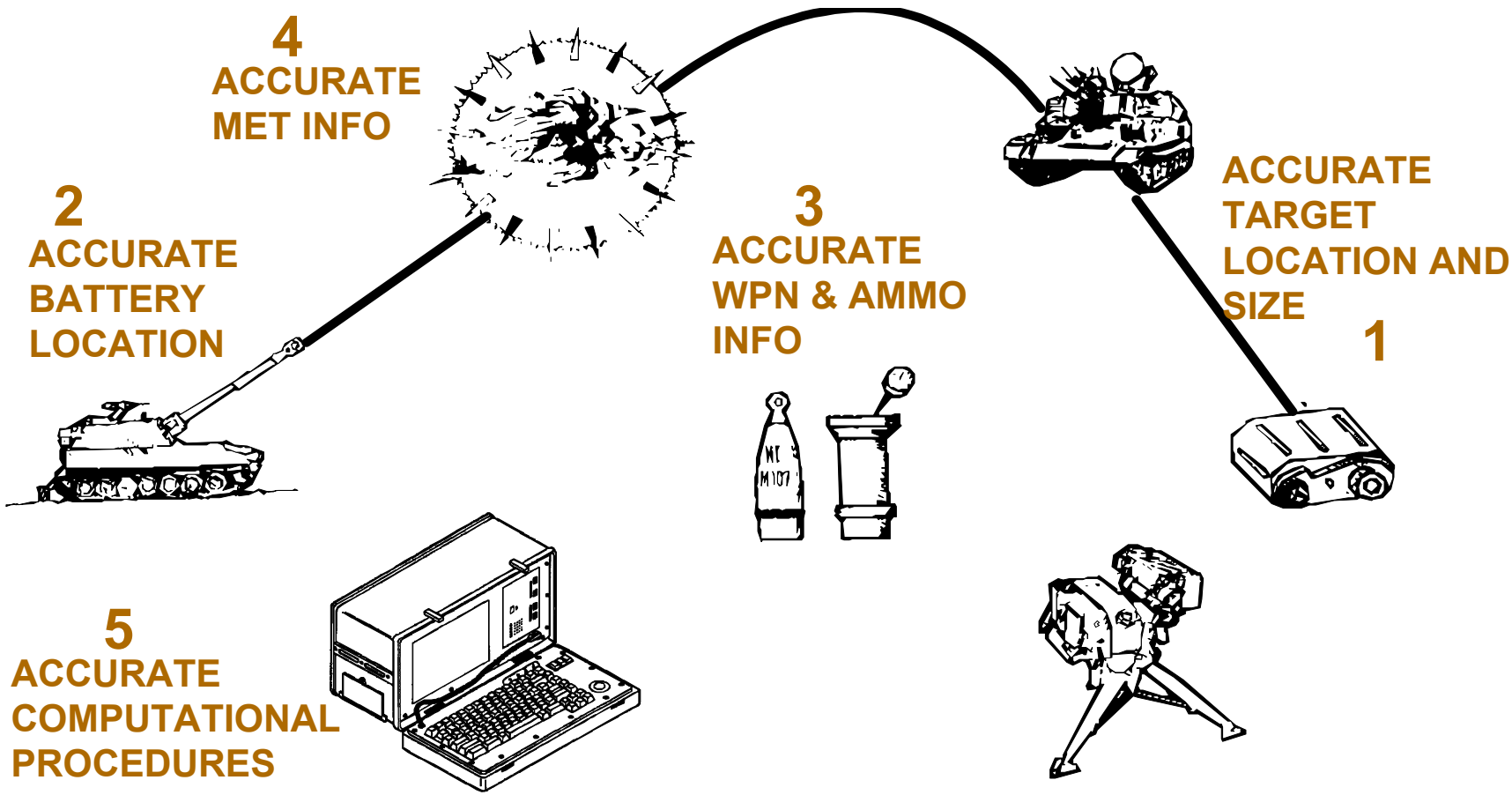
GUNNERY DEPARTMENT

FIVE REQUIREMENTS FOR ACCURATE PREDICTED FIRE



USAFAS

GUNNERY

THE PRACTICAL APPLICATION OF BALLISTICS SO THAT THE DESIRED EFFECTS ARE OBTAINED BY FIRE

BALLISTICS

THE SCIENCE WHICH DEALS WITH THE MOTION OF PROJECTILES AND THE CONDITIONS WHICH AFFECT THAT MOTION

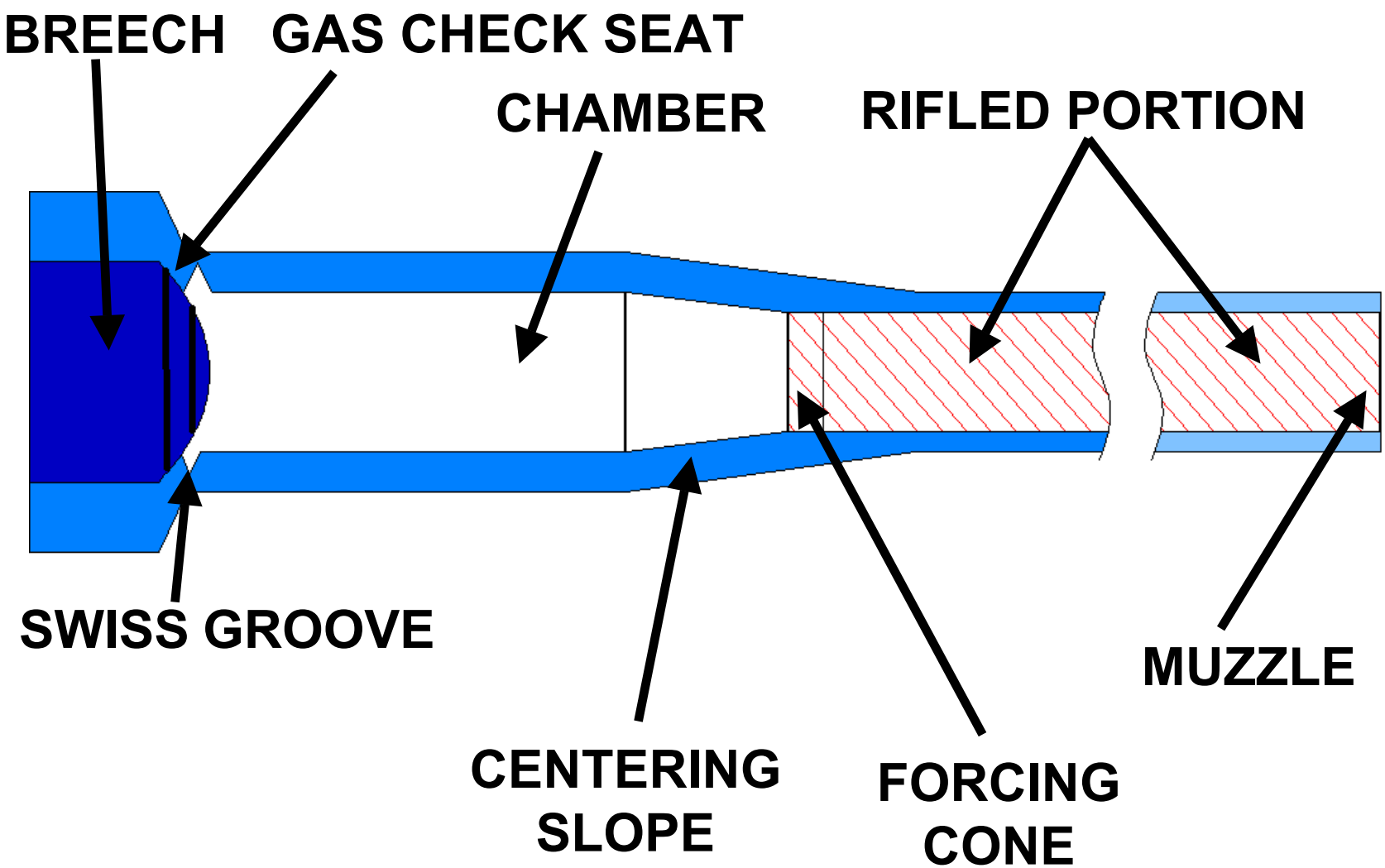
ARTILLERY BALLISTICS

- INTERIOR BALLISTICS
- TRANSITIONAL BALLISTICS
- EXTERIOR BALLISTICS
- TERMINAL BALLISTICS

INTERIOR BALLISTICS

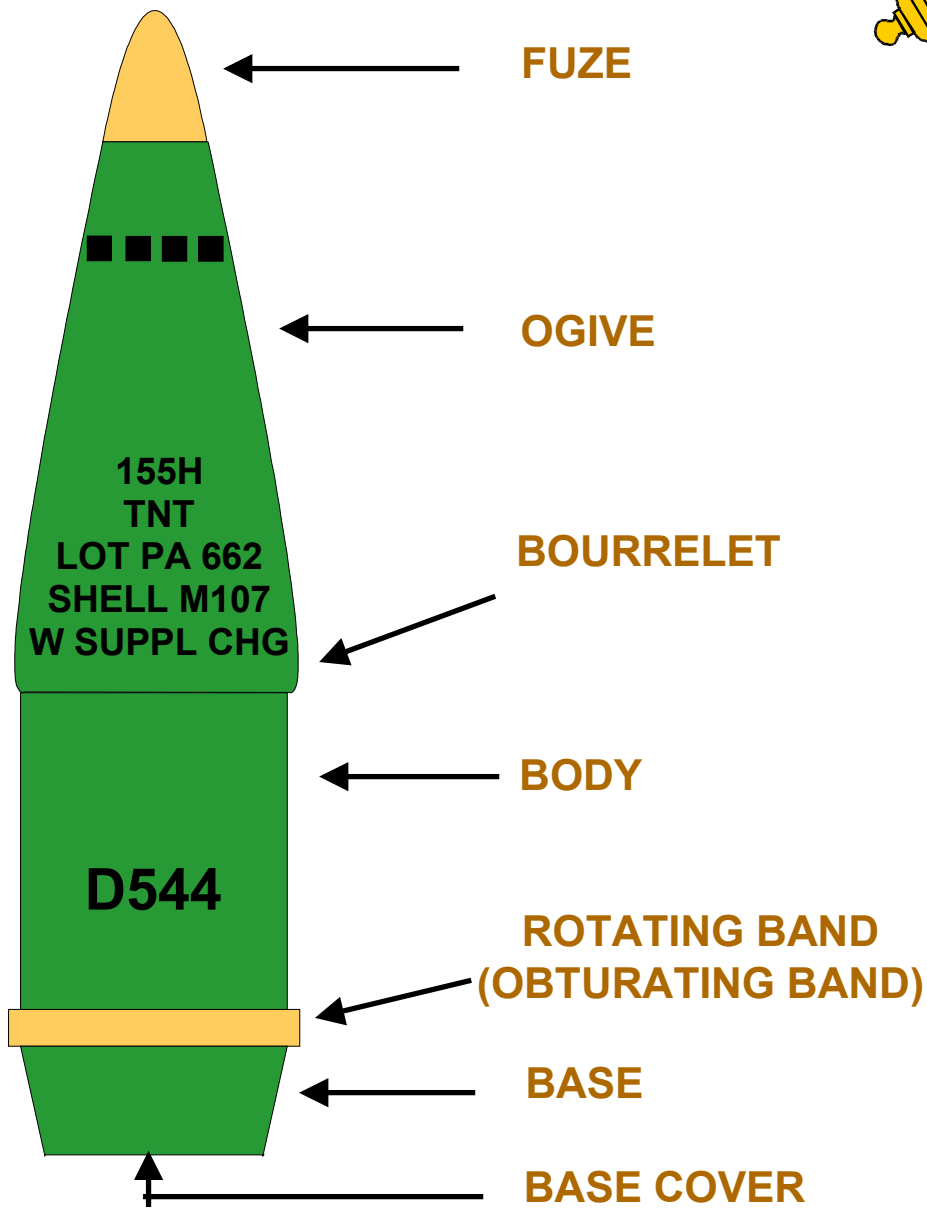
THE SCIENCE THAT DEALS WITH THE FACTORS AFFECTING THE MOTION OF THE PROJECTILE WITHIN THE TUBE

TUBE


BREECH
GAS CHECK SEAT
CHAMBER
RIFLED PORTION
SWISS GROOVE
CENTERING SLOPE
FORCING CONE
MUZZLE

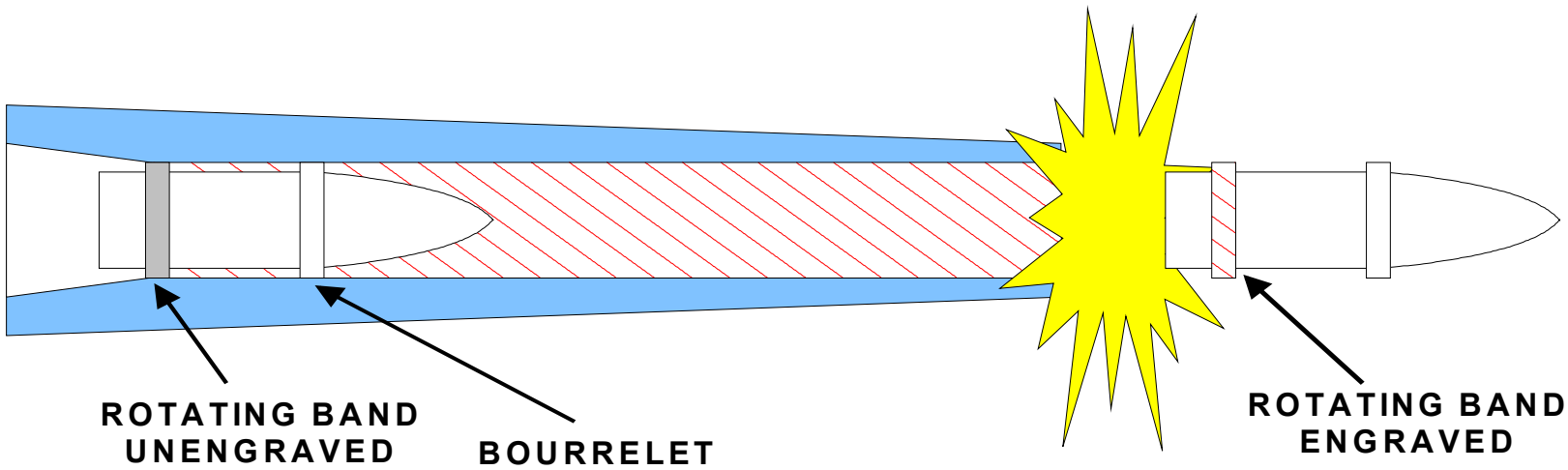
USAFAS

EXTERIOR PARTS OF PROJECTILE

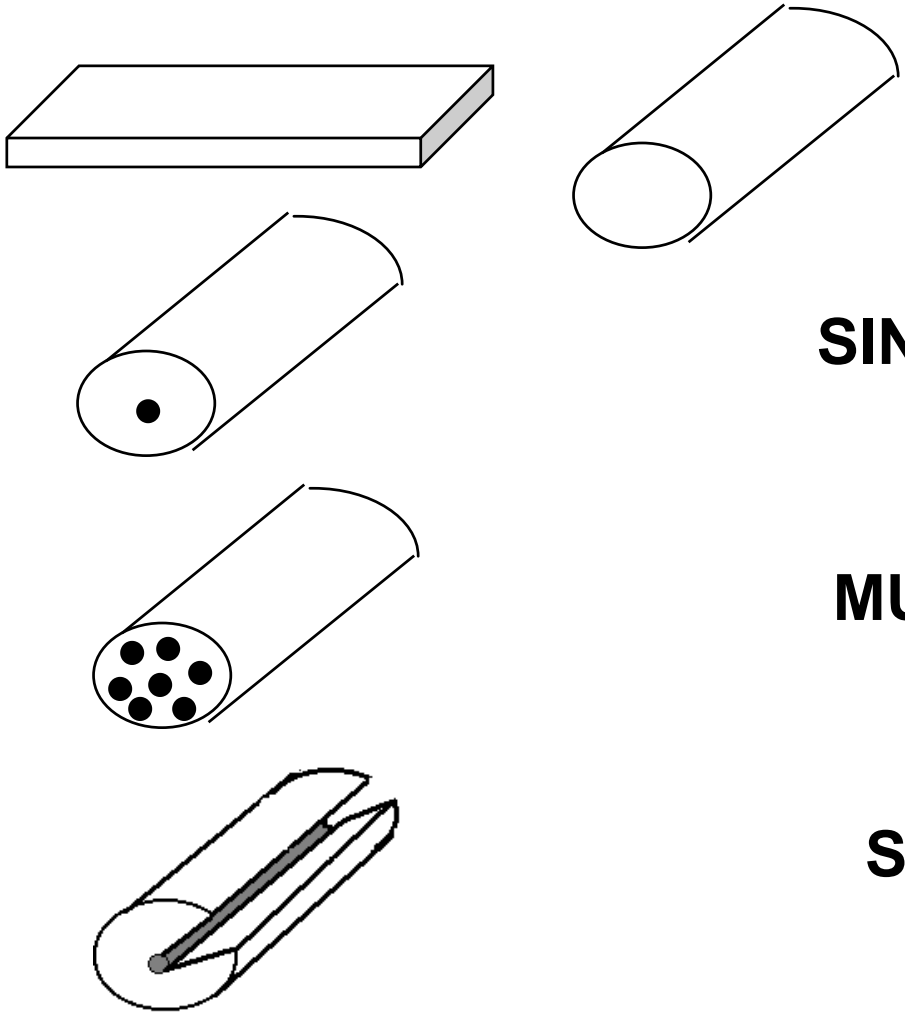


ROTATING BAND

- HOLDS PROJECTILE THROUGH ALL ANGLES OF ELEVATION
- CENTERS PROJECTILE (IN CONJUNCTION WITH BOURRELET)
- PROVIDES FORWARD OBTURATION
- OFFERS INITIAL RESISTANCE
- IMPARTS SPIN



POWDER GRAIN FORMS

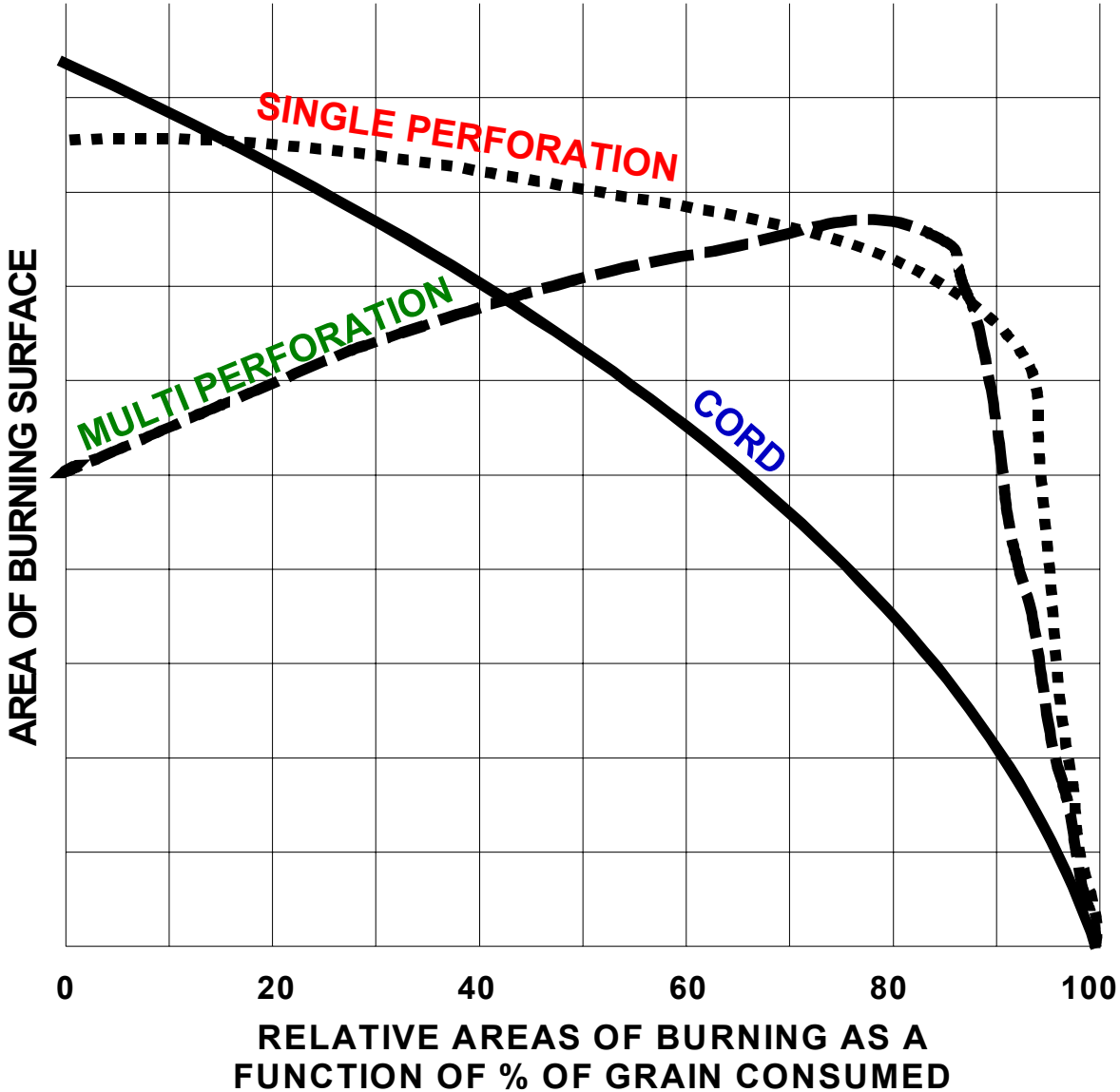


STRIP/CHORD

SINGLE PERFORATED

MULTI PERFORATED

SLOTTED STICK



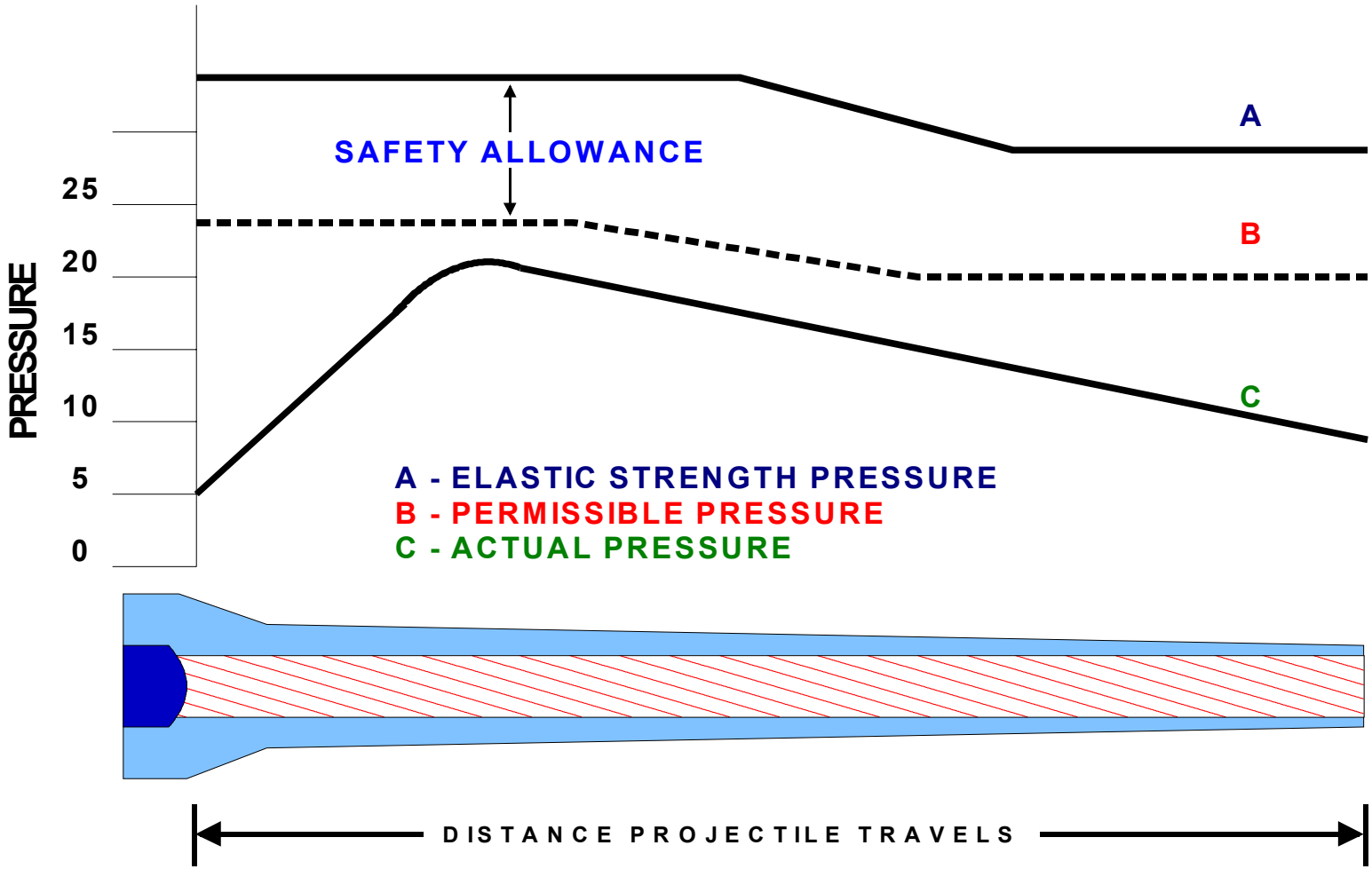
BURN RATES

DEGRESSIVE

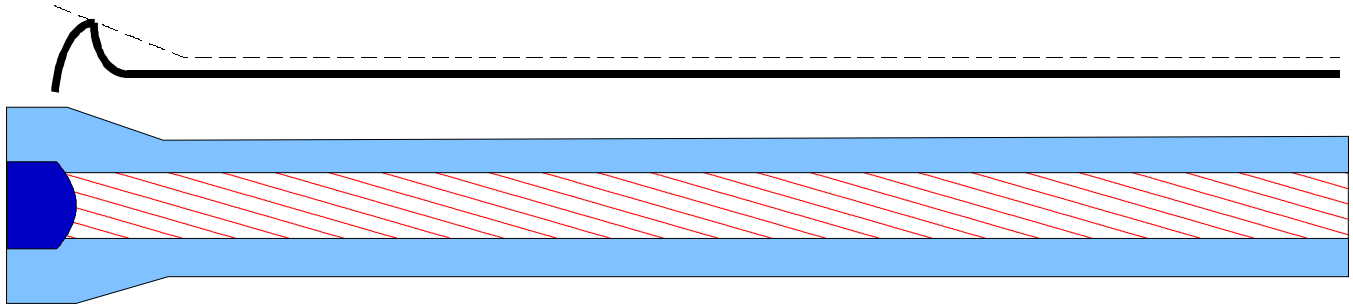
NEUTRAL

PROGRESSIVE

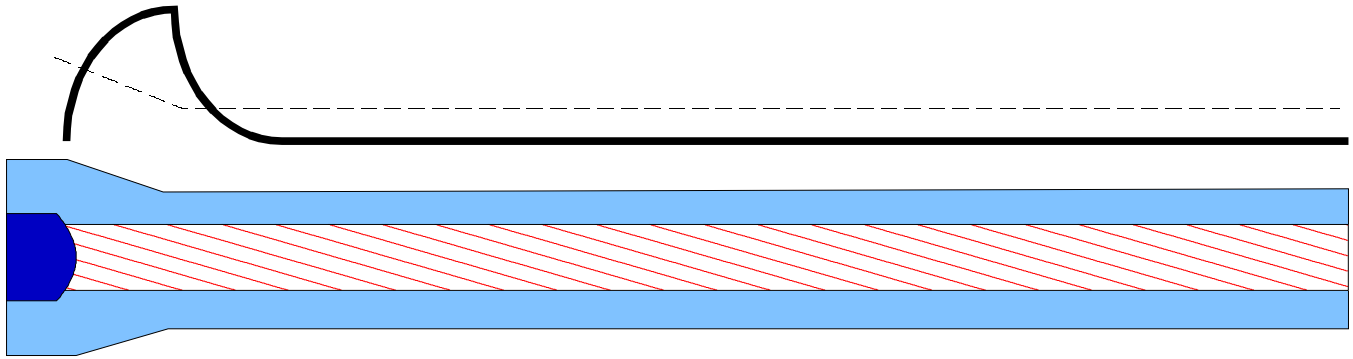
EXAMPLE OF A PRESSURE TRAVEL CURVE



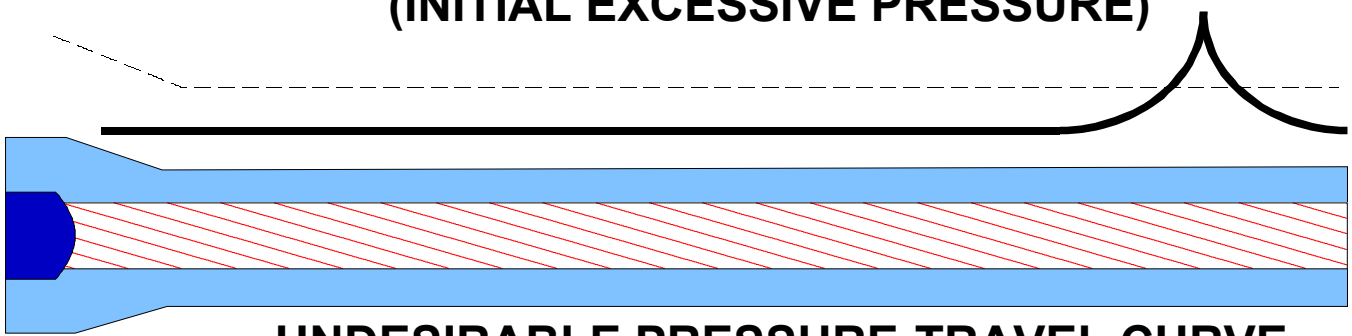
USAFAS



DESIRABLE PRESSURE-TRAVEL CURVE



UNDESIRABLE PRESSURE-TRAVEL CURVE
(INITIAL EXCESSIVE PRESSURE)



UNDESIRABLE PRESSURE-TRAVEL CURVE
(DELAYED EXCESSIVE PRESSURE)

FACTORS AFFECTING MUZZLE VELOCITY

- VELOCITY TRENDS
- AMMUNITION LOTS
- TOLERANCES IN NEW WEAPONS
- TUBE WEAR
- NON-UNIFORM RAMMING
- ROTATING BAND
- PROJECTILE / PROPELLANT TEMPERATURE

FACTORS AFFECTING MUZZLE VELOCITY

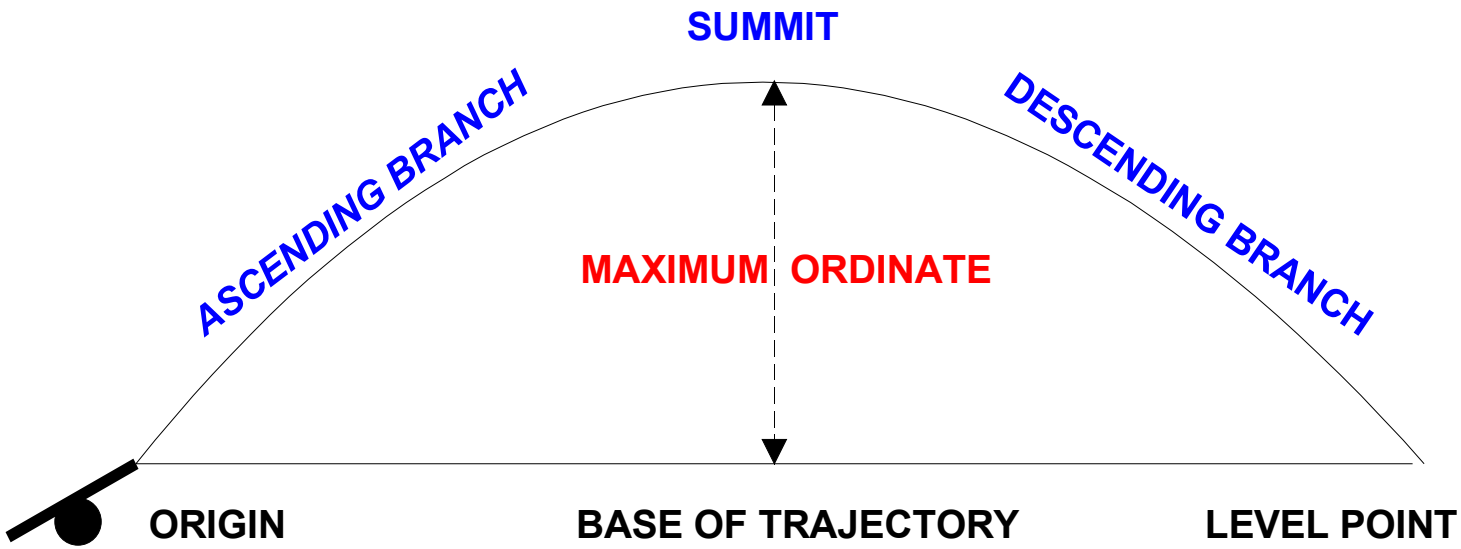
- MOISTURE CONTENT OF THE PROPELLANT
- POSITION OF THE PROPELLANT
- PROJECTILE WEIGHT
- COPPERING
- PROPELLANT RESIDUE
- TUBE CONDITIONING
- TUBE MEMORY

TRANSITIONAL BALLISTICS

THE STUDY OF THE TRANSITION FROM INTERIOR BALLISTICS TO EXTERIOR BALLISTICS

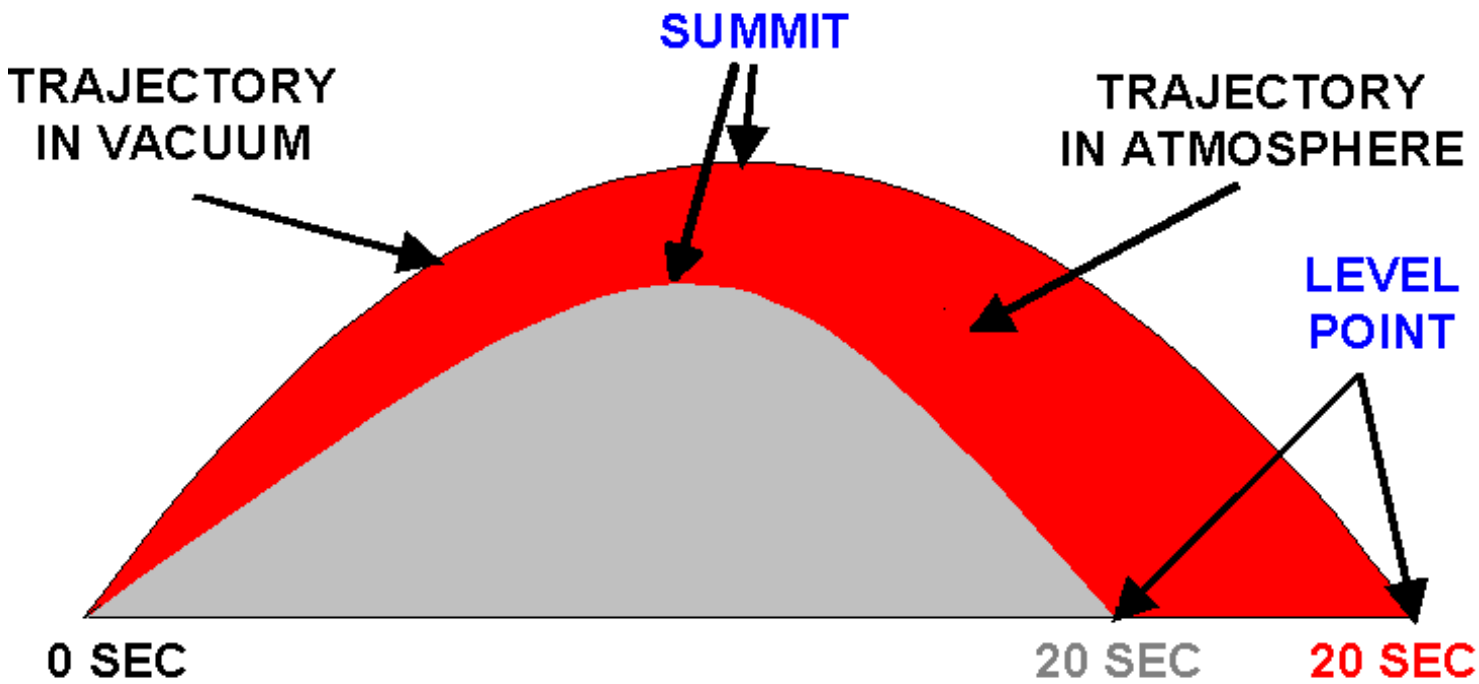
EXTERIOR BALLISTICS

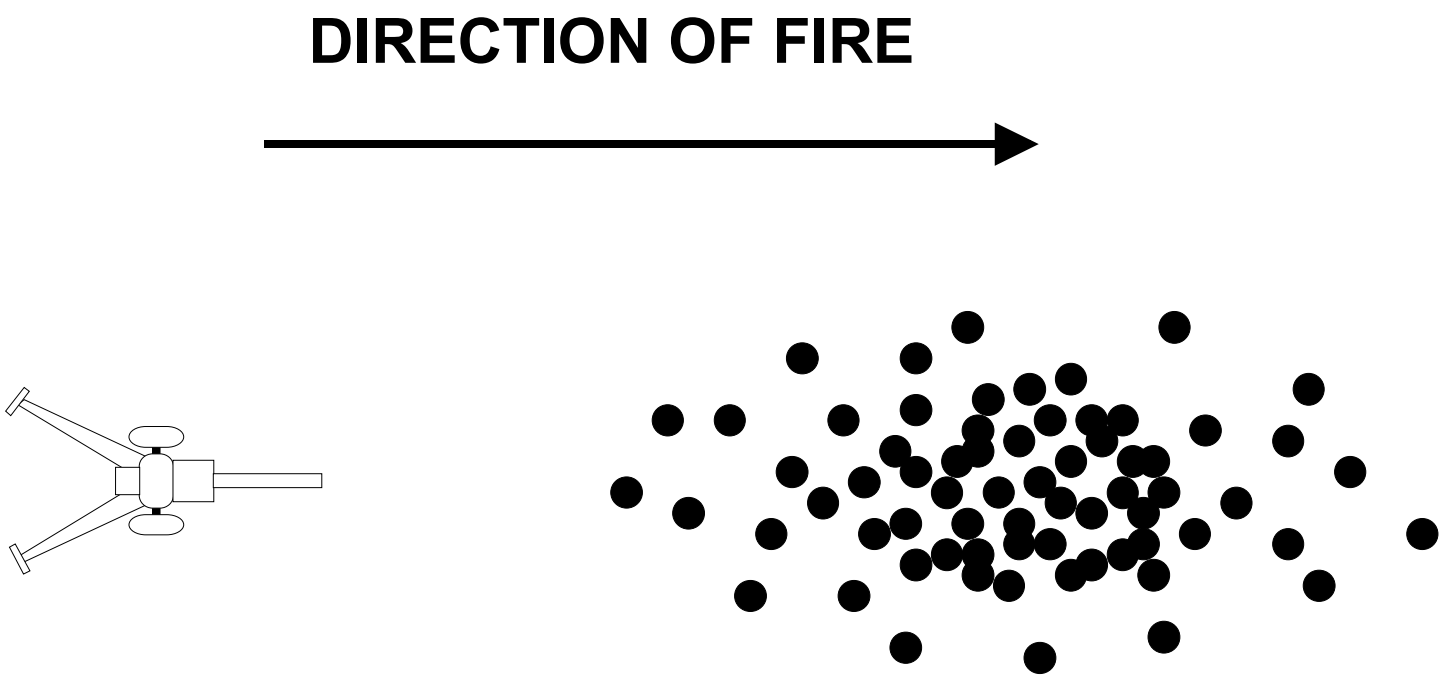
THE SCIENCE THAT DEALS WITH THE FACTORS AFFECTING THE MOTION OF THE PROJECTILE AFTER IT LEAVES THE MUZZLE OF THE WEAPON



INTRINSIC ELEMENTS OF A TRAJECTORY

TRAJECTORY IN VACUUM AND TRAJECTORY IN STANDARD ATMOSHERE





ELLIPTICAL DISPERSION PATTERN
CAUSED BY INHERENT ERROR

TERMINAL BALLISTICS

THE STUDY OF THE EFFECT OF PROJECTILES ON A TARGET

TABULAR FIRING TABLES

STANDARD CONDITIONS

WEATHER

- AIR TEMPERATURE 100% (59 °F)
- AIR DENSITY 100% (1225 g/m^3)
- NO WIND

STANDARD CONDITIONS

POSITION

- GUN, TARGET, AND MDP AT SAME ALTITUDE
- ACCURATE RANGE
- NO ROTATION OF THE EARTH

STANDARD CONDITIONS

MATERIAL

- STANDARD WEAPON, PROJECTILE, AND FUZE
- PROPELLANT TEMPERATURE 70 °F
- LEVEL TRUNNIONS AND PRECISION SETTINGS
- FIRING TABLE MUZZLE VELOCITY
- NO DRIFT

TABULAR FIRING TABLE
(TFT)

- INTRODUCTION
- FIRE CONTROL INFORMATION
- APPENDICES

INTRODUCTION

INTRODUCTION

- PROJ/FZ COMB. AND WEIGHTS - XI
- EFCs/LOSS IN MV - XII thru XV
- FIRING TABLE DATA - XXVIII
- CHARGE SELECTION TABLE - LIII

FIRE CONTROL INFORMATION (FCI)

CHARGE COVER PAGE

- STD MV FOR THAT CHARGE
- EXAMPLE: CHG 4GB (pg. 89)
- STD MV: 316.0 M/S

TABLE A

LINE NUMBER

- ENTRY ARGUMENT: QE
  DETERMINE: MET MESSAGE & LINE NUMBER
- GIVEN: QE 315
- DETERMINE: LINE 02

TABLE B

COMPLEMENTARY RANGE
LINE NUMBER

- ENTRY ARGUMENTS:
  - CHART RANGE (NEAREST 100m)
  - HEIGHT OF TARGET ABOVE GUN (NEAREST 100m)

  DETERMINE: COMPLEMENTARY RANGE
- GIVEN:
  - CHART RANGE 5000m
  - HEIGHT OF TARGET ABOVE GUN +100m
- DETERMINE: +26m

TABLE C

WIND COMPONENTS

- ENTRY ARGUMENT:
  - -CHART DIRECTION OF WIND

  DETERMINE:
  - - COMPONENTS OF A 1 KNOT WIND
- GIVEN:
  - - CHART DIR OF WIND 2000 MILS
- DETERMINE:
  - - CROSS WIND R 0.92
  - - RANGE WIND T 0.38

TABLE D

TEMPERATURE AND DENSITY CORRECTIONS

- ENTRY ARGUMENT:
  - DIFFERENCE IN HEIGHT BETWEEN THE MDP AND THE BATTERY (DH)
  DETERMINE: TEMP CORR (DT) AND DENSITY CORR (DD)
- GIVEN: DH +130m
- DETERMINE: DT -0.3
  DD -1.3

TABLE E

PROPELLANT TEMPERATURE

- ENTRY ARGUMENT:
  - PROPELLANT TEMPERATURE
    (INTERPOLATION REQUIRED)

  DETERMINE:
  - EFFECT ON MUZZLE VELOCITY
- GIVEN: PROP TEMP 88 °

TABLE E

INTERPOLATION

		80	+0.4	
	+8			X
+10		88	?	+0.4
		90	+0.8	

TABLE E

INTERPOLATION

		80	+0.4	
	+8			X
+10		88	?	
				+0.4
		90	+0.8	

$$\frac{+8}{+10} = \frac{X}{+0.4}$$

TABLE E

INTERPOLATION

		80	+0.4	
	+8			X
+10		88	?	+0.4
		90	+0.8	

$$+10X = (+8)(+0.4)$$

$$\frac{+8}{+10} = \frac{X}{+0.4}$$

USAFAS

TABLE E

INTERPOLATION

		80	+0.4	
	+8			X
+10		88	?	
				+0.4
		90	+0.8	

$$\frac{+8}{+10} = \frac{X}{+0.4}$$

$$+10X = (+8)(+0.4)$$

$$+10X = +3.2$$

USAFAS

TABLE E

INTERPOLATION

$$\begin{array}{cc} & \begin{bmatrix} 80 & +0.4 \\ 88 & ? \end{bmatrix} \\ +10 & \begin{bmatrix} +8 & \\ & \\ & \\ 90 & +0.8 \end{bmatrix} \end{array} X = +0.3 \quad +0.4$$

$$\frac{+8}{+10} = \frac{X}{+0.4}$$

$$+10X = (+8)(+0.4)$$

$$+10X = +3.2$$

$$X = +0.32 \approx +0.3$$

TABLE E

INTERPOLATION

	80	+0.4	
+8			X = +0.3
+10	88	?	+0.4
	90	+0.8	

$$\frac{+8}{+10} = \frac{X}{+0.4}$$

$$+10X = (+8)(+0.4)$$

$$+10X = +3.2$$

$$X = +0.32 \approx +0.3$$

?: $(+0.4) + (+0.3) = +0.7$

TABLE F

BASIC DATA & CORR FACTORS

- ENTRY ARGUMENT:
  - RANGE (NEAREST LISTED*) DET'M: Firing Data & Corr. Factors

  *TO DETERMINE EL (COL 2) REQUIRES INTERPOLATION TO NEAREST 10m
- ********** = Low/Hi angle dividing line
- GIVEN: RANGE 5000m (LOW ANGLE)
- DETERMINE: EL 304.5 mils
- GIVEN: RANGE 5030m

TABLE G

SUPPLEMENTARY DATA

- ENTRY ARGUMENT: RANGE (NEAREST LISTED*)
  DETERMINE: SUPPLEMENTARY DATA

* COMP SI FACTOR (COLs 12 & 13)

INTERPOLATE TO NEAREST 10m

TABLE H

ROTATION - RANGE

- ENTRY ARGUMENTS:
  - RANGE (NEAREST LISTED)
  - DIRECTION OF FIRE (NEAREST LISTED)

  DETERMINE: RANGE CORRECTION CAUSED BY ROTATION
- GIVEN: RANGE 4800m (LOW ANGLE)

  DIRECTION OF FIRE 0851 mils
- DETERMINE:

  RG CORR -13

  - MULTIPLY BY LATITUDE CORR FACTOR

TABLE I

ROTATION - AZIMUTH

- ENTRY ARGUMENTS:
  - LATITUDE (NEAREST LISTED)
  - RANGE (NEAREST LISTED)
  - DIRECTION OF FIRE (NEAREST LISTED
  DETERMINE: AZ CORR CAUSED BY ROTATION
- GIVEN: LATITUDE 34 °N
  RANGE 4800m (LOW ANGLE)
  DIRECTION OF FIRE 0851 mils
- DETERMINE: L 0.6

TABLE J

FUZE CORRECTION FACTORS

- ENTRY ARGUMENT:
  - FUZE SETTING (LISTED VALUE)

  DETERMINE: FUZE CORRECTION FACTORS

TABLE K

FUZE SETTING

- NOT USED BECAUSE IT IS FOR OLD M520A1 TI FUZES

ILLUMINATION

ILLUMINATION

- ENTRY ARGUMENT(TBL A): RANGE
- DET'M: Firing Data & Safety Data
- *TO DETERMINE QE (COL 2) REQUIRES INTERPOLATION TO NEAREST 10m
- ********** = Low/Hi angle dividing line
- Shaded area = fuze function on the ascending branch
- COL 2 & 3 = Firing Data
- COL 4 & 5 = Correction for change in HOB
- COL 6 & 7 = Safety Data
- TBL B = Correction to M565 FZ setting for M577 FZ
  - Enter w/M565 FZ Setting
  - Add correction to M565 FZ setting

APPENDICES

GRAPHICAL FIRING TABLES

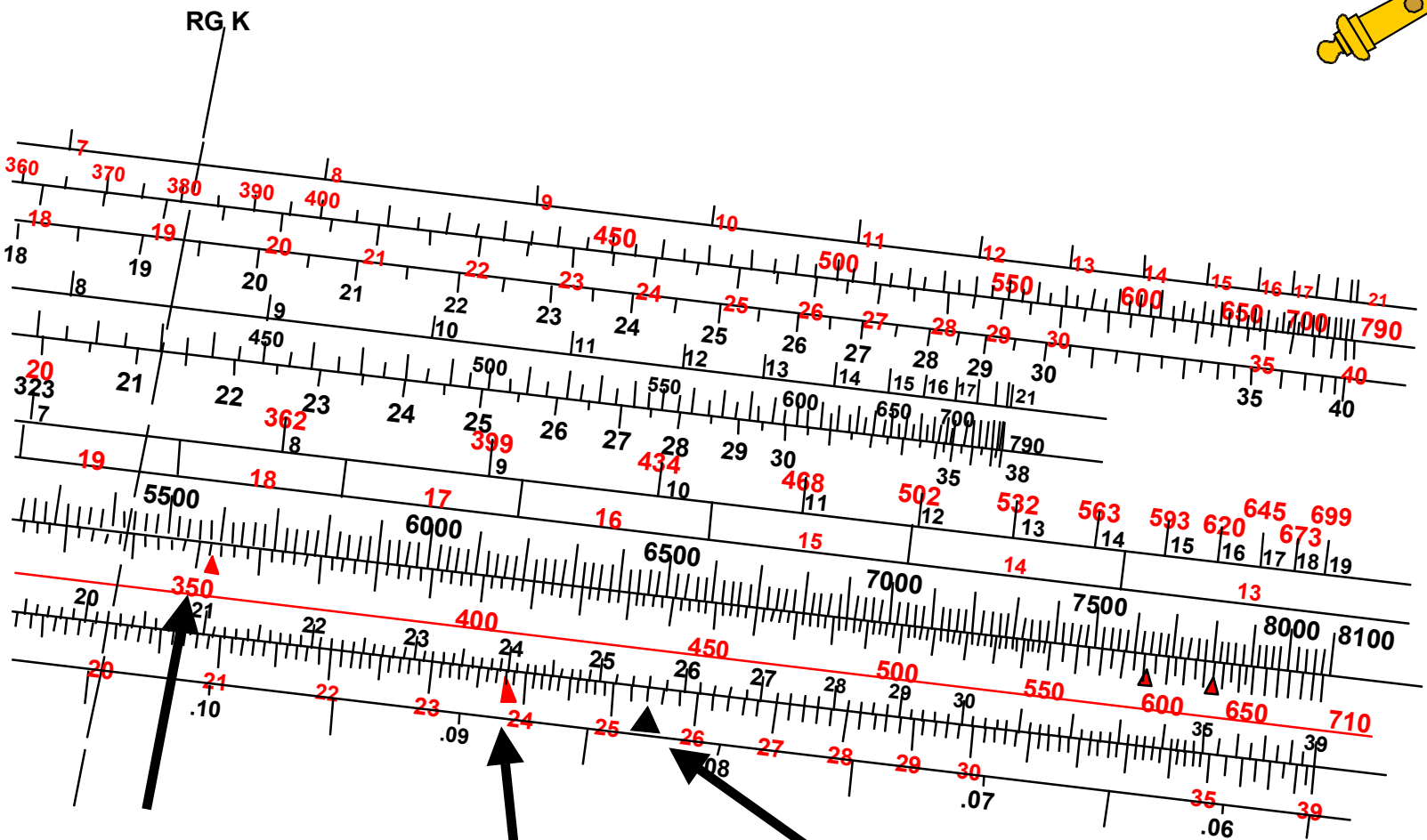
- Low Angle GFTs
- Hi Angle GFTs
- Illumination GFTs

LOW ANGLE GFT

(155-AM-2)

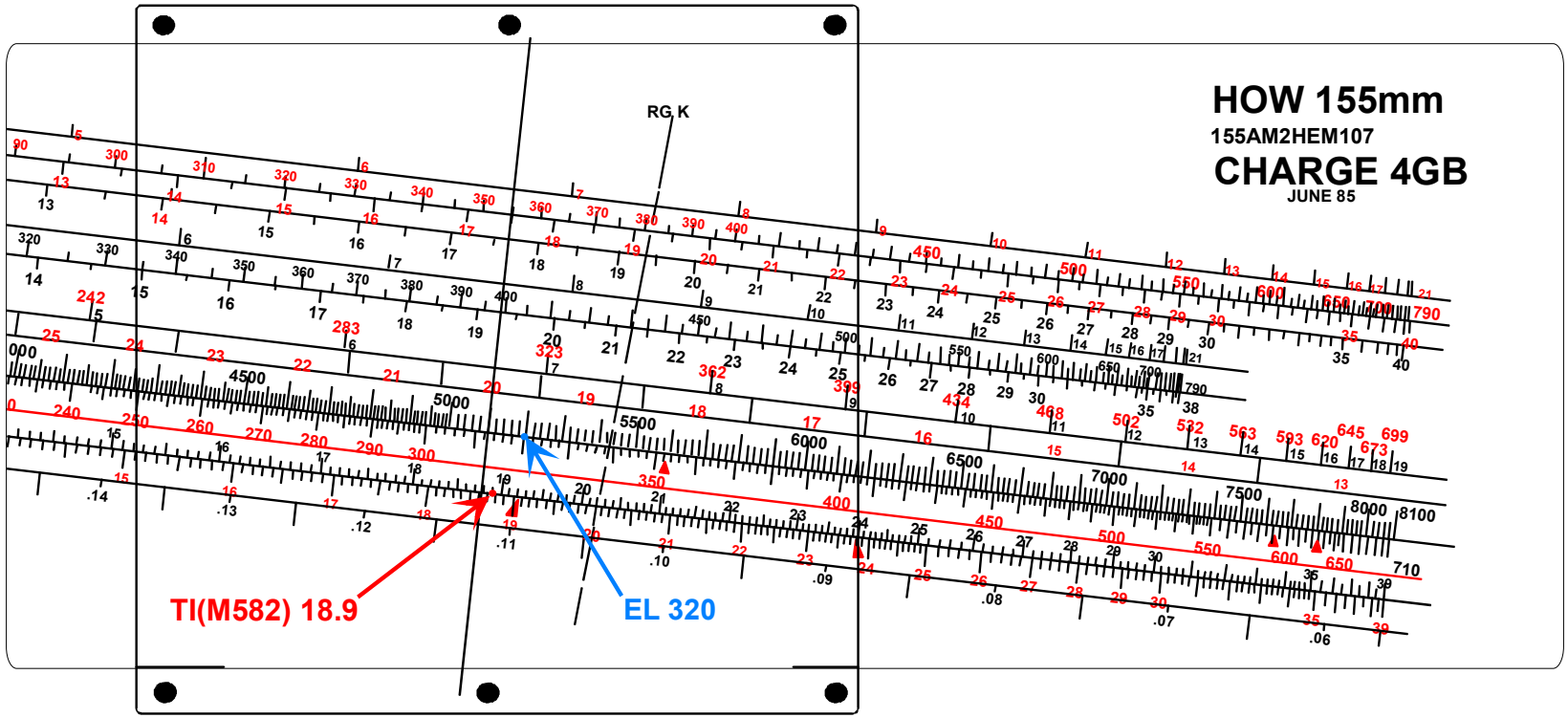
- RNG Scale - Visually Interpolated to Nearest 10m
- EL Scale - Visually Interpolated to Nearest 1 mil
- TOF/M582/M577/VT Scale
  - M582/M577: VI to Nearest 0.1 Second
  - VT: Vanish the tenth
  - TOF: Artillery Express to Nearest 1 Second
- M564/M565 Scale - VI to nearest 0.1 FZ Setting Increment
- Delta FS Scale - Read to 0.01 Seconds
- 100/R Scale - Read to Nearest 1 mil
- Drift Scale - Read to Nearest 1 mil
  - Drift Changeover Point (Red EL #s)
- ICM Scales

GUNNERY DEPARTMENT



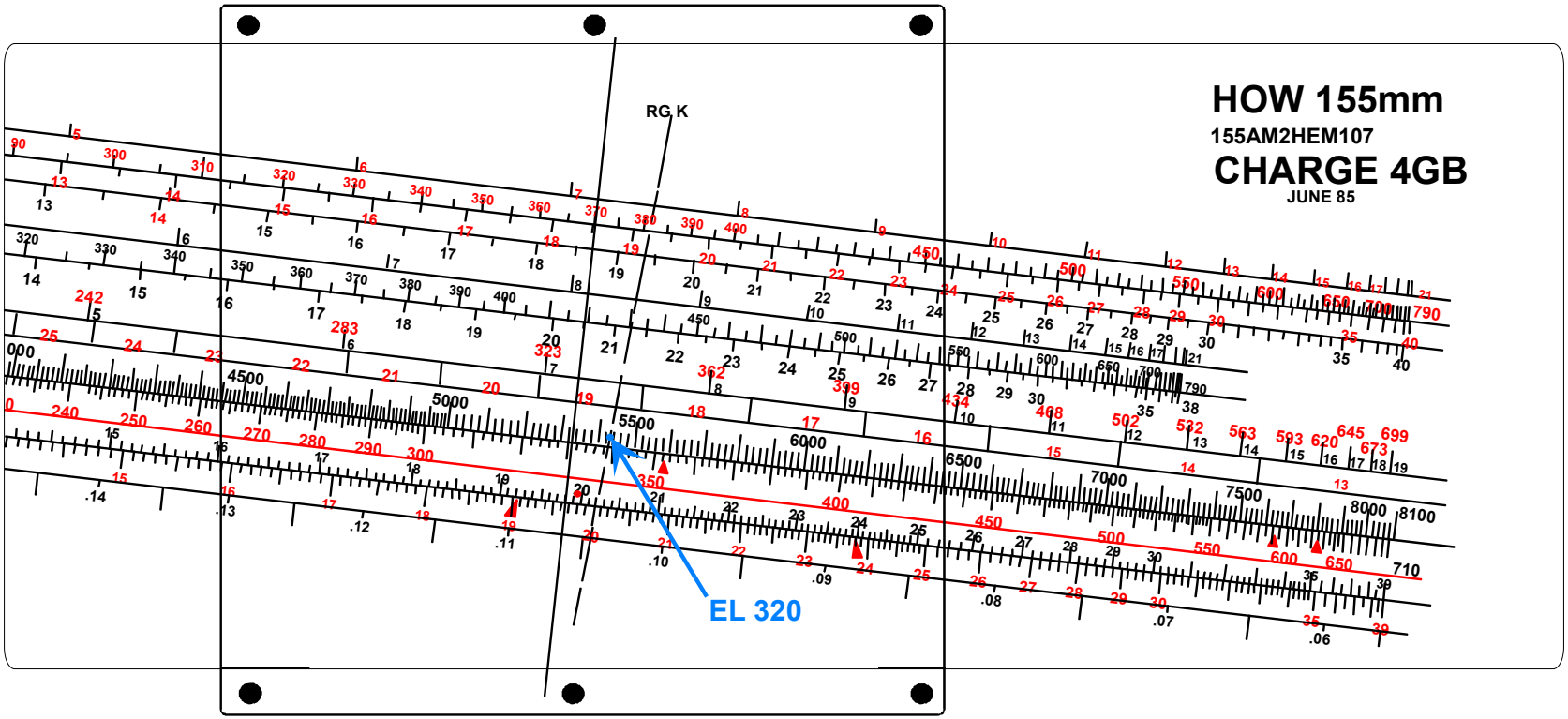
USAFAS

Applying the GFT setting



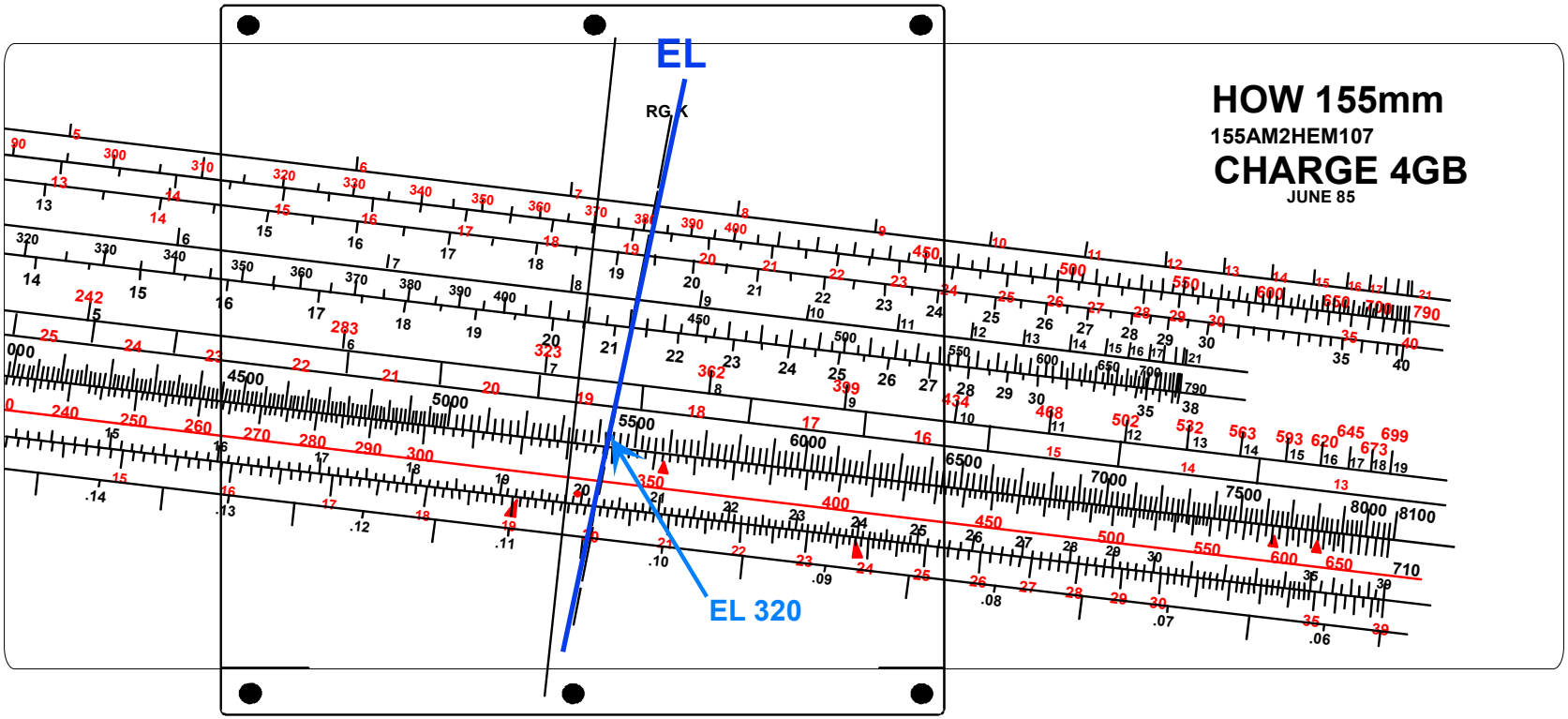
Place the MHL over RG 5100, place a blue dot over EL 320 and place a red dot over TI 18.9 for Fuze M582.

Applying the GFT setting



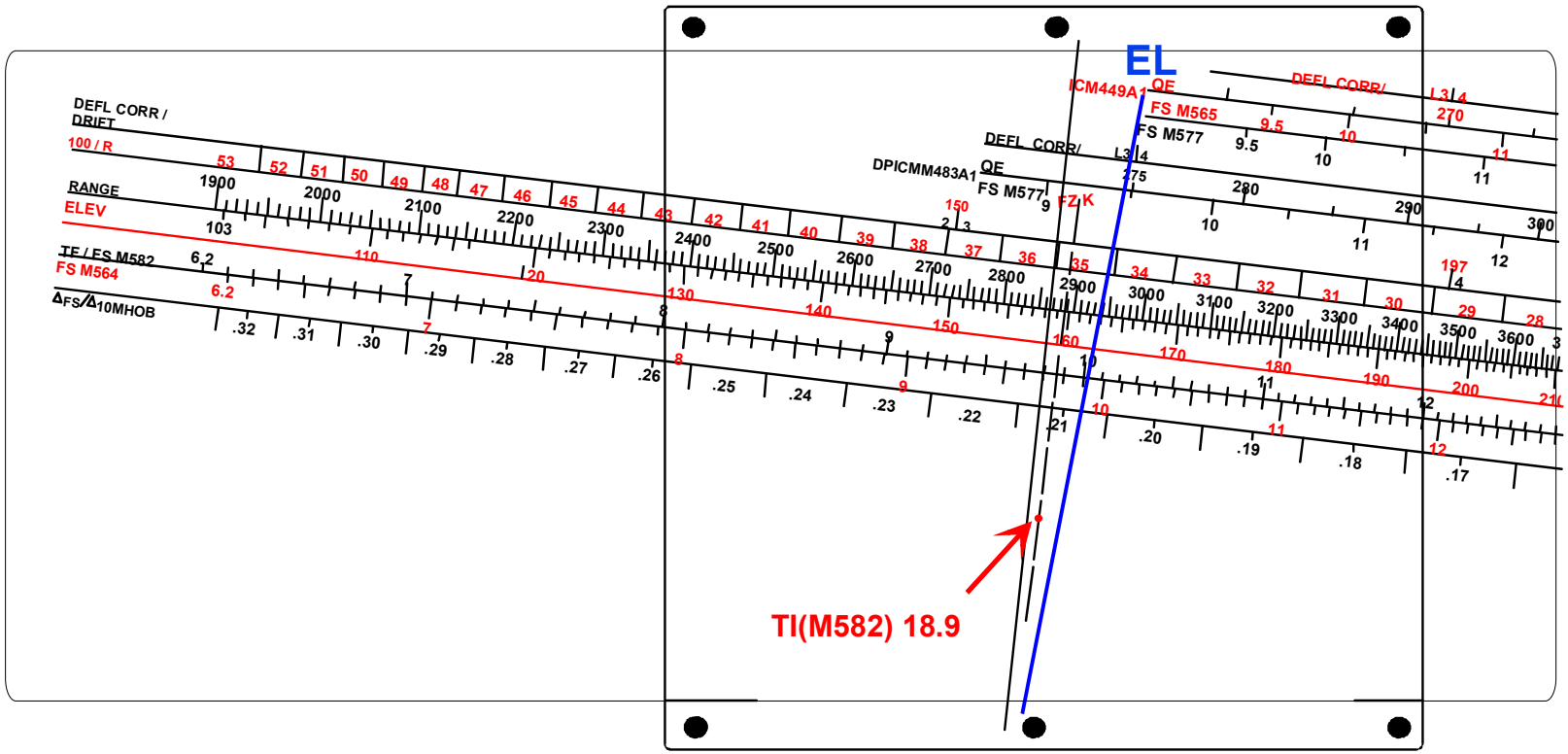
Slide the cursor to the right and place the blue dot over the RG K line.

Applying the GFT setting



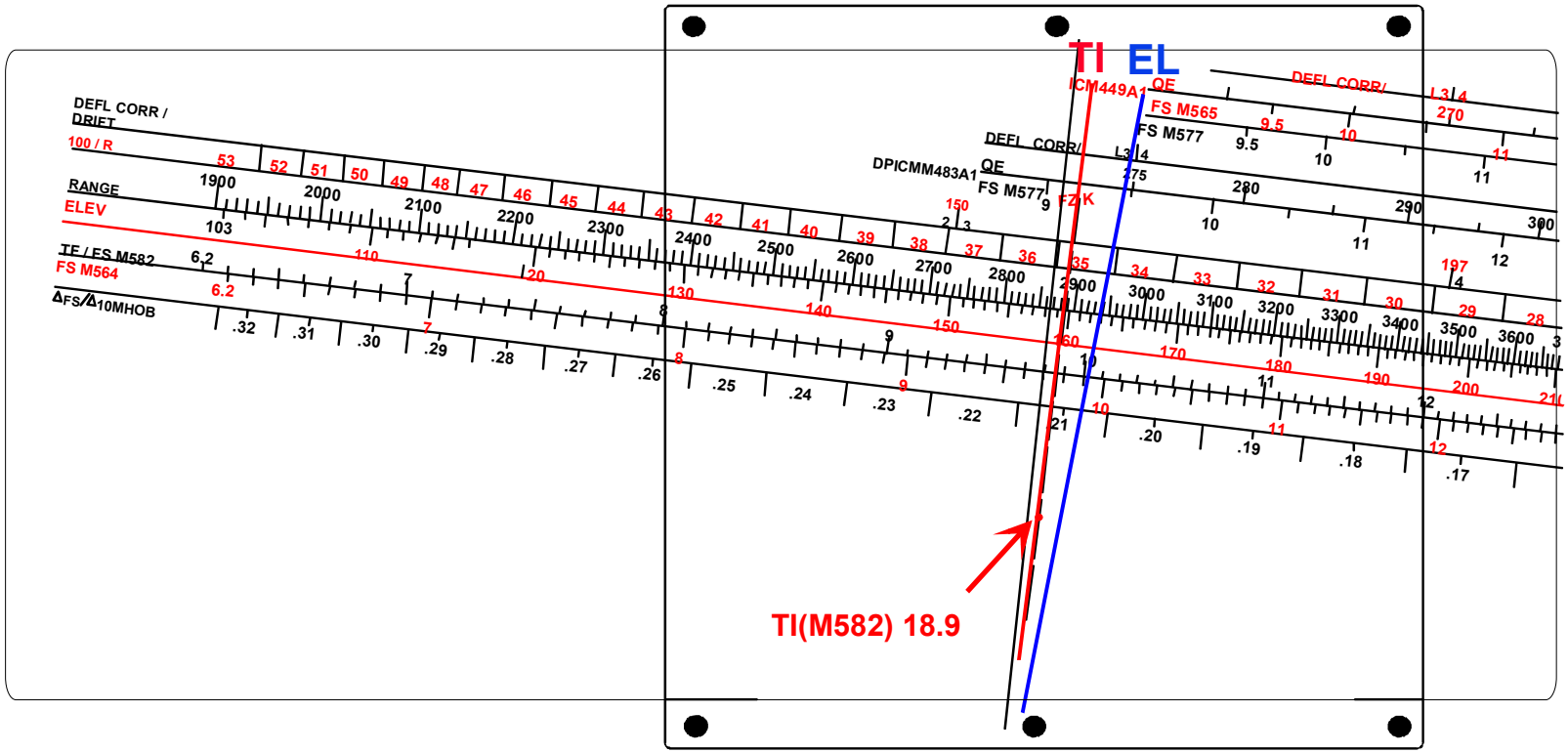
Using a straight edge, construct a blue line over the RG K line. Label this line with the letters EL in blue at the top of the line.

Applying the GFT setting



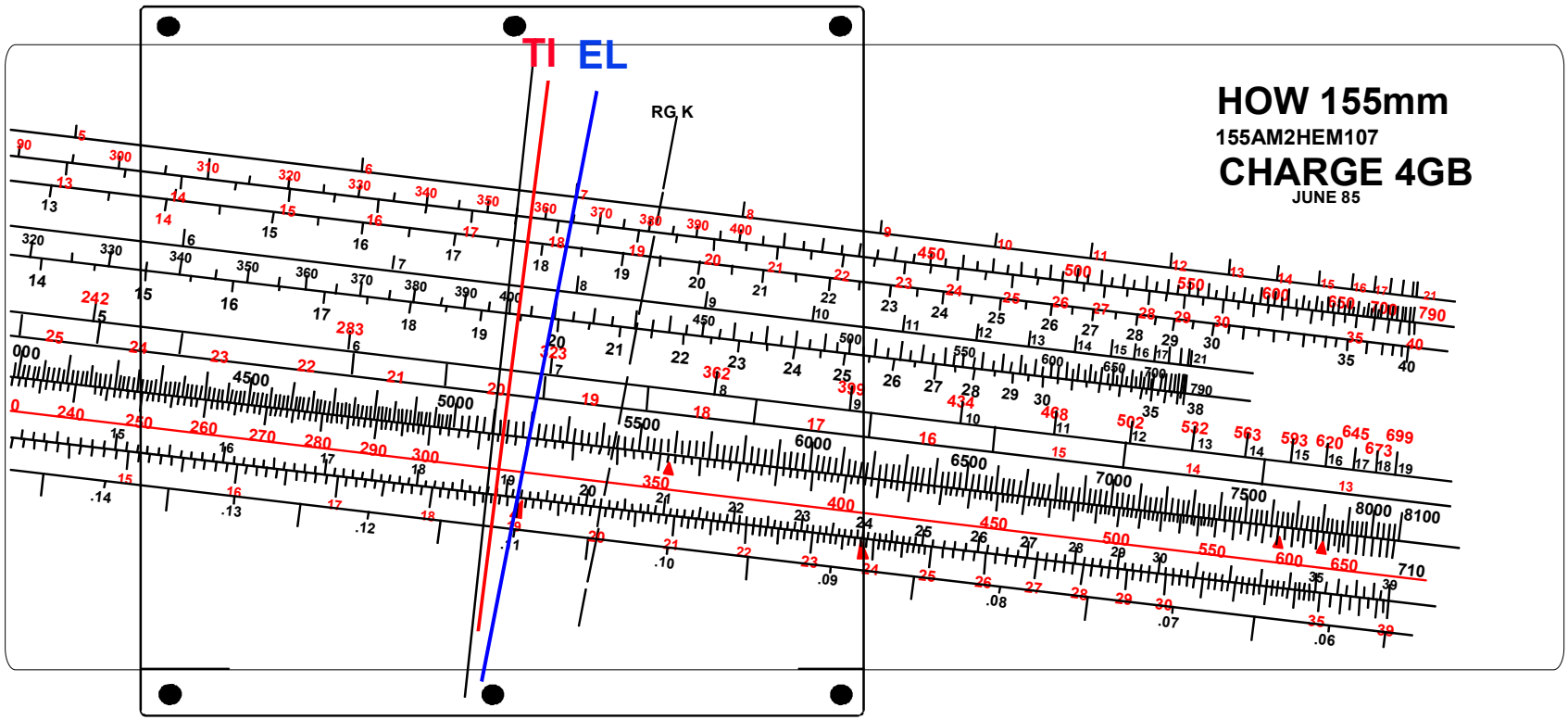
Slide the cursor to the left and place the red dot over the FZ K line.

Applying the GFT setting



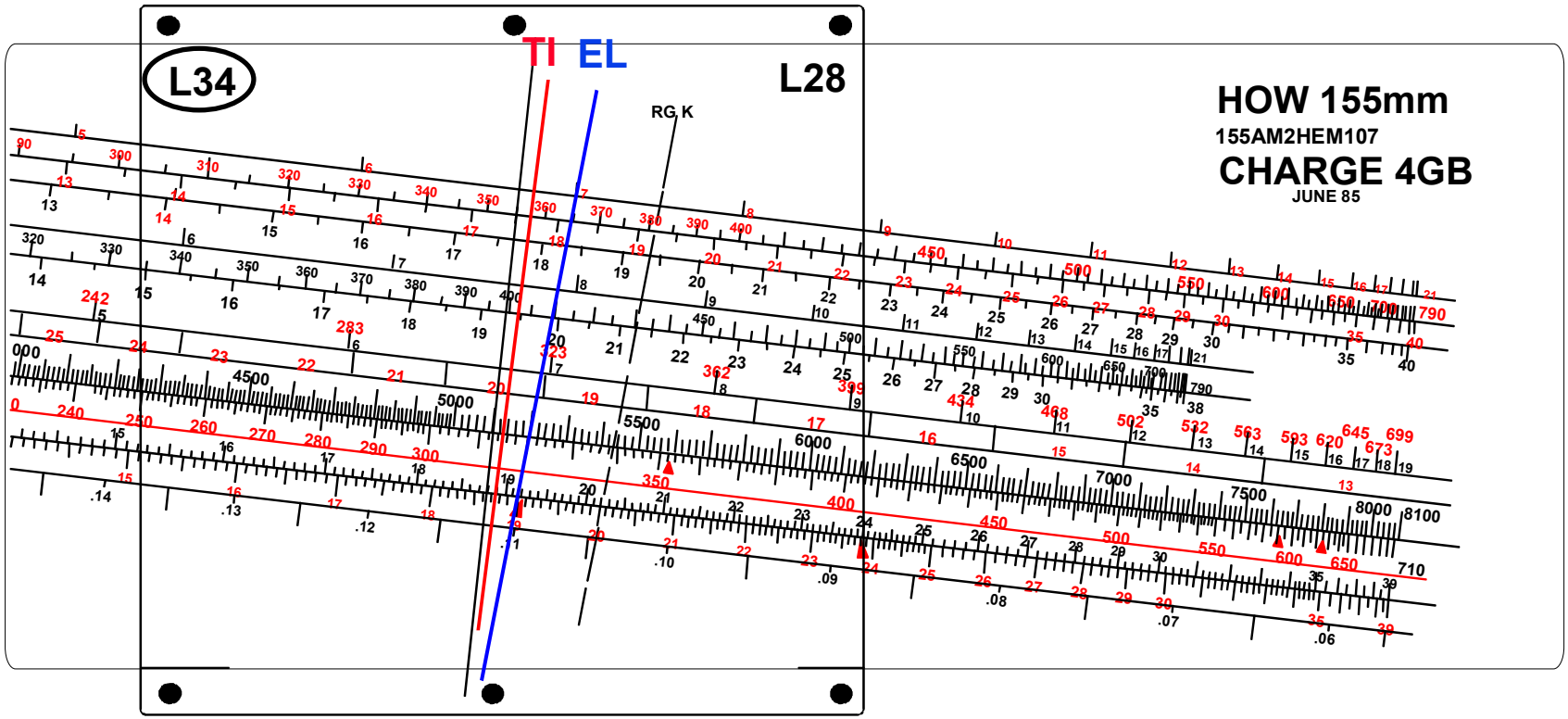
Using a straight edge, construct a red line over the FZ K line and the red dot. Label this line with the letters TI in red at the top of the line.

Applying the GFT setting



Place the MHL back over the range of 5100. The two lines you have constructed on the cursor should now read, EL 320 and TI 18.9.

Applying the GFT setting



After you have verified that your GFT setting is accurate place the Total DF Corr in the upper left corner of the cursor and circle it, then place the GFT DF Corr in the right corner, as shown.

HI ANGLE GFT

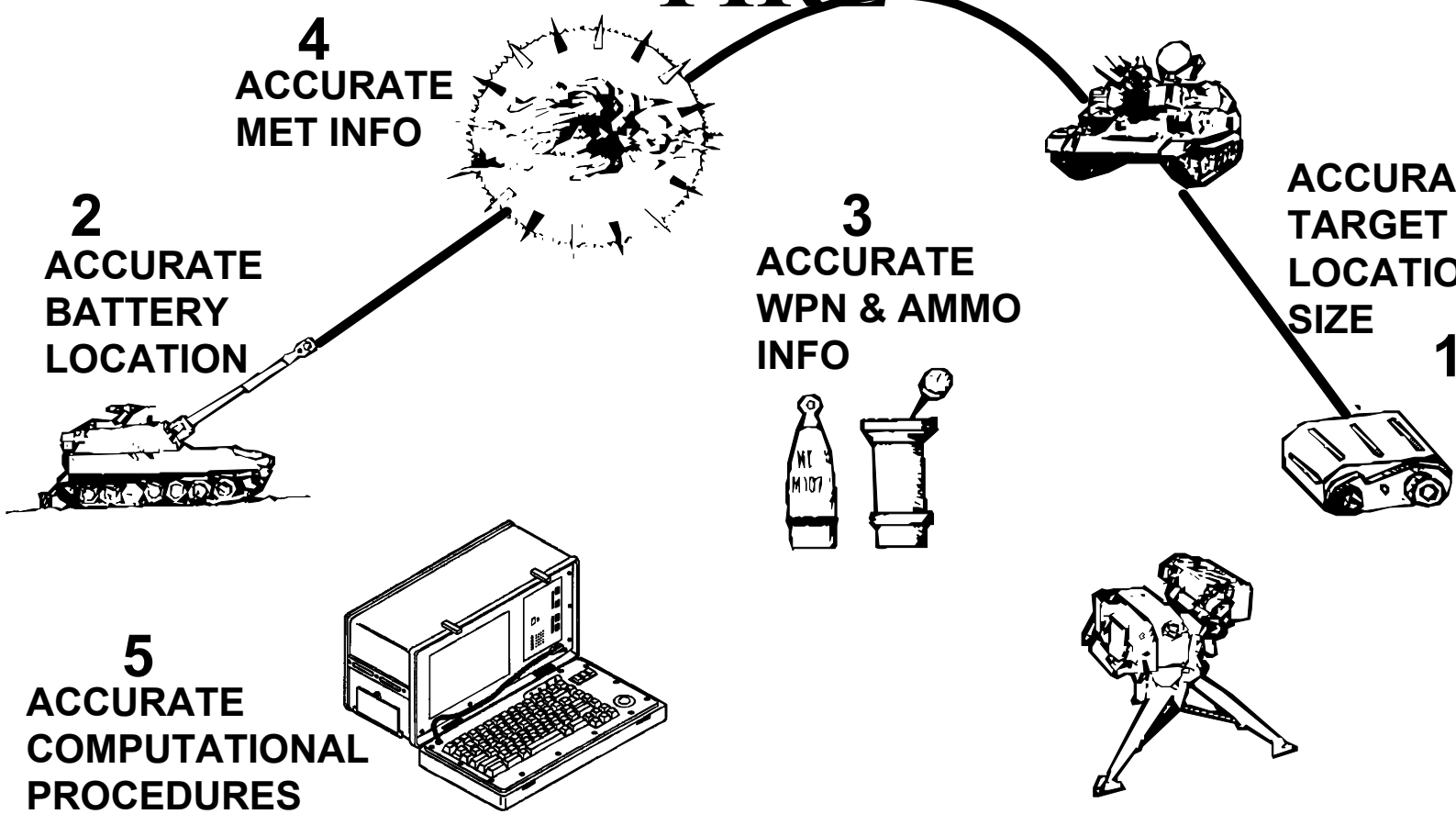
- Range Scale - VI to nearest 10m, self-selects charge
- 100/R - Read to nearest 1 mil
- EL Scale - VI to nearest 1 mil
  - Increases from right to left
  - Labeled every 10 mils
- 10 Mil Site Factor - VI to nearest 0.1 mil
  - No Hi Angle GSTs
  - Actual SI per 10 mils angle of SI
  - Increases from left to right
- Drift Scale - VI to nearest 1 mil
  - Increases from right to left
  - Extremely large
- TOF Scale - Artillery express to nearest 1 second
  - Used for VT fuze setting

ILLUMINATION GFT

- Range Scale - VI to nearest 10m
- 100/R - Read to nearest 1 mil
- ETI Scale - VI to nearest 1 mil
  - Used to det'm RNG to impact for non-functioning fuze
- HOB Scales - Listed in 50m increments
  - QE scales - VI to nearest 1 mil
    - Correspond to listed HOB
    - Heavy Black Arrows = HOB change < 50m
  - FS M565 Scales - VI to nearest 0.1 FZ Setting Increm.
    - Series of red arcs
    - Trace nearest red arc from QE to bottom of GFT
    - Must use ILLUM TFT, TBL B to convert to M577

THE KING OF BATTLE

FIVE REQUIREMENTS FOR ACCURATE PREDICTED FIRE



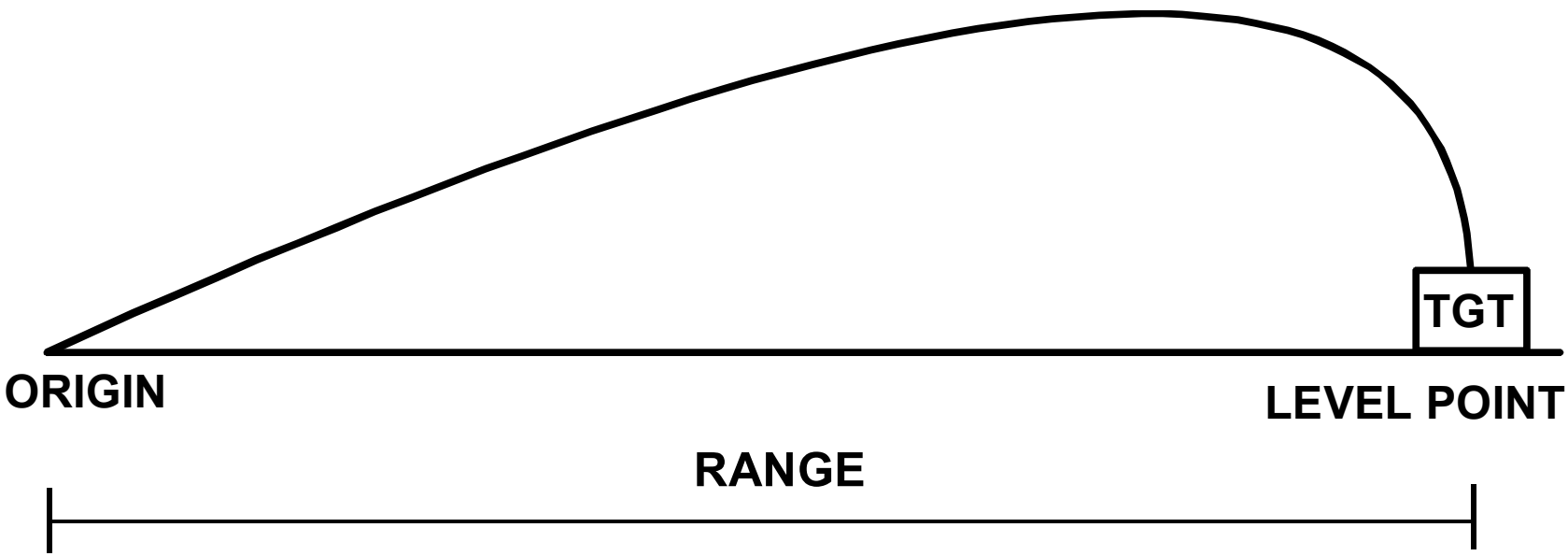
USAFAS

STANDARD CONDITIONS

POSITION

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

GUNNERY DEPARTMENT



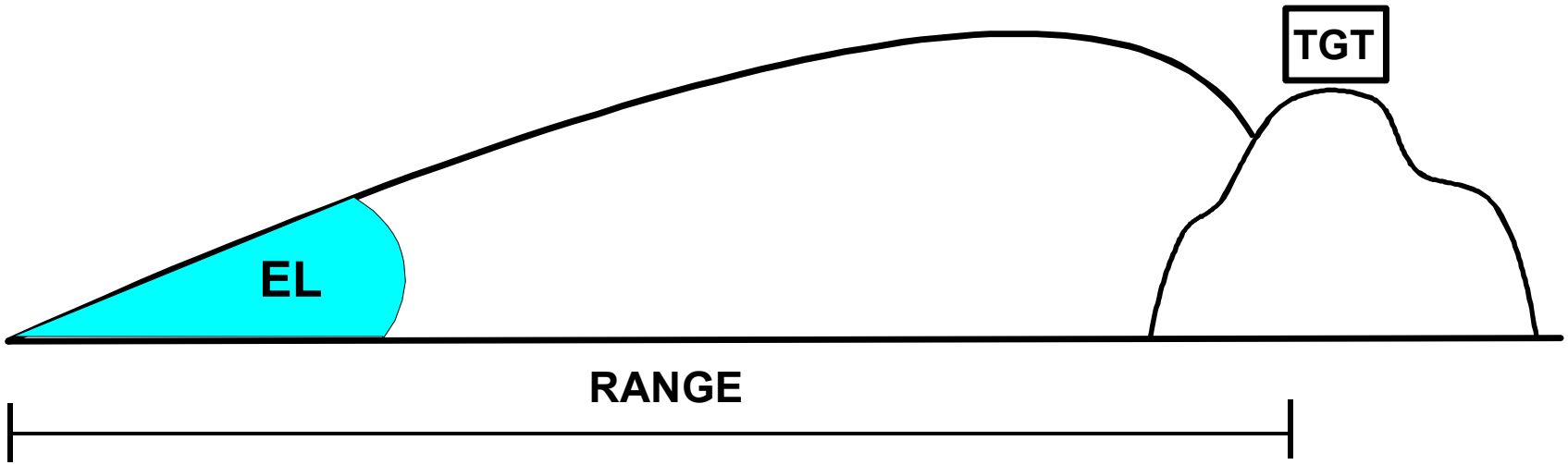
USAFAS

GUNNERY DEPARTMENT

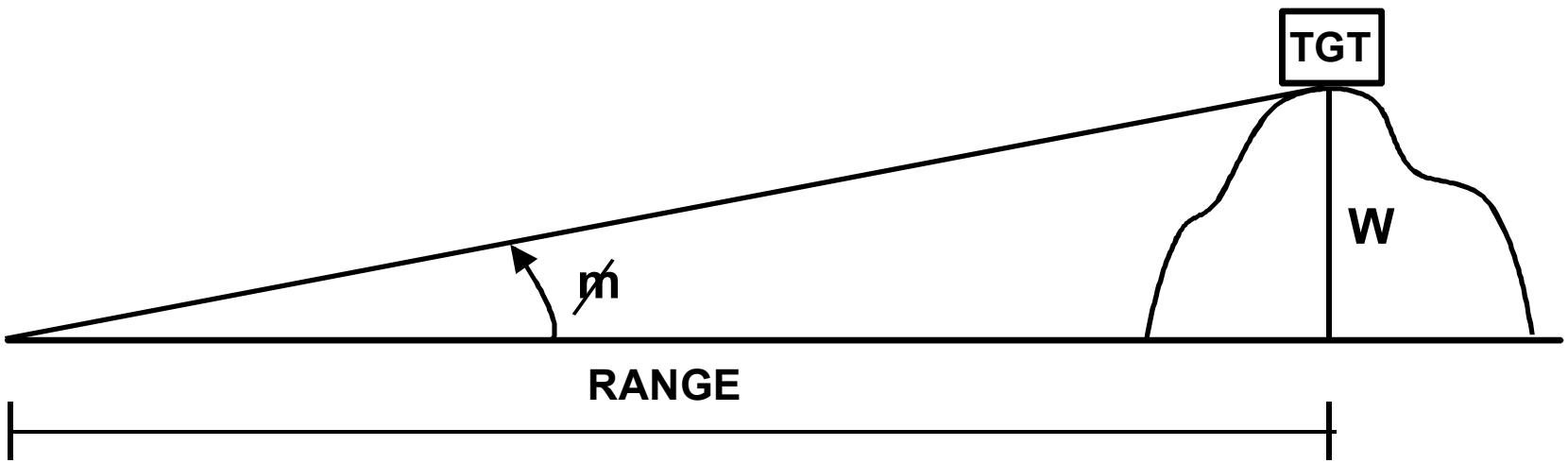
USAFAS

GUN AND TARGET NOT AT THE SAME ALTITUDE

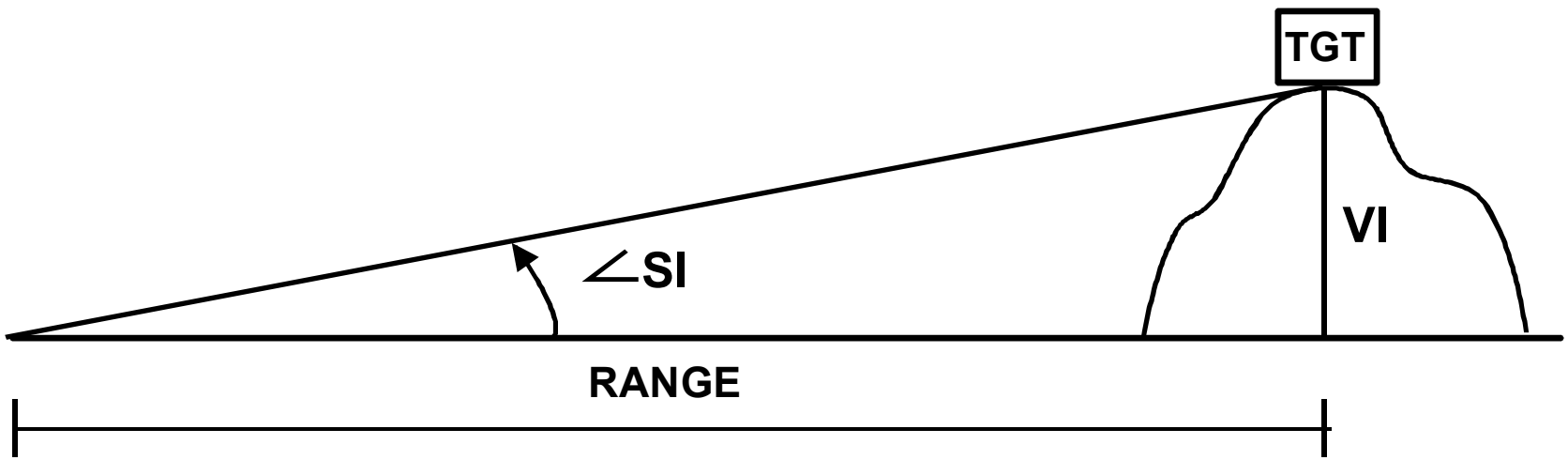
GUNNERY DEPARTMENT



USAFAS



$$W = R\ (1000s) \times m$$

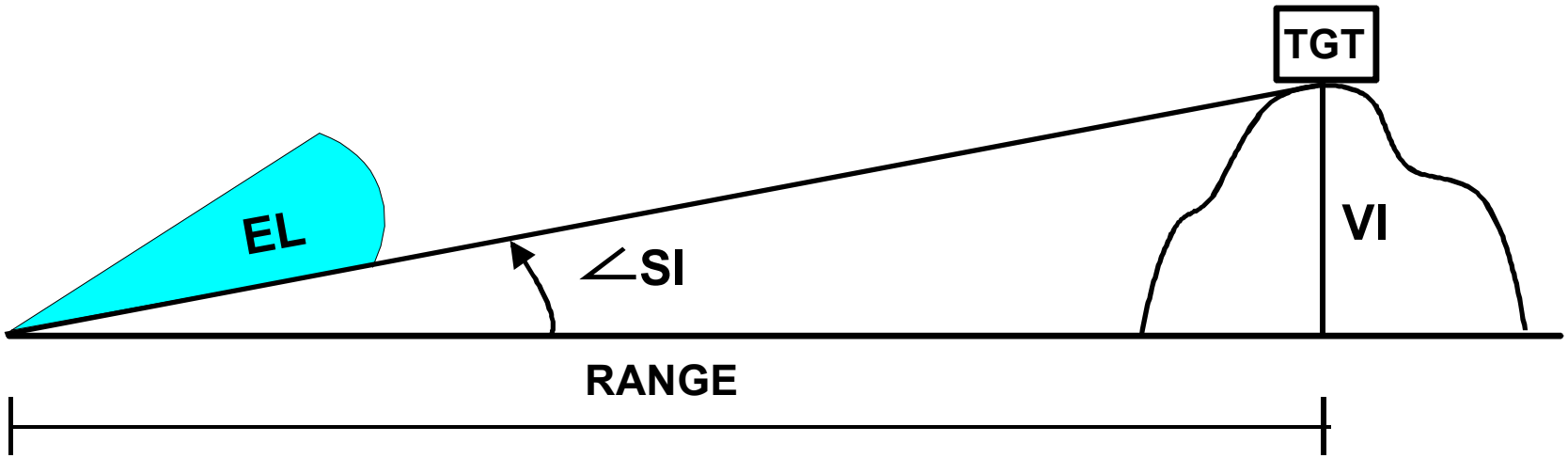


$$VI = R\ (1000s) \times \angle SI$$

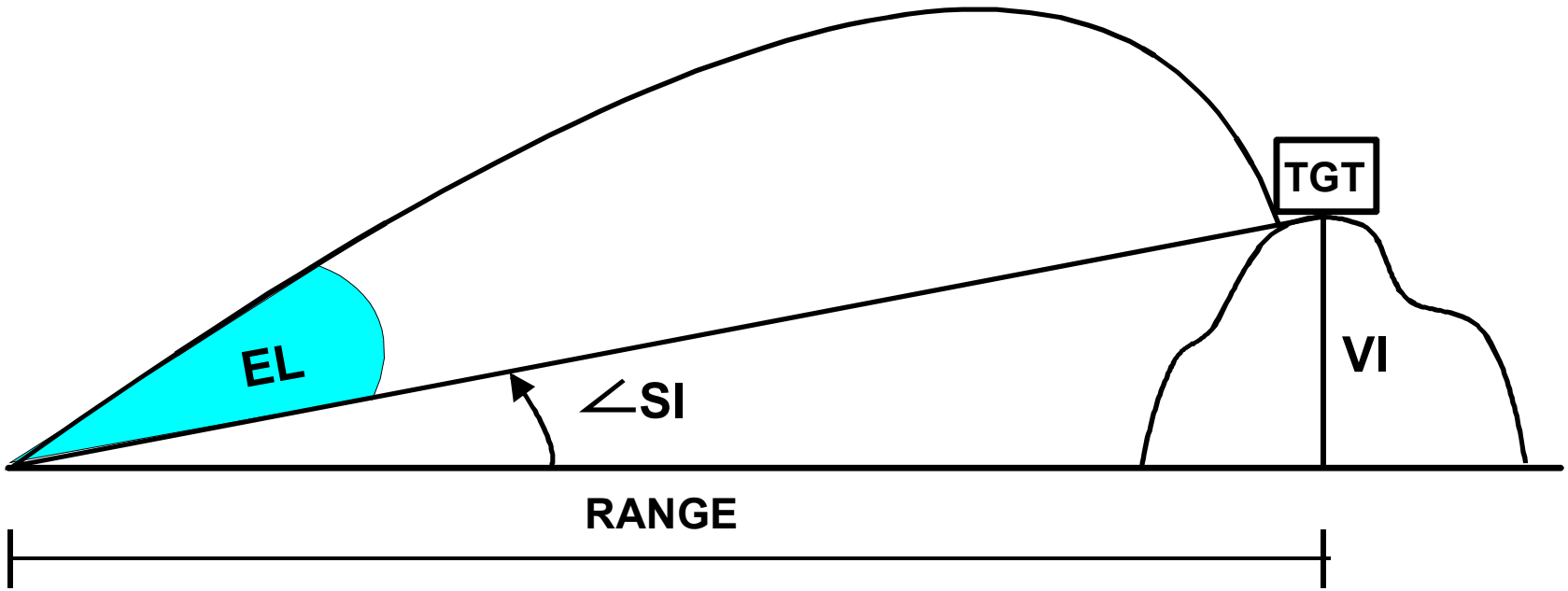
EQUATIONS

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

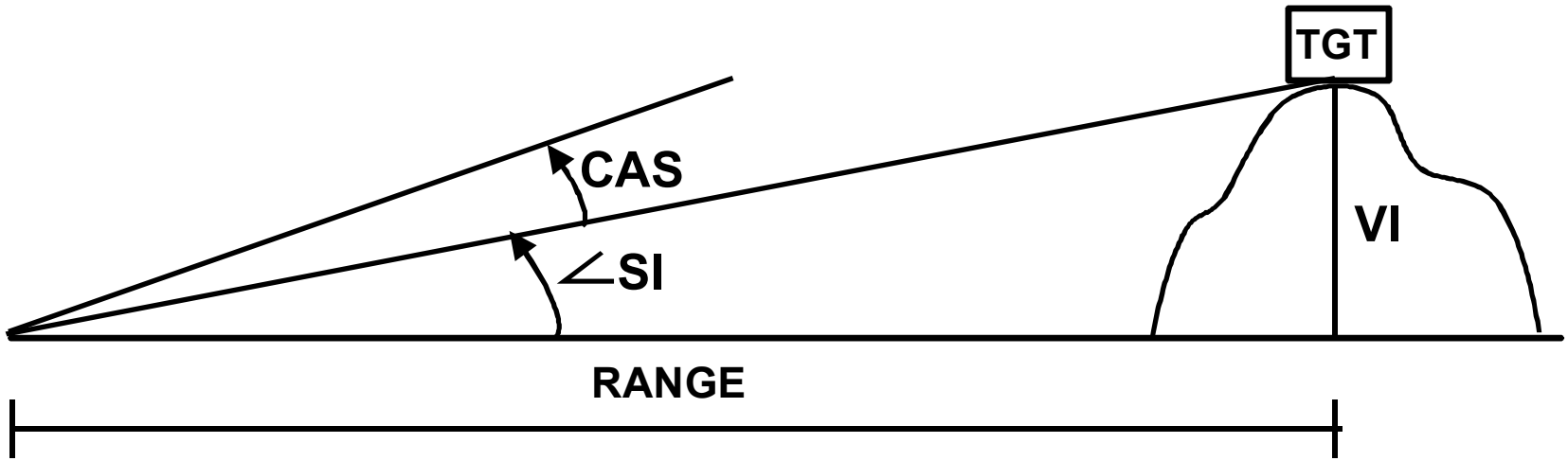
2 $\angle SI = \dfrac{VI}{RG\ (1000s)} \times 1.0186$ (+/-) NEAREST 0.1 mil


TGT
EL
∠SI
VI
RANGE

GUNNERY DEPARTMENT



USAFAS

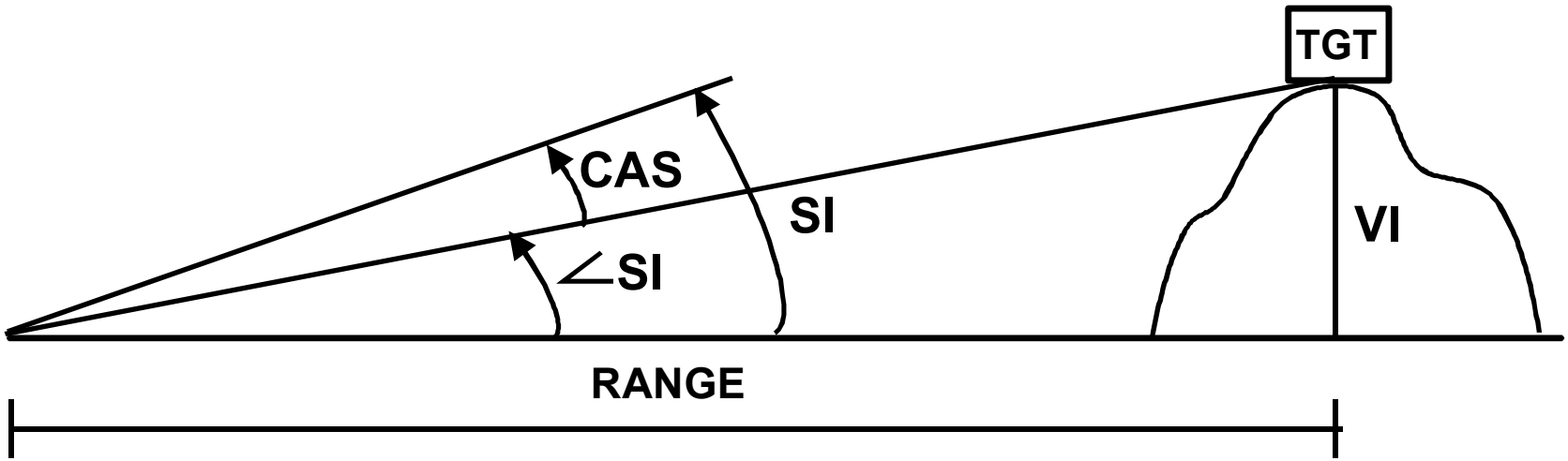

TGT
CAS
∠SI
VI
RANGE

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 = $|\angle SI| \times CSF$ (+/-) NEAREST 0.1 mil


TGT
CAS
SI
∠SI
VI
RANGE

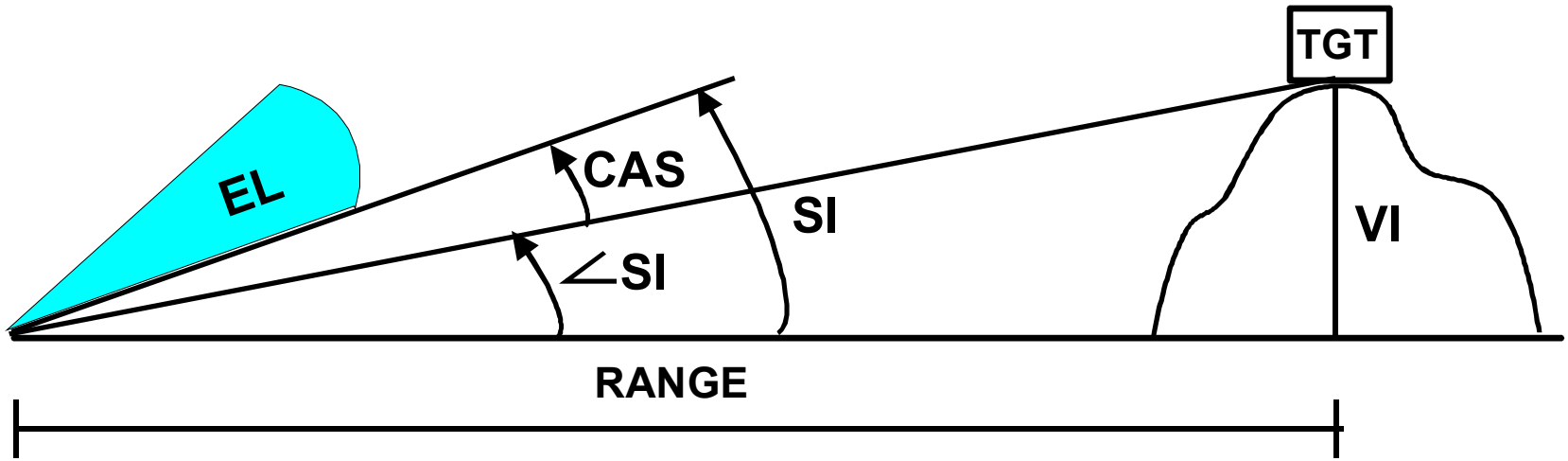
EQUATIONS

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

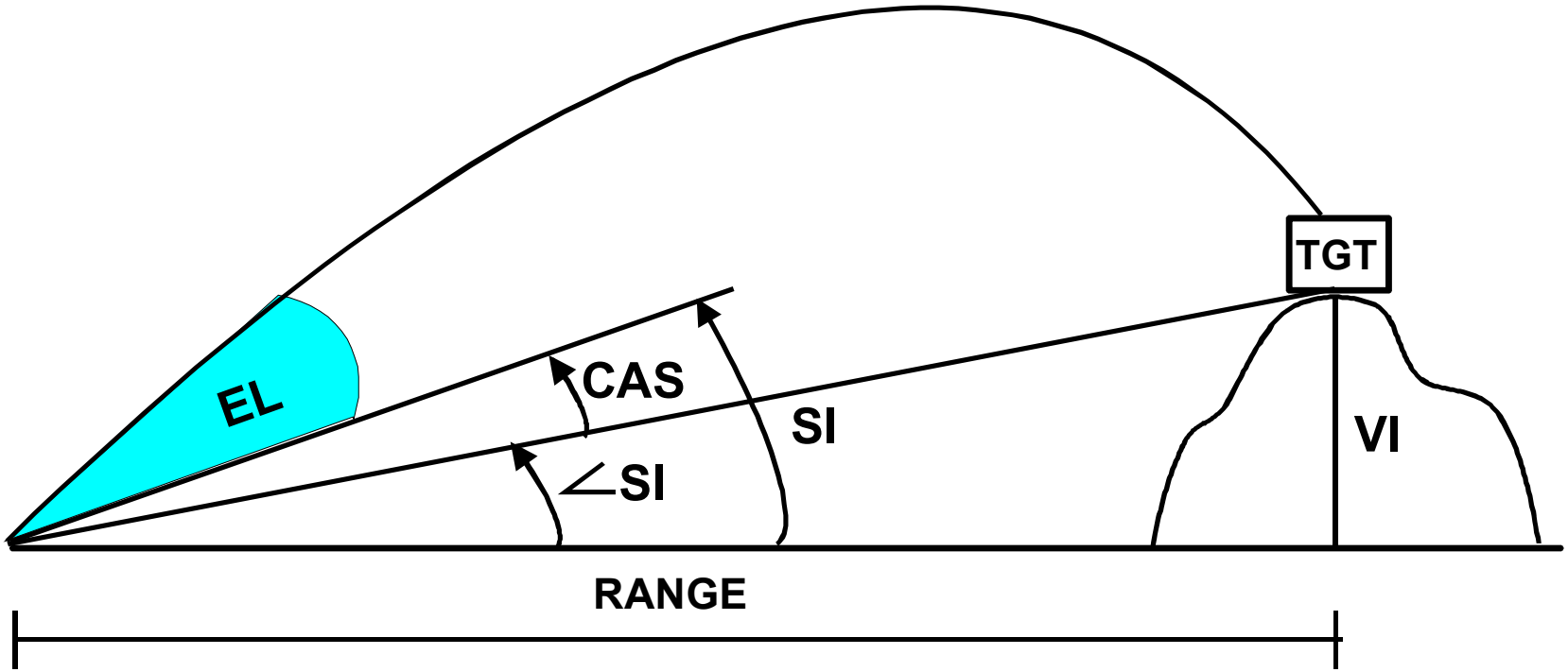
2 $\angle SI = \frac{VI}{RG\ (1000s)} \times 1.0186$ (+/-) NEAREST 0.1 mil

3 CAS = $|\angle SI| \times CSF$ (+/-) NEAREST 0.1 mil

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

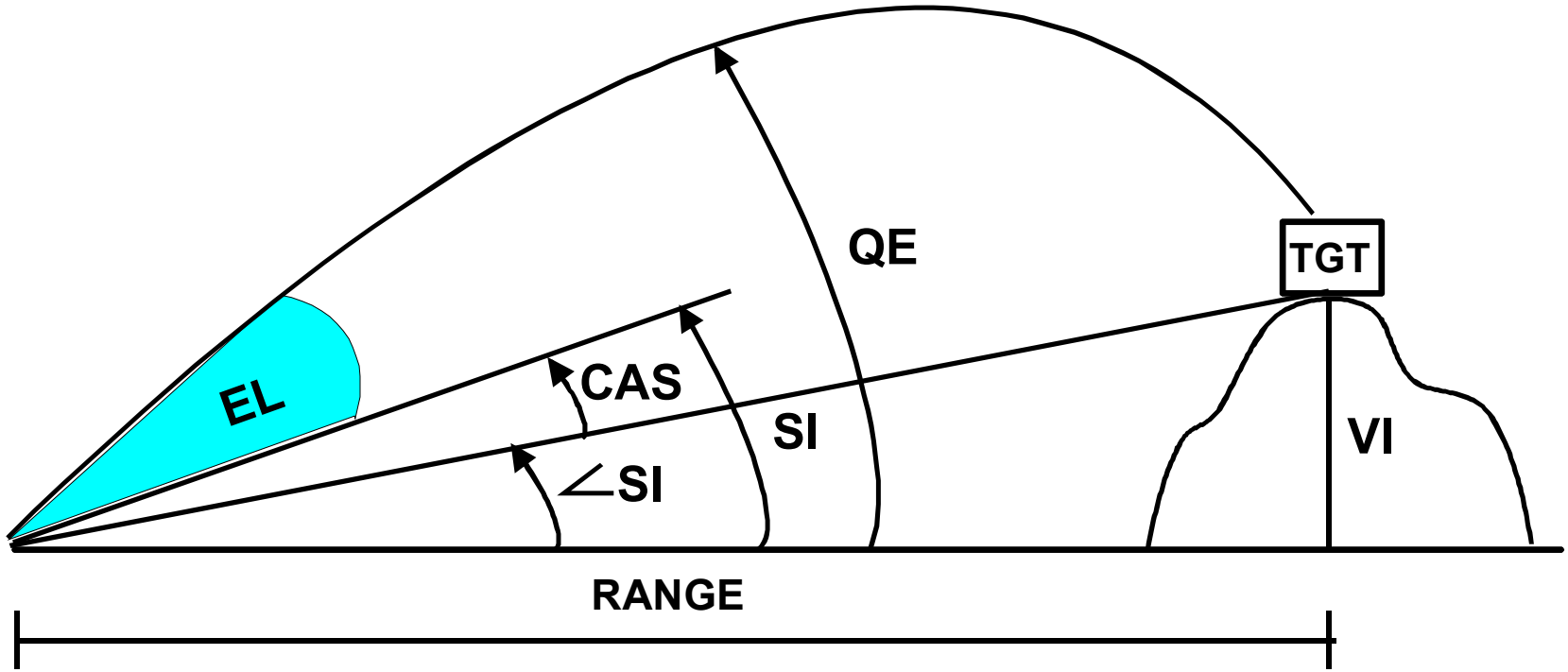

TGT
EL
CAS
SI
∠SI
VI
RANGE

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 = $|\angle SI|$ x CSF (+/-) NEAREST 0.1 mil

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

5 QE = EL + SI NEAREST 1 mil

MANUAL COMPUTATION

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

EQUATIONS

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

VI = 393 - 355 = +38

EQUATIONS

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

VI = 393 - 355 = +38

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

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

EQUATIONS

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

VI = 393 - 355 = +38

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

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

3 CAS = $|\angle SI| \times CSF$ (+/-) NEAREST 0.1 mil

COMP SI FACTOR INTERPOLATION

TABLE G, TFT

500	150	4500	+0.075
		4650	?
		5000	+0.103

X +0.028

COMP SI FACTOR INTERPOLATION

TABLE G, TFT

500	150	4500	+0.075
		4650	?
		5000	+0.103

X

+0.028

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

COMP SI FACTOR INTERPOLATION

TABLE G, TFT

	4500	+0.075	
150			X
500	4650	?	+0.028
	5000	+0.103	

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

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

USAFAS

COMP SI FACTOR INTERPOLATION

TABLE G, TFT

500	150	4500	+0.075
		4650	?
		5000	+0.103

X

+0.028

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

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

$500X = +4.2$

COMP SI FACTOR INTERPOLATION

TABLE G, TFT

		4500	+0.075
500	150		X=+0.008
		4650	?
		5000	+0.103

+0.028

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

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

$$500X = +4.2$$

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

USAFAS

COMP SI FACTOR INTERPOLATION

TABLE G, TFT

500	150	4500	+0.075
		4650	?
		5000	+0.103

X=+0.008

+0.028

$$\frac{C\ 150}{D\ 500} = \frac{X}{+0.028}\ \begin{matrix} C \\ D \end{matrix}$$

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

$$500X = +4.2$$

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

USE GST TO PERFORM INTERPOLATION

COMP SI FACTOR INTERPOLATION

TABLE G, TFT

500	150	4500	+0.075
		4650	?
		5000	+0.103

X=+0.008

+0.028

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

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

$$500X = +4.2$$

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

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

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 = $|\angle SI| \times CSF$ (+/-) NEAREST 0.1 mil

CAS = 8.3 x (+0.083) = +0.69 ≈ +0.7

EQUATIONS

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

VI = 393 - 355 = +38

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

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

3 CAS = $|\angle SI| \times CSF$ (+/-) 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

EQUATIONS

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

VI = 393 - 355 = +38

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

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

3 CAS = $|\angle SI| \times CSF$ (+/-) NEAREST 0.1 MIL

$CAS = 8.3 \times (+0.083) = +0.69 \approx +0.7$

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

$SI = (+8.3) + (+0.7) = +9.0 \approx +9$

5 QE = EL + SI NEAREST 1 mil

QE = 278 + (+9) = 287

GST

GUNNERY DEPARTMENT

"MAGIC-T"

VI (D) (MHL)

÷

RG (C) (MHL)

∠SI (D)

M

X

USAFAS

RULES FOR READING THE GST

- EXTRACT THREE NUMBERS
- PLACE THE DECIMAL POINT
  - MAKE AS LARGE AS POSSIBLE WITHOUT EXCEEDING VI
  - ROUGH MATH SI = VI / RG (1000s)
- EXPRESS TO THE APPROPRIATE ACCURACY

SI, VA	:	1 mil
Angle of 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		

<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		

<SI PEs (GST)

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

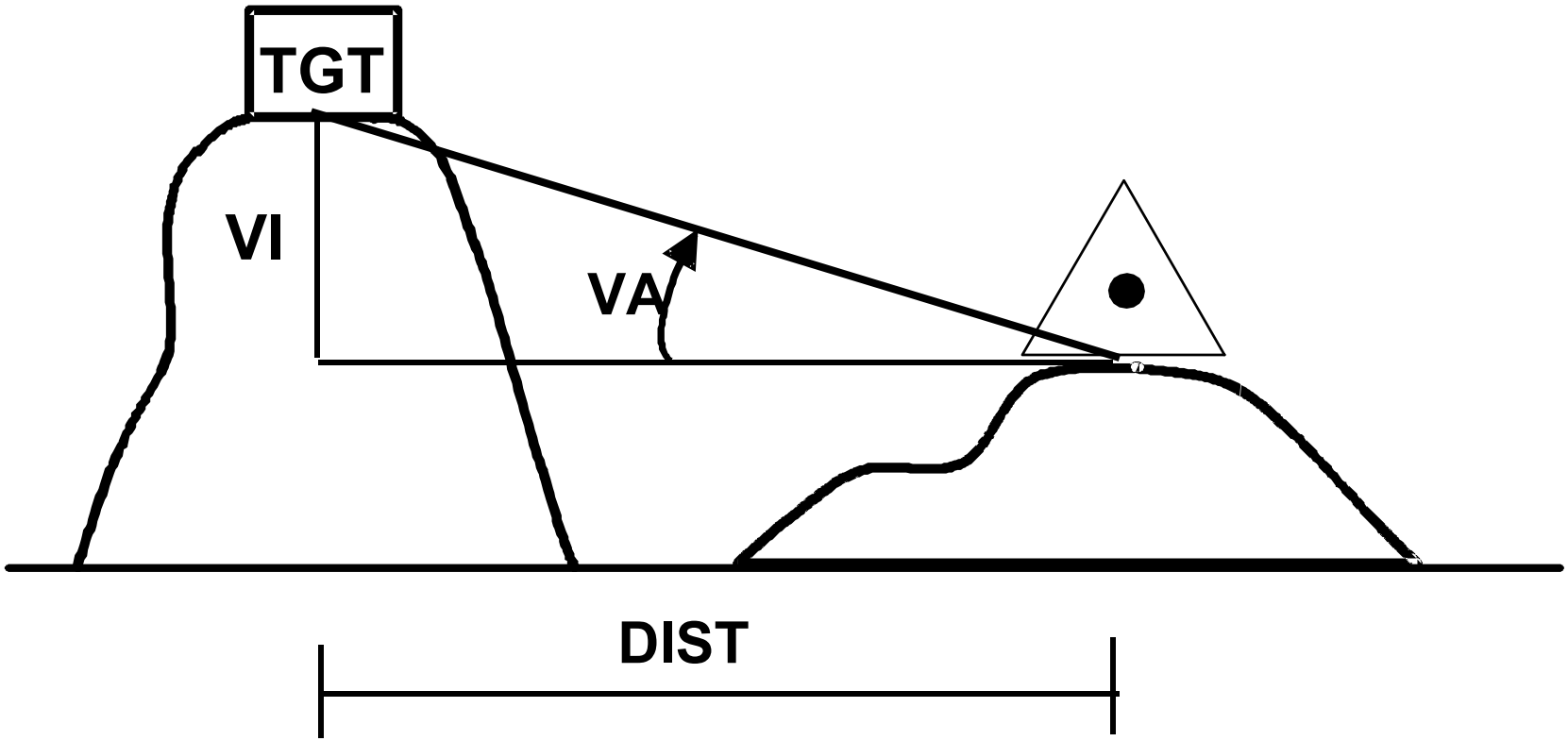
RG	ALT	VI	∠SI
5170	425	+55	+10.8
3910	363	-7	-1.8
4150	372		

<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

VERTICAL ANGLE (VA)



VI = DIST (1000s) x VA

"MAGIC-T"

VI (D) (MHL)

÷

RG (C) (MHL)

DIST (C) (MHL)

∠SI (D) M

VA (D) M

×

USAFAS

VA PEs (GST)

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

DIS	ALT	VI	VA
4360	375		
5610	418		
2430			+17

USAFAS

VA PEs (GST)

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

DIS	ALT	VI	VA
4360	375	-37	-9
5610	418		
2430			+17

USAFAS

VA PEs (GST)

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

DIS	ALT	VI	VA
4360	375	-37	-9
5610	418	+6	+1
2430			+17

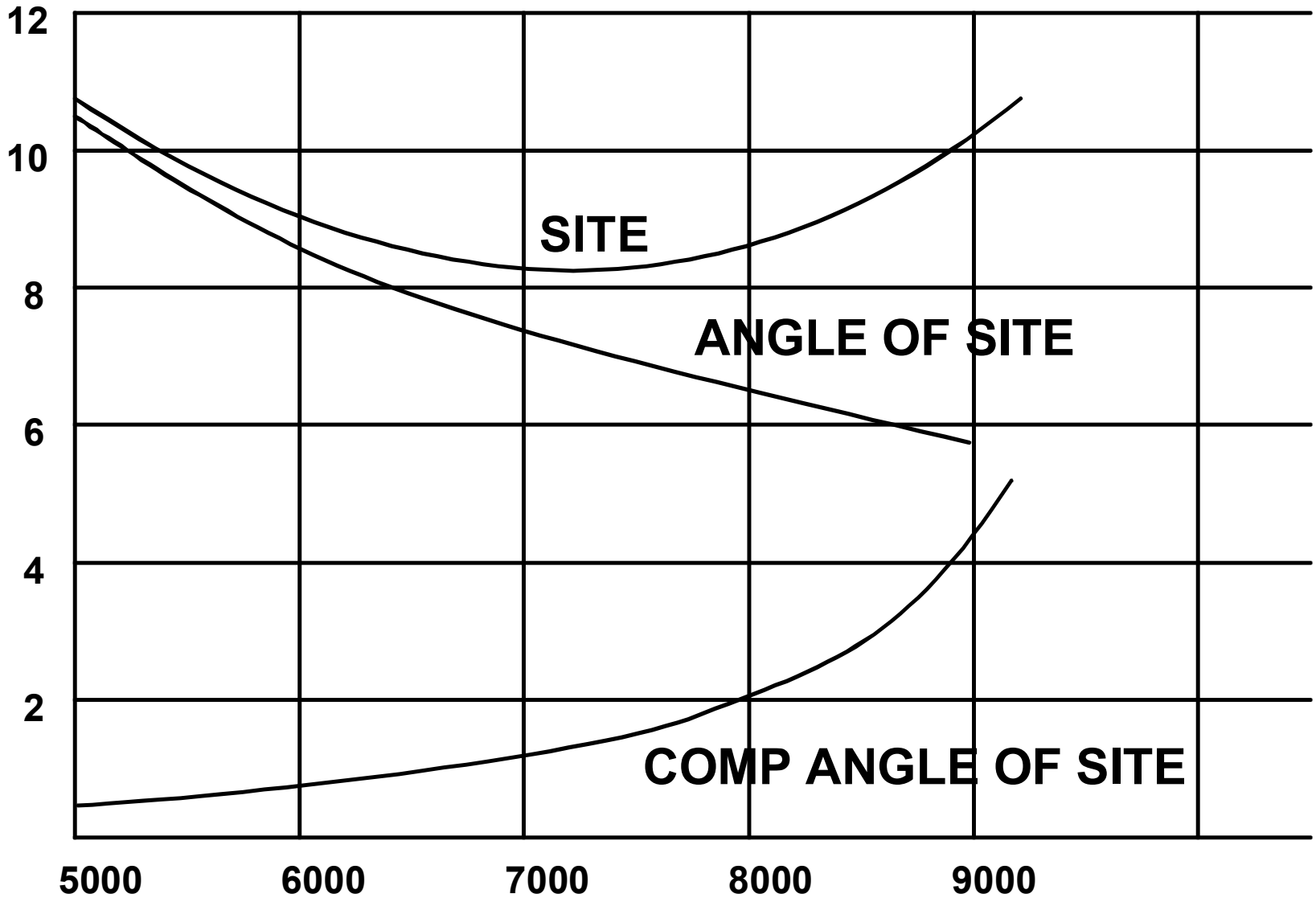
USAFAS

VA PEs (GST)

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

DIS	ALT	VI	VA
4360	375	-37	-9
5610	418	+6	+1
2430	452	+40	+17

SITE (SI)


12
10
8
6
4
2
SITE
ANGLE OF SITE
COMP ANGLE OF SITE
5000
6000
7000
8000
9000

"MAGIC-T"

VI (D) (MHL)

÷

RG (C) (MHL)	∠SI (D) M
DIST (C) (MHL)	VA (D) M
RG (SI-RG) (MHL)	SI (D) 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	

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	

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	

USAFAS

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