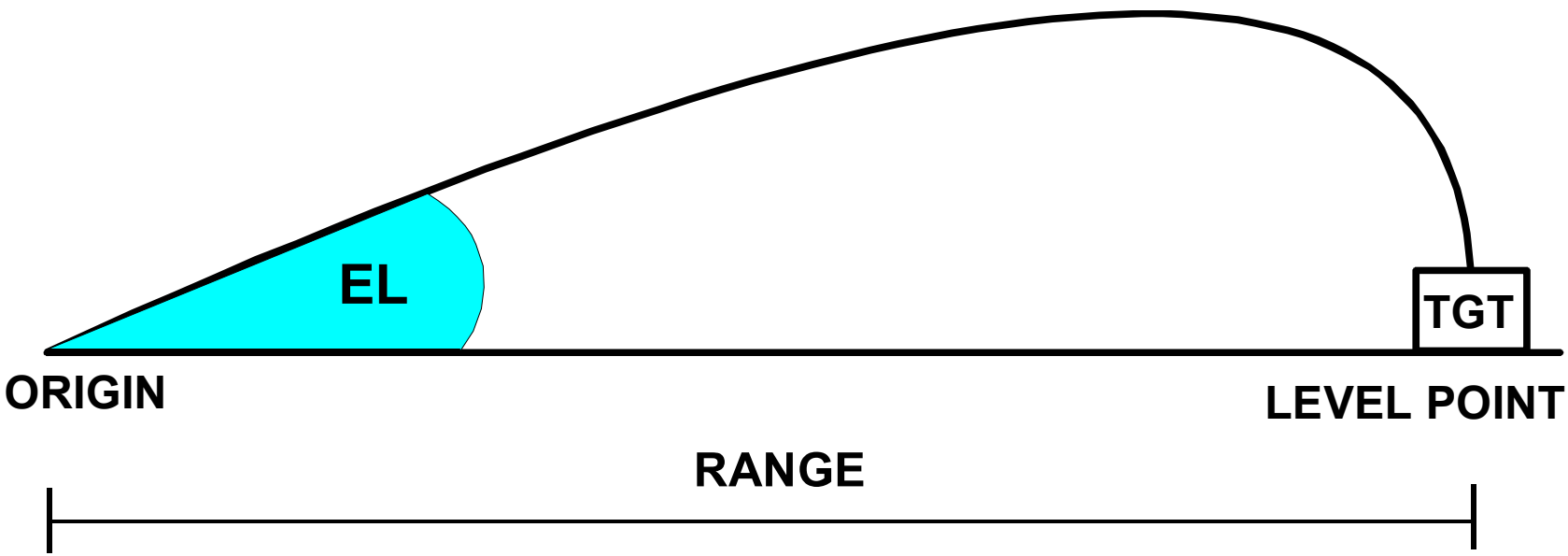
1. GUN, TARGET, AND MDP AT SAME ALTITUDE
2. ACCURATE RANGE
3. NO ROTATION OF THE EARTH

GUNNERY DEPARTMENT



USAFAS

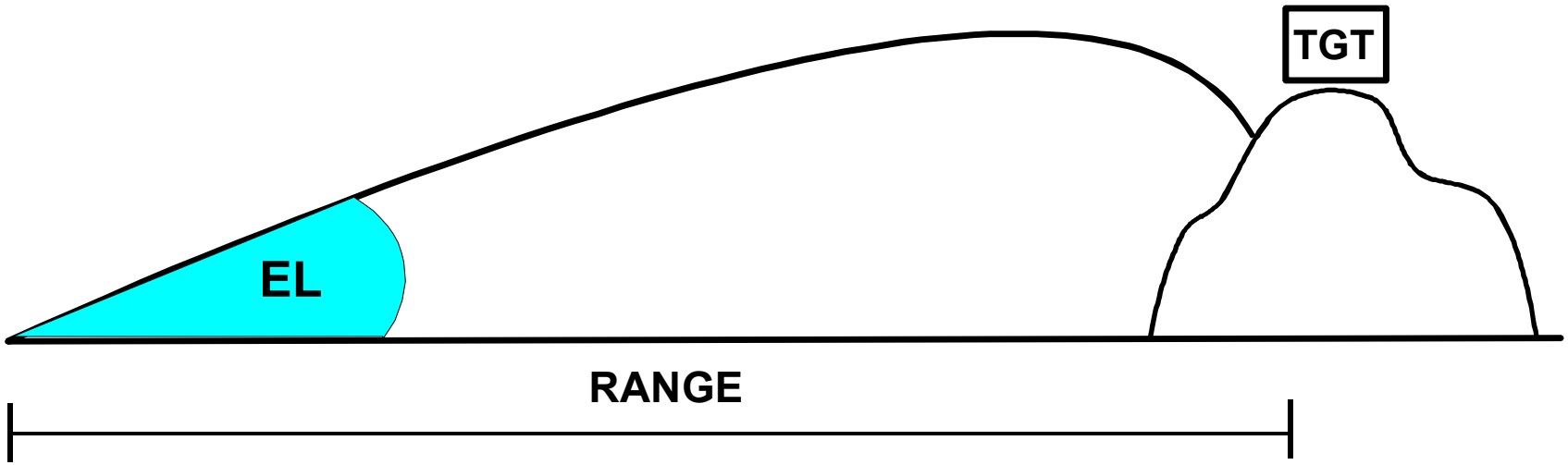
GUNNERY DEPARTMENT



USAFAS

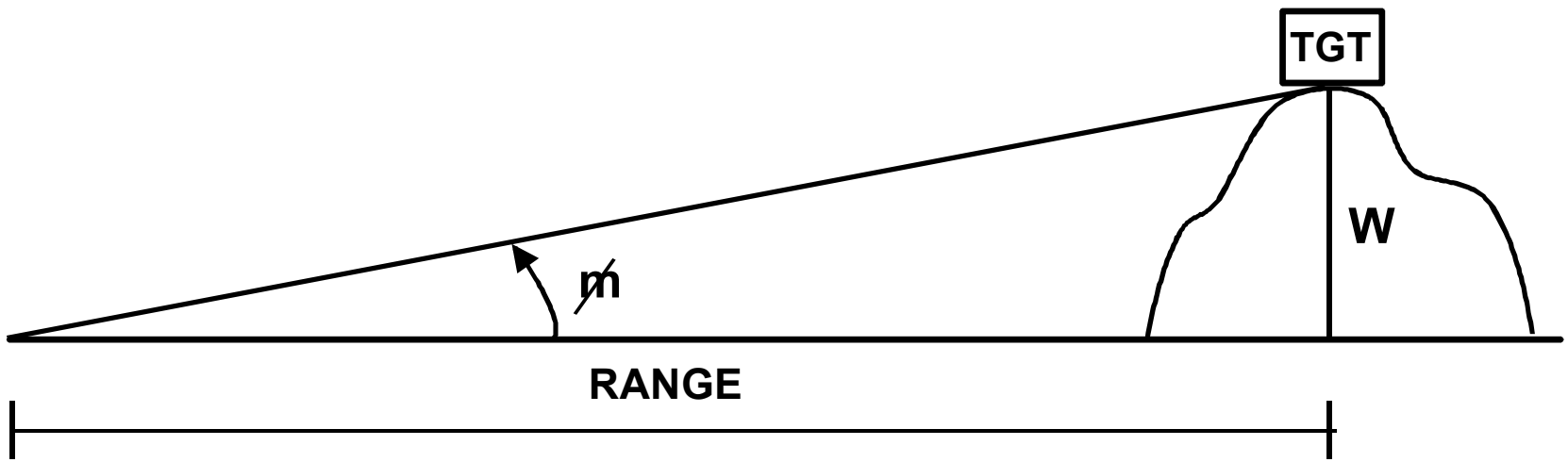
GUN AND TARGET *NOT* AT THE SAME ALTITUDE

GUNNERY DEPARTMENT



USAFAS

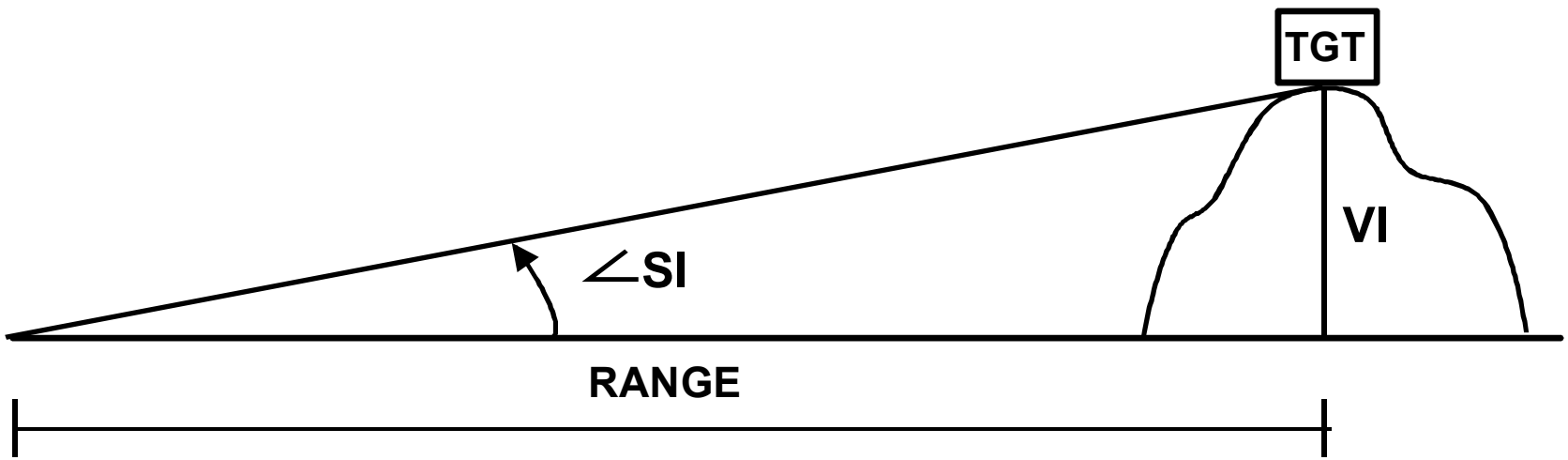
GUNNERY DEPARTMENT



$$W = R\ (1000s) \times \acute{m}$$

USAFAS

GUNNERY DEPARTMENT



$$VI = R\ (1000s) \times \angle SI$$

USAFAS

MANUAL COMPUTATION

GIVEN: TGT ALT 393m RG 4650m
PLT ALT 355m CHG 4GB

EQUATIONS

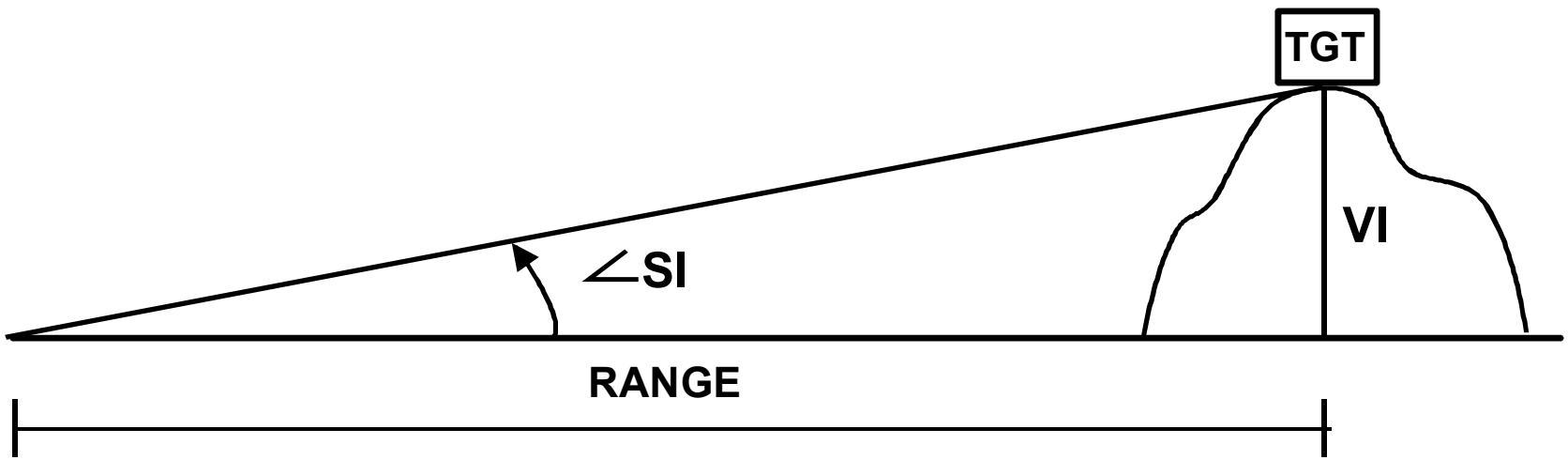
1. VI = TGT ALT - PLT ALT (+/-) NEAREST 1 m

EQUATIONS

1. VI = TGT ALT - PLT ALT (+/-) NEAREST 1 m

   VI = 393 - 355 = +38

GUNNERY DEPARTMENT



$$VI = R\ (1000s) \times \angle SI$$

USAFAS

EQUATIONS

1. VI = TGT ALT - PLT ALT (+/-) NEAREST 1 m

2. $\angle SI = \dfrac{VI}{RG\ (1000s)} \times 1.0186$ (+/-) NEAREST 0.1 mil

EQUATIONS

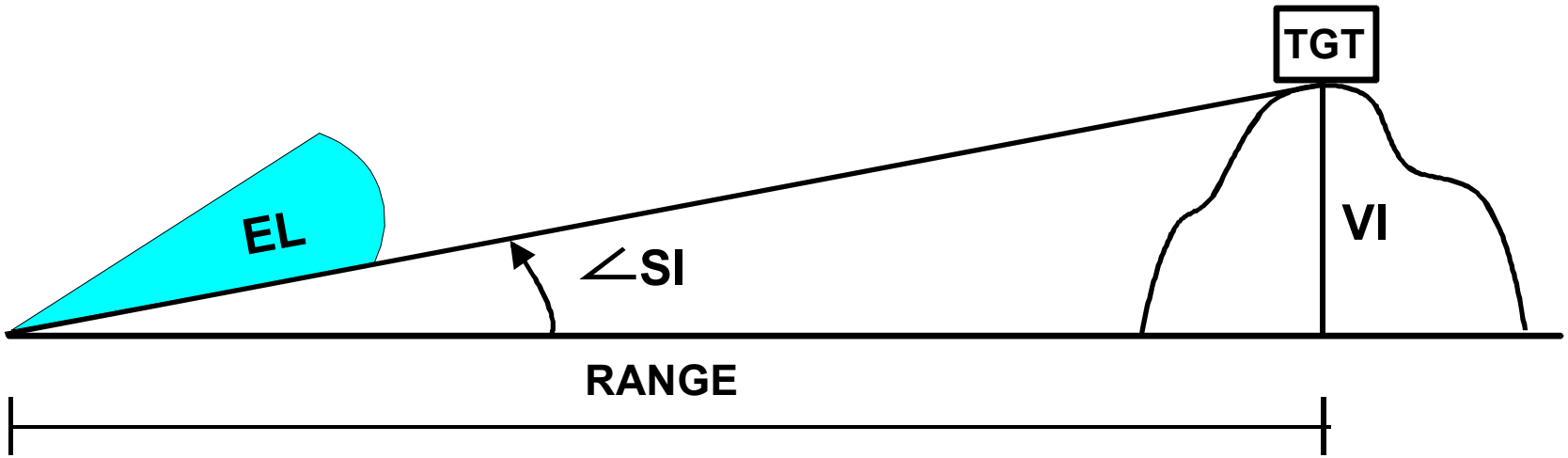
1. VI = TGT ALT - PLT ALT (+/-) NEAREST 1 m

   VI = 393 - 355 = +38

2. $\angle SI = \dfrac{VI}{RG\ (1000s)} \times 1.0186$ (+/-) NEAREST 0.1 mil

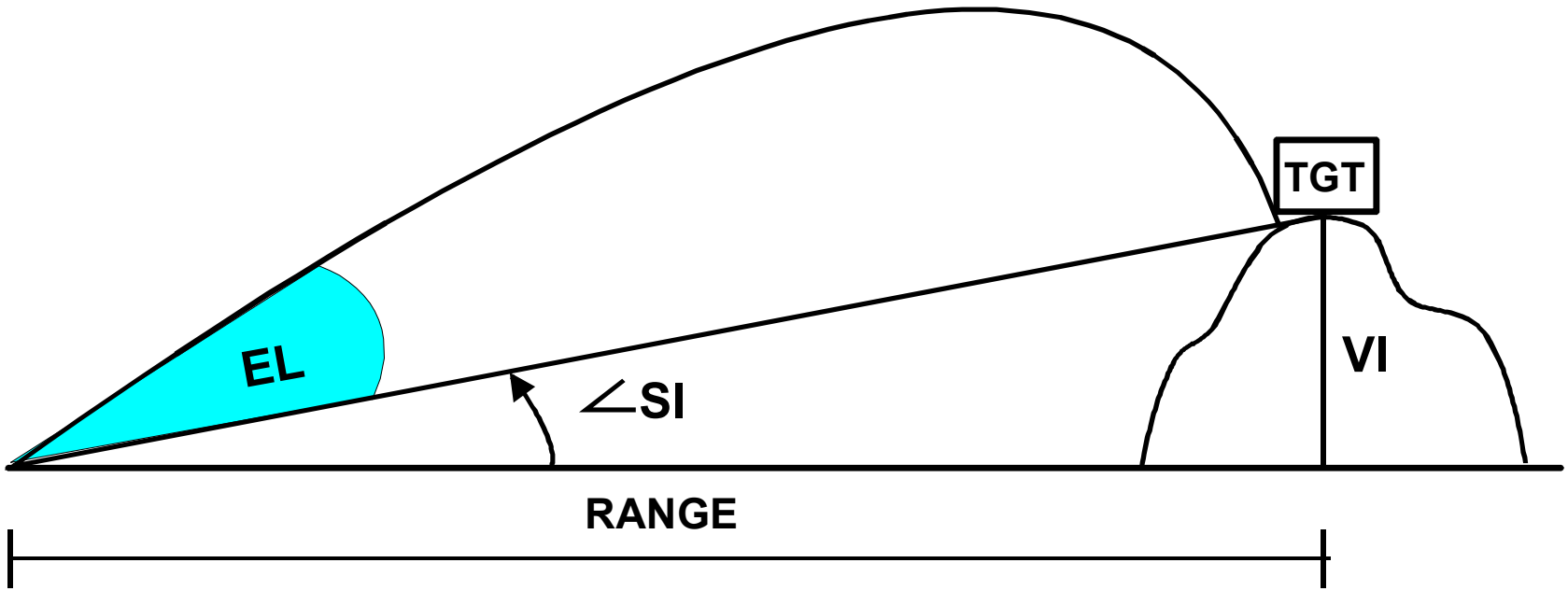
   $\angle SI = (+38 \div 4.65) \times 1.0186 = +8.32 \approx +8.3$

GUNNERY DEPARTMENT



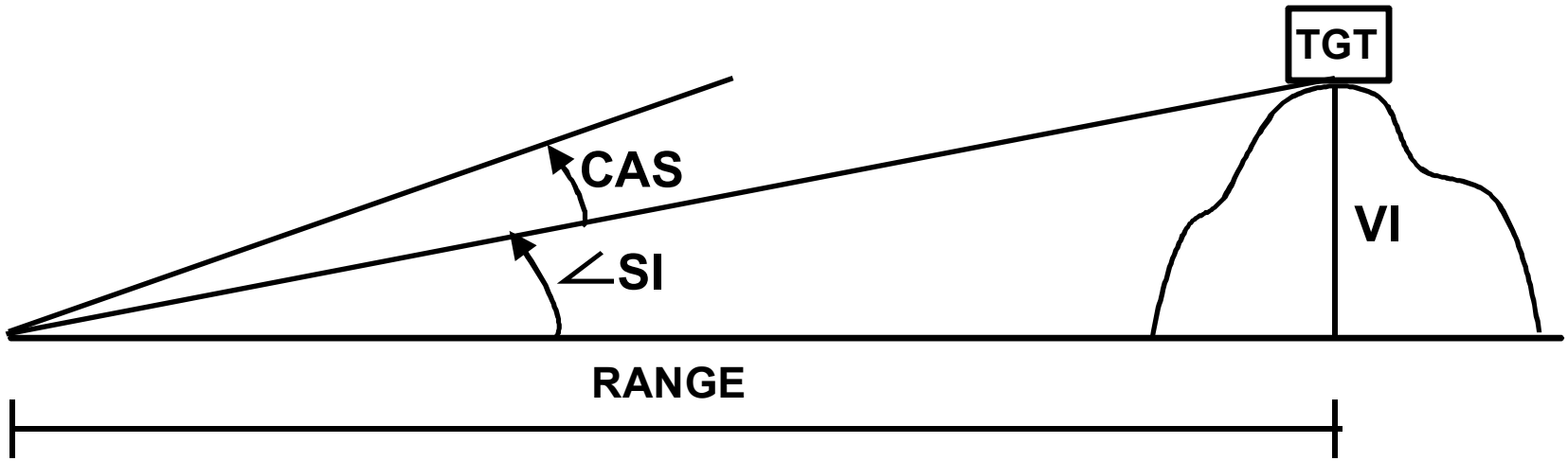
USAFAS

GUNNERY DEPARTMENT



USAFAS

GUNNERY DEPARTMENT



USAFAS

EQUATIONS

1. VI = TGT ALT - PLT ALT (+/-) NEAREST 1 m

2. $\angle SI = \dfrac{VI}{RG\ (1000s)} \times 1.0186$ (+/-) NEAREST 0.1 mil

3. CAS = ABS VAL $\angle$SI x CSF (+/-) NEAREST 0.1 MIL

EQUATIONS

1. VI = TGT ALT - PLT ALT (+/-) NEAREST 1 m

   VI = 393 - 355 = +38

2. $\angle SI = \dfrac{VI}{RG\ (1000s)} \times 1.0186$ (+/-) NEAREST 0.1 mil

   $\angle SI = (+38 \div 4.65) \times 1.0186 = +8.32 \approx +8.3$

3. CAS = ABS VAL $\angle SI$ x CSF (+/-) NEAREST 0.1 MIL

COMP SI FACTOR INTERPOLATION
TABLE G, TFT

$$500\left[150\begin{bmatrix}4500 & +0.075\\ 4650 & ?\end{bmatrix}X \quad 5000 \quad +0.103\right]+0.028$$

COMP SI FACTOR INTERPOLATION
TABLE G, TFT

500	150	4500	+0.075
		4650	?
		5000	+0.103

$$\frac{150}{500} = \frac{X}{+0.028}$$

COMP SI FACTOR INTERPOLATION
TABLE G, TFT

500	150	4500	+0.075
		4650	?
		5000	+0.103

X

+0.028

$$500X = (150)(+0.028)$$

$$\frac{150}{500} \quad \frac{X}{+0.028}$$

COMP SI FACTOR INTERPOLATION
TABLE G, TFT

500	150	4500	+0.075
		4650	?
		5000	+0.103

X

+0.028

$$\frac{150}{500} \quad \frac{X}{+0.028}$$

$$500X = (150)(+0.028)$$

$$500X = +4.2$$

COMP SI FACTOR INTERPOLATION
TABLE G, TFT

500	150	4500	+0.075
		4650	?
		5000	+0.103

X=+0.008

+0.028

$$\frac{150}{500} \quad \frac{X}{+0.028}$$

$$500X = (150)(+0.028)$$

$$500X = +4.2$$

$$X = +0.0084 \approx +0.008$$

COMP SI FACTOR INTERPOLATION
TABLE G, TFT

500	150	4500	+0.075
		4650	?
		5000	+0.103

X=+0.008

+0.028

$$\frac{150}{500} = \frac{X}{+0.028}$$

$$500X = (150)(+0.028)$$

$$500X = +4.2$$

$$X = +0.0084 \approx +0.008$$

?: $(+0.075) + (+0.008) = +0.083$

USAFAS

EQUATIONS

1. VI = TGT ALT - PLT ALT (+/-) NEAREST 1 m

   VI = 393 - 355 = +38

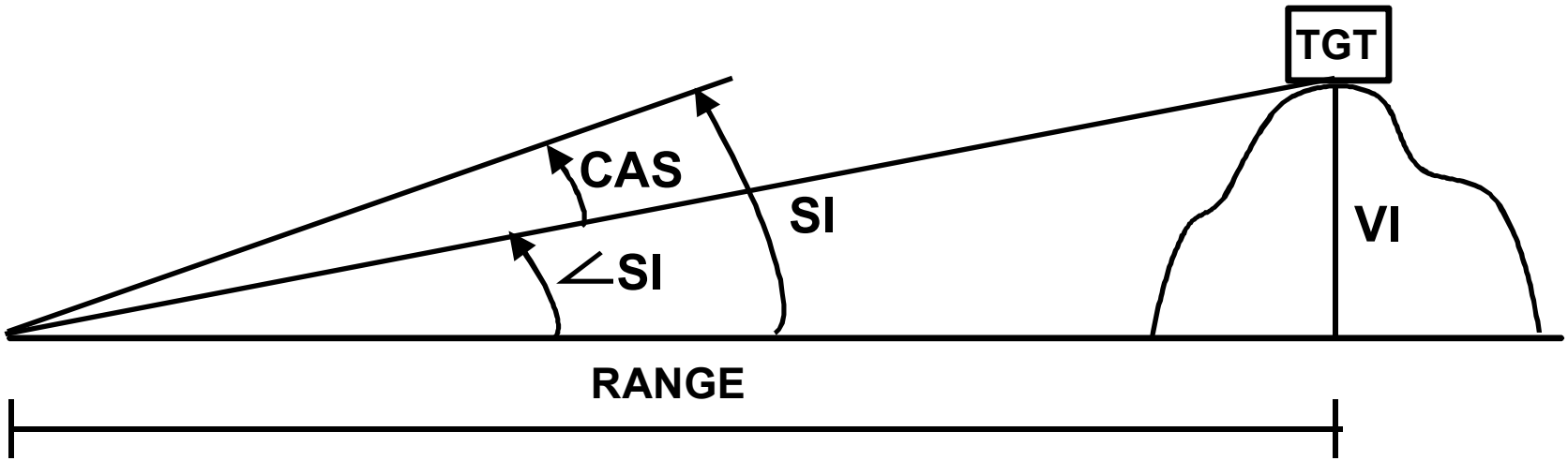
2. $\angle SI = \dfrac{VI}{RG\ (1000s)} \times 1.0186$ (+/-) NEAREST 0.1 mil

   $\angle SI = (+38 \div 4.65) \times 1.0186 = +8.32 \approx +8.3$

3. CAS = ABS VAL $\angle SI$ x CSF (+/-) NEAREST 0.1 MIL

   CAS = 8.3 x (+0.083) = +0.69 ≈ +0.7

GUNNERY DEPARTMENT



USAFAS

EQUATIONS

1. VI = TGT ALT - PLT ALT (+/-) NEAREST 1 m

2. $\angle SI = \dfrac{VI}{RG\ (1000s)} \times 1.0186$ (+/-) NEAREST 0.1 mil

3. CAS = ABS VAL $\angle$SI x CSF (+/-) NEAREST 0.1 MIL

4. SI = $\angle$SI + CAS (+/-) NEAREST 1 mil

EQUATIONS

1. VI = TGT ALT - PLT ALT (+/-) NEAREST 1 m

   VI = 393 - 355 = +38

2. $\angle SI = \dfrac{VI}{RG\ (1000s)} \times 1.0186$ (+/-) NEAREST 0.1 mil

   $\angle SI = (+38 \div 4.65) \times 1.0186 = +8.32 \approx +8.3$

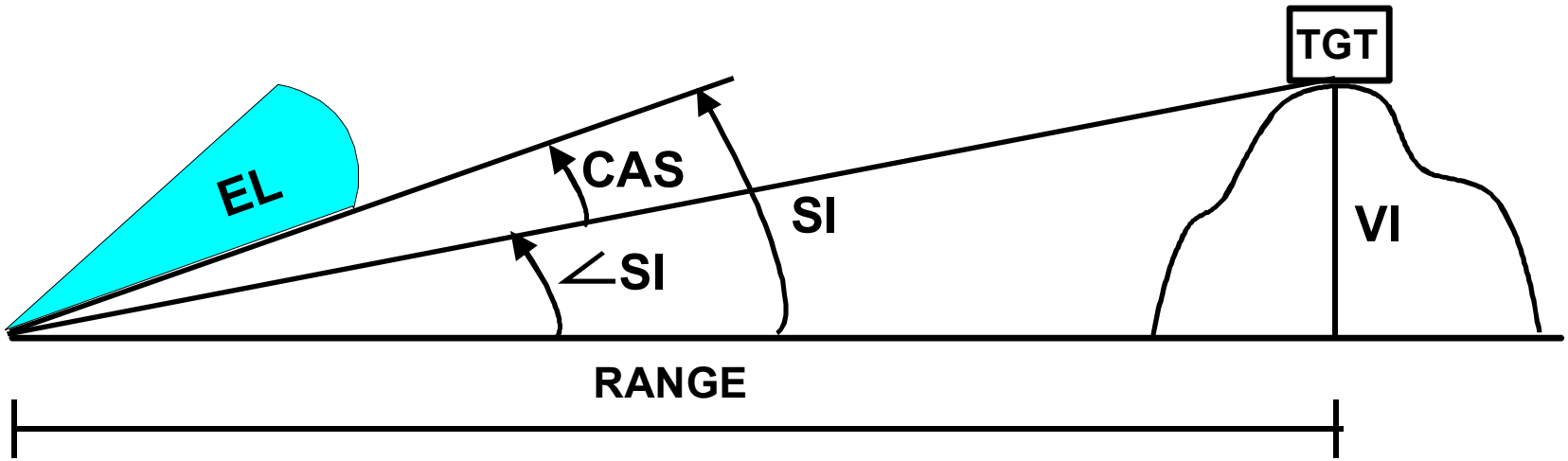
3. CAS = ABS VAL $\angle SI$ x CSF (+/-) NEAREST 0.1 MIL

   CAS = 8.3 x (+0.083) = +0.69 ≈ +0.7

4. SI = $\angle SI$ + CAS (+/-) NEAREST 1 mil

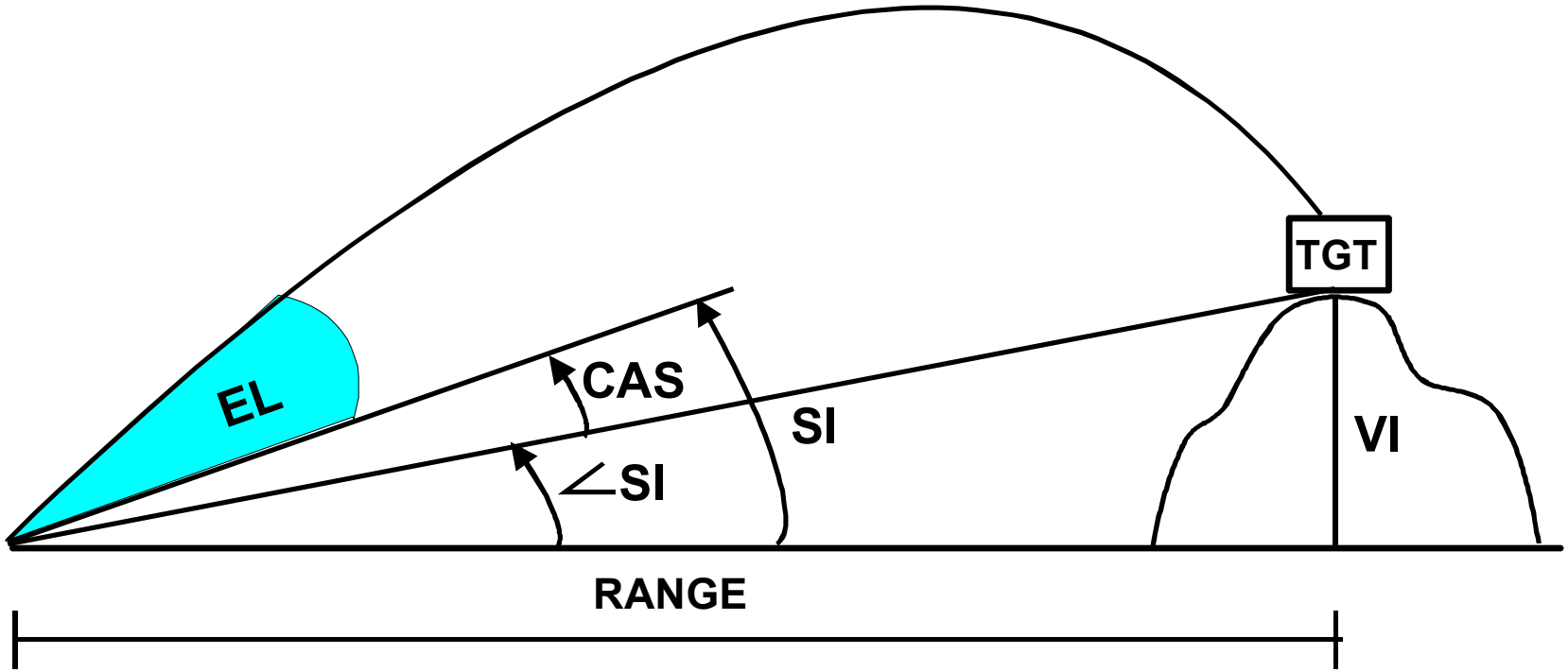
   SI = (+8.3) + (+0.7) = +9.0 ≈ +9

GUNNERY DEPARTMENT



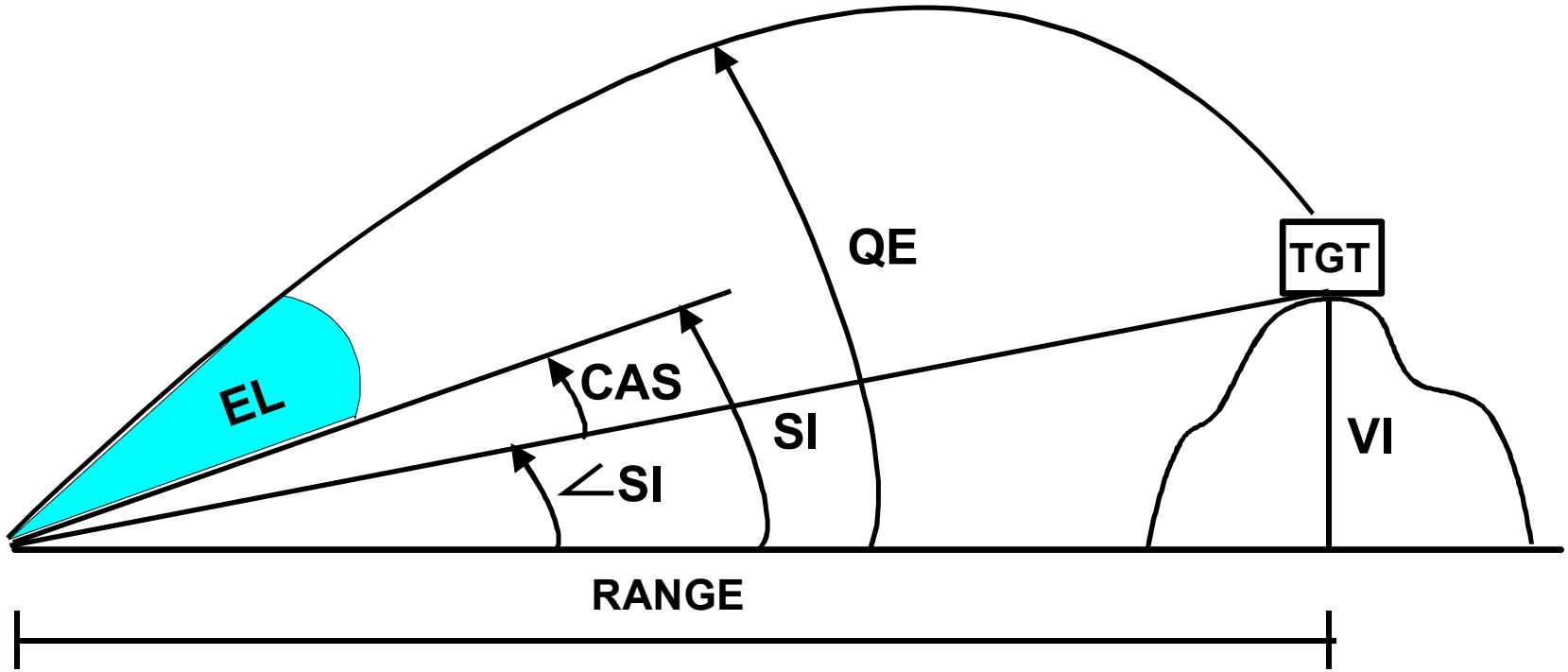
USAFAS

GUNNERY DEPARTMENT



USAFAS

GUNNERY DEPARTMENT



USAFAS

EQUATIONS

1. VI = TGT ALT - PLT ALT (+/-) NEAREST 1 m

2. $\angle SI = \dfrac{VI}{RG\ (1000s)} \times 1.0186$ (+/-) NEAREST 0.1 mil

3. CAS = ABS VAL ∠SI x CSF (+/-) NEAREST 0.1 MIL

4. SI = ∠SI + CAS (+/-) NEAREST 1 mil

5. QE = EL + SI NEAREST 1 mil

EQUATIONS

1. VI = TGT ALT - PLT ALT (+/-) NEAREST 1 m

   VI = 393 - 355 = +38

2. $\angle SI = \dfrac{VI}{RG\ (1000s)} \times 1.0186$ (+/-) NEAREST 0.1 mil

   $\angle SI = (+38 \div 4.65) \times 1.0186 = +8.32 \approx +8.3$

3. CAS = ABS VAL $\angle SI$ x CSF (+/-) NEAREST 0.1 MIL

   CAS = 8.3 x (+0.083) = +0.69 ≈ +0.7

4. SI = $\angle SI$ + CAS (+/-) NEAREST 1 mil

   SI = (+8.3) + (+0.7) = +9.0 ≈ +9

5. QE = EL + SI NEAREST 1 mil

   QE = 278 + (+9) = 287

EQUATIONS

1. VI = TGT ALT - PLT ALT (+/-) NEAREST 1 m

2. $\angle SI = \dfrac{VI}{RG\ (1000s)} \times 1.0186$ (+/-) NEAREST 0.1 mil

3. CAS = ABS VAL ∠SI x CSF (+/-) NEAREST 0.1 MIL

4. SI = ∠SI + CAS (+/-) NEAREST 1 mil

5. QE = EL + SI NEAREST 1 mil

GST

"MAGIC-T"

VI (D) (MHL)

÷

RG (C) (MHL)

∠SI (D)

M

×

RULES FOR READING THE GST

- EXTRACT THREE NUMBERS
- PLACE THE DECIMAL POINT
  - MAKE AS LARGE AS POSSIBLE W/O EXCEEDING VI
- EXPRESS TO THE APPROPRIATE ACCURACY
  - SI, VA : 1 mil
  - ∠SI : 0.1 mil
  - VI : 1 meter
- SAME SIGN AS VI

∠SI PEs (GST)

GIVEN: GST 155 AM-2
PROJ HE M107
BTRY ALT 370

RG	ALT	VI	∠SI
5170	425		
3910	363		
4150	372		
6340			+6.0
4500		+25	
5720			-4.0
7350	350		

∠SI PEs (GST)

GIVEN: GST 155 AM-2
PROJ HE M107
BTRY ALT 370

RG	ALT	VI	∠SI
5170	425	+55	+10.8
3910	363		
4150	372		
6340			+6.0
4500		+25	
5720			-4.0
7350	350		

∠SI PEs (GST)

GIVEN: GST 155 AM-2
PROJ HE M107
BTRY ALT 370

RG	ALT	VI	∠SI
5170	425	+55	+10.8
3910	363	-7	-1.8
4150	372		
6340			+6.0
4500		+25	
5720			-4.0
7350	350		

∠SI PEs (GST)

GIVEN: GST 155 AM-2
PROJ HE M107
BTRY ALT 370

RG	ALT	VI	∠SI
5170	425	+55	+10.8
3910	363	-7	-1.8
4150	372	+2	+0.5
6340			+6.0
4500		+25	
5720			-4.0
7350	350		

∠SI PEs (GST)

GIVEN: GST 155 AM-2
PROJ HE M107
BTRY ALT 370

RG	ALT	VI	∠SI
5170	425	+55	+10.8
3910	363	-7	-1.8
4150	372	+2	+0.5
6340	407	+37	+6.0
4500		+25	
5720			-4.0
7350	350		

∠SI PEs (GST)

GIVEN: GST 155 AM-2
PROJ HE M107
BTRY ALT 370

RG	ALT	VI	∠SI
5170	425	+55	+10.8
3910	363	-7	-1.8
4150	372	+2	+0.5
6340	407	+37	+6.0
4500	395	+25	+5.6
5720			-4.0
7350	350		

∠SI PEs (GST)

GIVEN: GST 155 AM-2
PROJ HE M107
BTRY ALT 370

RG	ALT	VI	∠SI
5170	425	+55	+10.8
3910	363	-7	-1.8
4150	372	+2	+0.5
6340	407	+37	+6.0
4500	395	+25	+5.6
5720	348	-22	-4.0
7350	350		

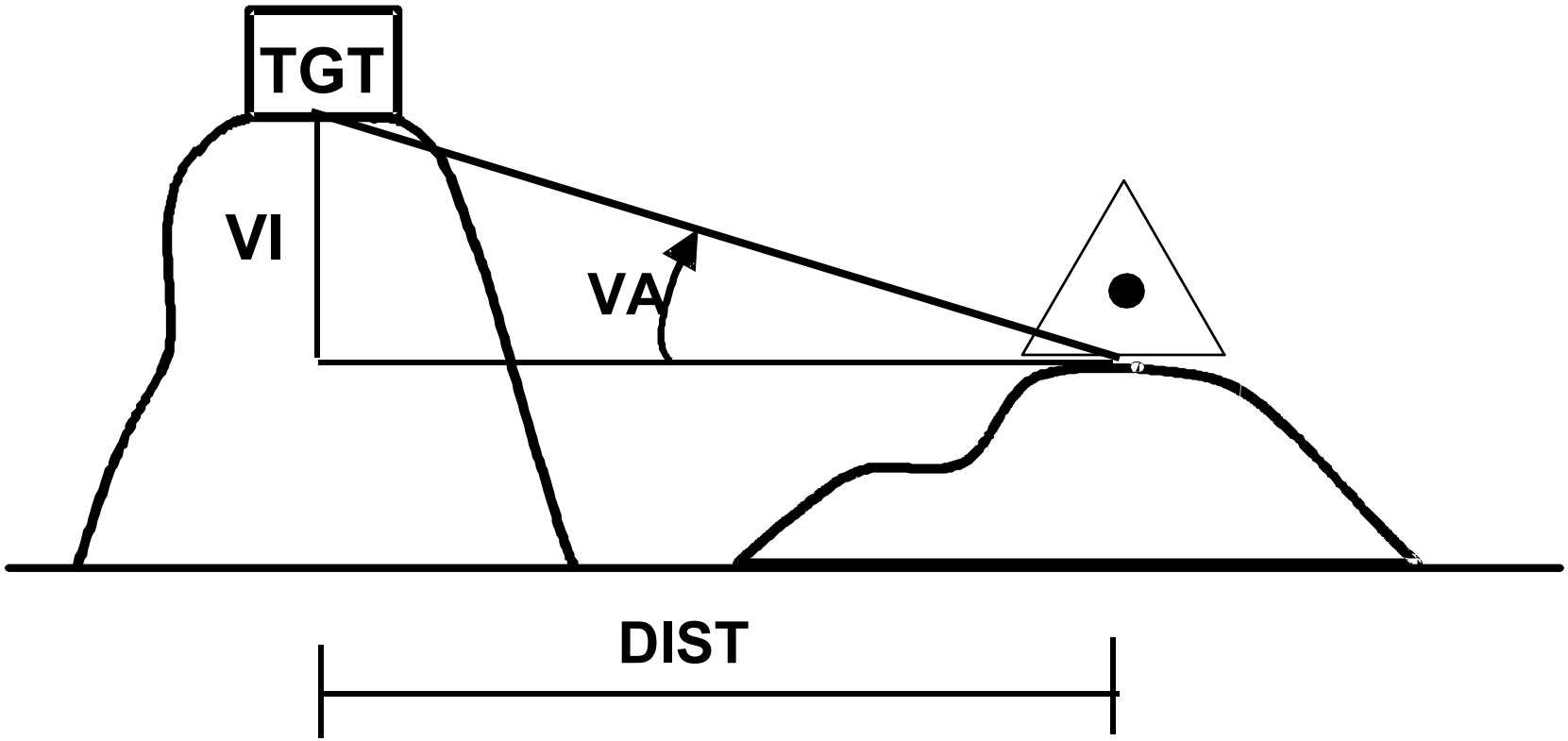
∠SI PEs (GST)

GIVEN: GST 155 AM-2
PROJ HE M107
BTRY ALT 370

RG	ALT	VI	∠SI
5170	425	+55	+10.8
3910	363	-7	-1.8
4150	372	+2	+0.5
6340	407	+37	+6.0
4500	395	+25	+5.6
5720	348	-22	-3.9
7350	350	-20	-2.8

VERTICAL ANGLE (VA)

GUNNERY DEPARTMENT



VI = DIST (1000s) x VA

USAFAS

"MAGIC-T"

VI (D) (MHL)

÷

RG (C) (MHL)

DIST (C) (MHL)

∠SI (D) M

VA (D) M

×

VA PEs (GST)

GIVEN: GST 155 AM-2
PROJ HE M107
OBS ALT 412

DIST	ALT	VI	VA
4360	325		
5610	418		
2430			+17
9840	408		
3770		+23	
1930			-32
2990	441		

VA PEs (GST)

GIVEN: GST 155 AM-2
PROJ HE M107
OBS ALT 412

DIST	ALT	VI	VA
4360	325	-87	-20
5610	418		
2430			+17
9840	408		
3770		+23	
1930			-32
2990	441		

VA PEs (GST)

GIVEN: GST 155 AM-2
PROJ HE M107
OBS ALT 412

DIST	ALT	VI	VA
4360	325	-87	-20
5610	418	+6	+1
2430			+17
9840	408		
3770		+23	
1930			-32
2990	441		

VA PEs (GST)

GIVEN: GST 155 AM-2
PROJ HE M107
OBS ALT 412

DIST	ALT	VI	VA
4360	325	-87	-20
5610	418	+6	+1
2430	452	+40	+17
9840	408		
3770		+23	
1930			-32
2990	441		

VA PEs (GST)

GIVEN: GST 155 AM-2
PROJ HE M107
OBS ALT 412

DIST	ALT	VI	VA
4360	325	-87	-20
5610	418	+6	+1
2430	452	+40	+17
9840	408	-4	0
3770		+23	
1930			-32
2990	441		

VA PEs (GST)

GIVEN: GST 155 AM-2
PROJ HE M107
OBS ALT 412

DIST	ALT	VI	VA
4360	325	-87	-20
5610	418	+6	+1
2430	452	+40	+17
9840	408	-4	0
3770	435	+23	+6
1930			-32
2990	441		

VA PEs (GST)

GIVEN: GST 155 AM-2
PROJ HE M107
OBS ALT 412

DIST	ALT	VI	VA
4360	325	-87	-20
5610	418	+6	+1
2430	452	+40	+17
9840	408	-4	0
3770	435	+23	+6
1930	351	-61	-32
2990	441		

VA PEs (GST)

GIVEN: GST 155 AM-2
PROJ HE M107
OBS ALT 412

DIST	ALT	VI	VA
4360	325	-87	-20
5610	418	+6	+1
2430	452	+40	+17
9840	408	-4	0
3770	435	+23	+6
1930	351	-61	-32
2990	441	+29	+10

SITE

(SI)

"MAGIC-T"

VI (D) (MHL)

÷

RG (C) (MHL)

DIST (C) (MHL)

RG(SI-RG)(MHL)SI(D)

∠SI (D) M

VA (D) M

M

×

SI PEs (GST)

GIVEN: GST 155 AM-2
PROJ HE M107
BTRY ALT 438

RG	CHG	ALT	VI	SI
3540	3	463		
5160	4		-42	
5430	3		+45	
7370	4	430		
6510	6	504		
3220	3		+64	
6630	4	420		

SI PEs (GST)

GIVEN: GST 155 AM-2
PROJ HE M107
BTRY ALT 438

RG	CHG	ALT	VI	SI
3540	3	463	+25	+8
5160	4		-42	
5430	3		+45	
7370	4	430		
6510	6	504		
3220	3		+64	
6630	4	420		

SI PEs (GST)

GIVEN: GST 155 AM-2
PROJ HE M107
BTRY ALT 438

RG	CHG	ALT	VI	SI
3540	3	463	+25	+8
5160	4	396	-42	-9
5430	3		+45	
7370	4	430		
6510	6	504		
3220	3		+64	
6630	4	420		

SI PEs (GST)

GIVEN: GST 155 AM-2
PROJ HE M107
BTRY ALT 438

RG	CHG	ALT	VI	SI
3540	3	463	+25	+8
5160	4	396	-42	-9
5430	3	483	+45	+12
7370	4	430		
6510	6	504		
3220	3		+64	
6630	4	420		

SI PEs (GST)

GIVEN: GST 155 AM-2
PROJ HE M107
BTRY ALT 438

RG	CHG	ALT	VI	SI
3540	3	463	+25	+8
5160	4	396	-42	-9
5430	3	483	+45	+12
7370	4	430	-8	-2
6510	6	504		
3220	3		+64	
6630	4	420		

SI PEs (GST)

GIVEN: GST 155 AM-2
PROJ HE M107
BTRY ALT 438

RG	CHG	ALT	VI	SI
3540	3	463	+25	+8
5160	4	396	-42	-9
5430	3	483	+45	+12
7370	4	430	-8	-2
6510	6	504	+66	+11
3220	3		+64	
6630	4	420		

SI PEs (GST)

GIVEN: GST 155 AM-2
PROJ HE M107
BTRY ALT 438

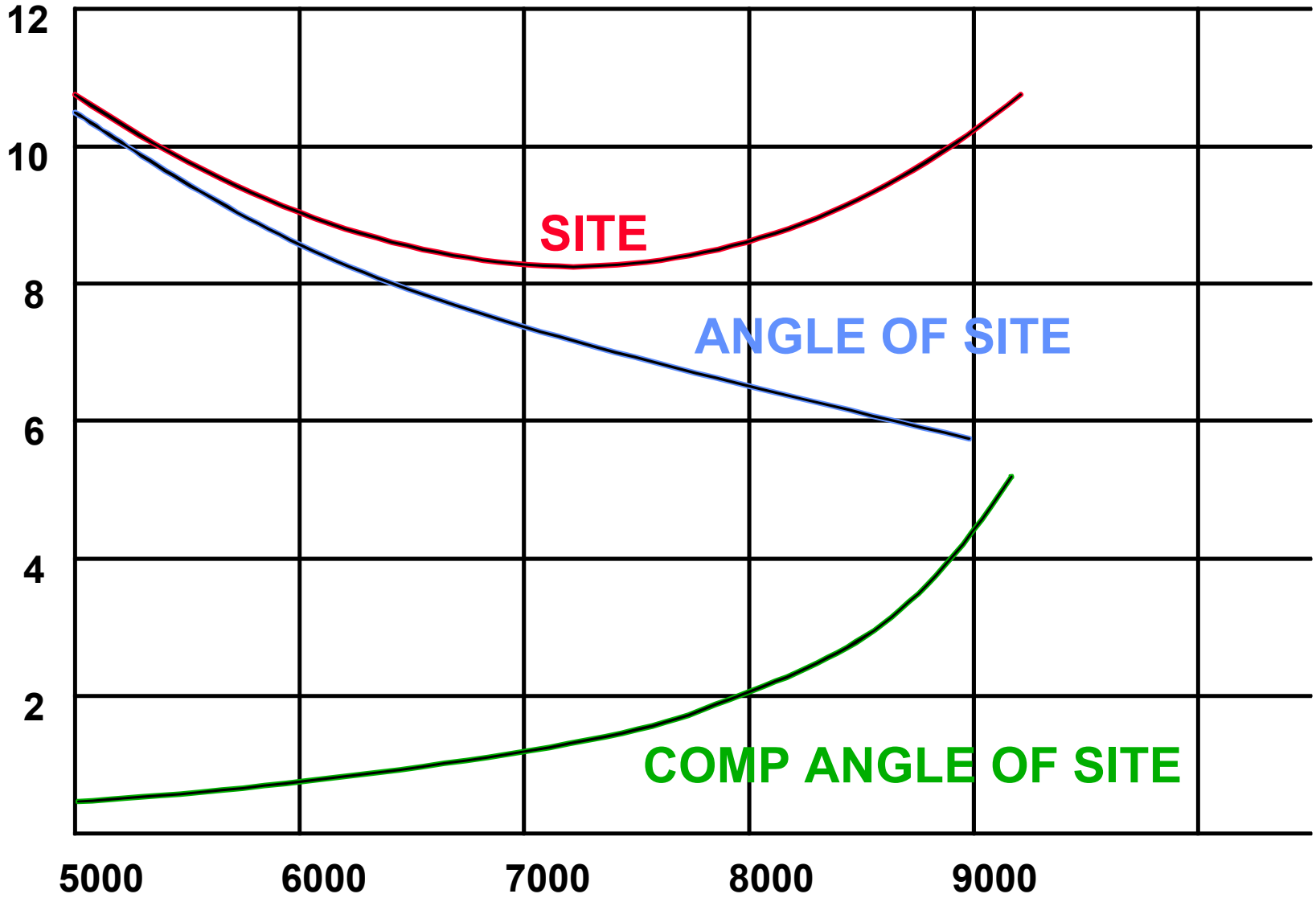
RG	CHG	ALT	VI	SI
3540	3	463	+25	+8
5160	4	396	-42	-9
5430	3	483	+45	+12
7370	4	430	-8	-2
6510	6	504	+66	+11
3220	3	502	+64	+21
6630	4	420		

SI PEs (GST)

GIVEN: GST 155 AM-2
PROJ HE M107
BTRY ALT 438

RG	CHG	ALT	VI	SI
3540	3	463	+25	+8
5160	4	396	-42	-9
5430	3	483	+45	+12
7370	4	430	-8	-2
6510	6	504	+66	+11
3220	3	502	+64	+21
6630	4	420	-18	-4

GUNNERY DEPARTMENT



USAFAS

THE KING OF BATTLE