Biometric Data Generation Guide

Fort Moore Blackhawk Trail Exercise - Physiological Monitoring

OVERVIEW

This guide provides specific instructions for generating realistic biometric data for the Enhanced Individual Soldier Report System, focusing on body temperature (Column O) and heart rate (Column U - to be added) during the Fort Moore training exercise.

CSV STRUCTURE MODIFICATIONS

Current Structure (20 columns A-T):

A: callsign K: shootercallsign

B: squad L: weapon

C: ip M: munition

D: playerid N: hitzone

E: casualtystate O: temp (body temperature)

F: processedtimegmt P: rssi

G: latitude Q: mcs

H: longitude R: nexthop

I: battery S: stepcount

J: posture T: falldetected

Required Addition:

• Column U: heartrate (Beats per minute - BPM)

BODY TEMPERATURE SIMULATION (Column 0)

Baseline Temperature Ranges

Normal Resting: 97.8°F - 99.1°F (36.6°C - 37.3°C)

Light Activity: 98.2°F - 99.8°F (36.8°C - 37.7°C)

Moderate Exertion: 99.0°F - 101.2°F (37.2°C - 38.4°C) High Stress/Combat: 99.5°F - 102.0°F (37.5°C - 38.9°C)

Temperature Progression by Exercise Phase

Phase 1: Preparation & Movement (0700-0830)



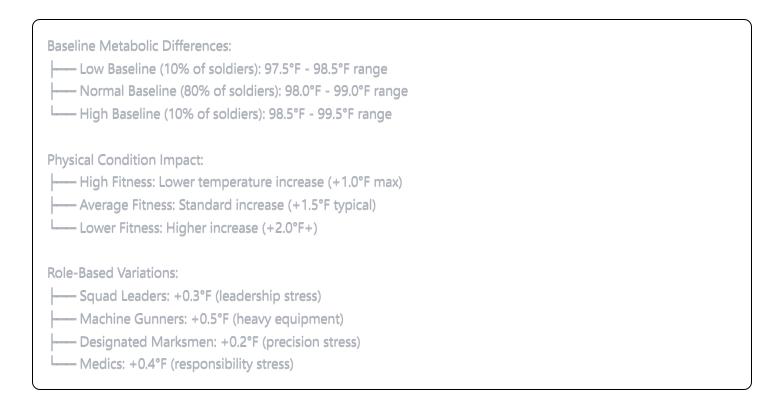
Phase 2: Combat Engagement (0830-0915)

0830-0835 (Initial Contact):
0835-0900 (Sustained Combat):
0900-0915 (Final Maneuvers): Continued Elevation: 99.5°F - 101.8°F Fatigue Factor: Slightly decreased from peak Tactical Movement: Maintained high levels

Phase 3: Consolidation (0915-0930)

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	Post-Combat Recovery:
	—— Gradual Decrease: -0.2°F per 5-minute interval
	Recovery Range: 99.0°F - 100.5°F
	Return Toward Baseline: Still elevated from exertion
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Individual Soldier Variations



Medical Alert Triggers (Temperature)

Heat Stress Warnings:	
Hypothermia Warnings:	
Expected Alert Rate:	

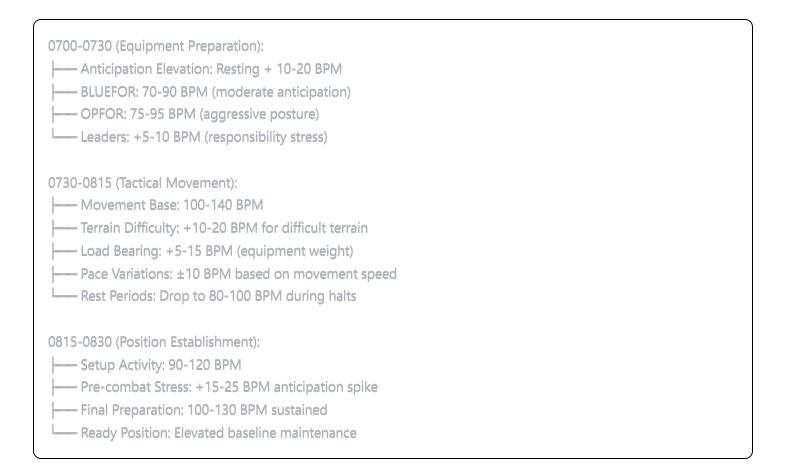
HEART RATE SIMULATION (Column U - New)

Baseline Heart Rate Ranges by Age/Fitness

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	Highly Fit Soldiers (60% of unit):	
	Average Fit Soldiers (35% of unit):	
	Lower Fitness Soldiers (5% of unit):	

Heart Rate Progression by Exercise Phase

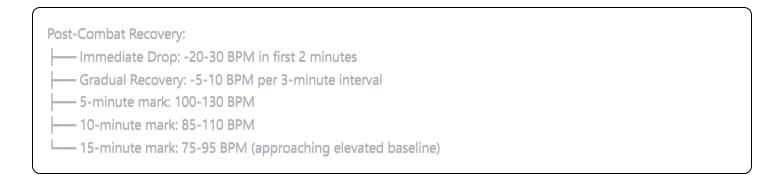
Phase 1: Preparation & Movement (0700-0830)



Phase 2: Combat Engagement (0830-0915)

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0830-0835 (Initial Contact):
—— Contact Shock: Immediate spike of +40-60 BPM
---- BLUEFOR (Initiating): 150-180 BPM
—— OPFOR (Receiving): 160-190 BPM (higher surprise factor)
Peak Response: 2-3 soldiers may exceed 190 BPM
0835-0900 (Sustained Combat):
  --- Combat Sustained: 140-175 BPM
  — Fire and Movement: 160-185 BPM during bounds
 — Cover Position: 130-160 BPM (slightly lower in cover)
  — Suppressive Fire: 150-180 BPM (weapon operation)
Fatigue Onset: Gradual 5-10 BPM decrease after 15 min
0900-0915 (Final Maneuvers):
—— Continued Combat: 135-170 BPM
  — Fatigue Factor: -10-15 BPM from peak levels
—— Tactical Movement: 145-175 BPM during movement
 — Adrenaline Maintenance: Sustained high levels
```

Phase 3: Consolidation (0915-0930)



Casualty Impact on Heart Rate



Medical Alert Triggers (Heart Rate)



BIOMETRIC DATA CORRELATION

Temperature-Heart Rate Relationships

Normal Correlation: Every 1°F temperature increase = +8-12 BPM Combat stress breaks normal correlation	
Stress Response Pattern: —— Heart rate spikes first (0-30 seconds) —— Temperature follows (2-5 minutes delayed) —— Heart rate recovers faster (5-10 minutes) —— Temperature maintains elevation longer (15-20 minutes)	
Environmental Factors:	

Activity-Biometric Correlation

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Posture Impact:	
—— Standing Movement: Highest HR/temp	
—— Prone Position: Moderate HR, lower temp	
— Kneeling: Intermediate levels	
L "Down" (casualty): Varies by injury type	
Step Count Correlation:	
—— High step count (>200/15min): +10-20 BPM, +0.5°F	
— Moderate activity (50-200 steps): Normal correlation	
Low activity (<50 steps): Baseline levels	
L—— Combat movement: Disconnected correlation due to stress	
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DATA GENERATION ALGORITHMS

Temperature Generation Logic

python		·

```
def generate_temperature(soldier, timestamp, phase, activity_level, baseline_temp):
  # Base calculation
  temp = baseline_temp
  # Phase-based adjustment
  if phase == "movement":
    temp += uniform(0.5, 2.0)
  elif phase == "combat":
    temp += uniform(1.5, 2.5)
  elif phase == "consolidation":
    temp += uniform(0.2, 1.0)
  # Individual factors
  temp += soldier.metabolic_factor # ±0.3°F
  temp += soldier.fitness_factor # ±0.5°F
  temp += soldier.role_factor # ±0.3°F
  # Stress/activity spike
  if activity_spike:
    temp += uniform(0.3, 0.8)
  # Temporal smoothing (prevent rapid changes)
  temp = smooth_transition(previous_temp, temp, max_change=0.2)
  return round(temp, 1)
```

Heart Rate Generation Logic

python

```
def generate_heartrate(soldier, timestamp, phase, activity, stress_level):
  # Base heart rate from fitness profile
  base_hr = soldier.resting_hr
  # Activity-based calculation
  if activity == "resting":
    target_hr = base_hr + uniform(5, 15)
  elif activity == "light_movement":
    target_hr = base_hr + uniform(20, 40)
  elif activity == "tactical_movement":
    target_hr = base_hr + uniform(40, 80)
  elif activity == "combat":
    target_hr = base_hr + uniform(80, 125)
  # Stress multiplier
  if stress_level == "high":
    target_hr *= uniform(1.2, 1.4)
  elif stress_level == "extreme":
    target_hr *= uniform(1.4, 1.6)
  # Physiological limits
  max_hr = 220 - soldier.age
  target_hr = min(target_hr, max_hr)
  # Temporal smoothing
  hr = smooth_transition(previous_hr, target_hr, max_change=15)
  return round(hr)
```

Data Quality and Realism

Sampling Rate:
— Normal Operations: 30-second intervals
Combat Phase: 15-second intervals
Medical Events: 5-second intervals
Missing Data: <1% realistic sensor failures
Physiological Limits:
—— Temperature: 95.0°F - 106.0°F absolute bounds
—— Heart Rate: 30-250 BPM absolute bounds
Rate of Change: Realistic physiological transitions
Correlation Checks: Maintain realistic temp/HR relationships
Individual Consistency:
Each soldier maintains characteristic baseline
—— Fitness level affects all calculations
— Medical conditions modify response patterns
Role-based stress factors remain consistent
IMPLEMENTATION CHECKLIST
Pre-Generation Setup
Define 60 soldier profiles with baseline biometrics
Assign fitness levels and individual variation factors
Establish role-based stress modifiers
Create timeline with phase transitions
Generation Process
☐ Initialize baseline temperatures and heart rates

Quality Assurance

- Verify medical alert trigger rates (5-8% of soldiers)Confirm realistic biometric progressions
- Validate temperature-heart rate correlations
- Test casualty impact scenarios

■ Apply phase-specific modifications

■ Add individual and role-based variations

Implement temporal smoothing algorithmsValidate physiological limits and correlations

■ Ensure data supports Enhanced Individual Soldier Report System requirements		
This biometric data generation guide ensures physiologically accurate, tactically relevant data the supports the Enhanced Individual Soldier Report System's primary medical monitoring objectives while maintaining training scenario realism.		