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Analysis of Air Land Combat Tactics
using JANUS(T) System

by

Park, Hun Keun

March, 1990

Thesis Advisor: Samuel H. Parry

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The comparison of fighting tactics in a high-resolution model from the JANUS(T) system is the primary purpose for this thesis. The scenario is fought between the South Korean Army Battalion Task force (called Blue) against a North Korean Mechanized Battlion (Red). Two courses of action for defense are analyzed in order to determine whether a static or dynamic tactic is better for the Blue force in a sector during the first thirty minutes of an invasion into South Korea. Attrition rates, firepower scores, and the number of survivors are needed to compute the force ratio, which is primary measure of effectiveness. At the end of the battle, the static defense tactic has the largest force ratio and is thus the better tactic.

The data that are generated from the JANUS(T) model form the fundamental basis for the comparison of methods that calculate force ratios. The data from the Janus(T) model are important because they are generated from a database of the actual terrain of Korea and of the characteristics of hostile and allied weapons. The JANUS(T) output shows casualties of the four weapon types for both forces during a simulated time period. The sequence of weapon casualties form a time history or time series. Maximum likelihood estimates (MLE) for time series of the casualties are derived by the Combat Analysis Model (COMAN). The attrition rate is then used by the potential-antipotential (PAP) system and the Lanchester simulation.

A recent enhancement to the JANUS(T) system includes the capability for the user to structure a combat scenario and allow it to run multiple times in an automatic mode, where the randomness of each replication is a result of Monte Carlo processes on random variables (i.e., detections, hits and kills) which will give different results with each simulation. Assuming independence, the COMAN MLE is used on the combined time-series of ten replications. Embedded into the COMAN MLE attrition rates are the other battlefield factors. The attrition rates include much more than the probability of kill (PK) values. The attrition rate that was produced is a composite of the interaction of every system, not just the firepower. The Eigenvalue matrix in the thesis encompasses the relevant databases inherent to the JANUS(T) system. Consequently, the value vector is as good as the portrayal of battle which is produced by the JANUS(T) system.

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Analysis of Air Land Combat Tactics using JANUS(T) System

by

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Captain, Republic Of Korean Army
B.S., Korea Military Academy, 1984

Submitted in partial fulfillment of the
requirements for the degree of

MASTER OF SCIENCE IN OPERATIONS RESEARCH

from the

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ABSTRACT

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I. INTRODUCTION

A. BACKGROUND

The Korean peninsula is a very complex area. Politically, it is divided into two small countries called South Korea and North Korea. Geographically, there are many small streams, mountains, hills, and reservoirs. The area of South Korea is very limited since there are seas on three sides. Tactically, it is relatively easy for the enemy to focus its attack. The duration of the first battle is the most important component necessary for South Korea to prevent a North Korean victory. North Korea will concentrate its total force at the start of the battle. They have a strong military force and are well prepared to engage in war. Also, they understand the importance of a short-term battle that will not give South Korea the opportunity to obtain allied reinforcements. In other words, North Korea has an advantage if it finishes the battle quickly.

South Korea has invested a significant amount of money to defend against the threat posed by North Korea and to maintain a peaceful atmosphere on the Korean peninsula. Also, they have developed defensive tactics in response to enemy attack and have updated their weapon systems to maximize force effectiveness.

Because South Korea had no room for withdrawal and no military force to overwhelm the enemy, its basic concept of defense is static rather than dynamic or offensive. The static defense consists of placements that include minefields and fixed positions, as well as troops whose priority is to impede or impair the advancing enemy. A new critical concept of defense is needed which is supported by the economic development and advanced technology of South Korea. A new concept of defense is dynamic and counters the enemy with an offensive or retaliatory attack. In either case, the question of interest is which defense has a comparative advantage in the face of a North Korean assault.

In either defense scenario, which force has more military power? Some insist that North Korea has more power, some claim that South Korea has more power, and others believe that both forces are balanced on the Korean peninsula. The question cannot be answered until the completion of an actual war. It is not enough to subjectively conclude that one force is stronger. Thinking and making a decision without actual and verified information can be misleading.

Military forces can be evaluated differently depending on the tactics, the organization, the terrain, etc.. Given a force size and situation, which course of action is best for

the defenders or Blue force? For the study, the Blue force is South Korea and the Red force is North Korea. There are two defense courses of action considered for South Korean forces: Course of Action 1 (COA1) is static and Course of Action 2 (COA2) is dynamic. If the scoring method to evaluate existing weapon systems is known, then the question of determining who is more powerful can be solved more effectively.

In November 1986, the Deputy Under Secretary of the Army for Operations Research (DUSA-OR) sponsored the Combat Scoring System Workshop. The objective of the workshop was to discuss and evaluate existing weapon-scoring systems and to estimate characteristics for future systems. One conclusion drawn from the three day meeting was that the current static, linear-aggregated scoring systems will be used until more acceptable alternatives can be produced. [Ref.1: p.28] The linear-aggregated scoring system is used in this thesis to investigate which force possesses the greatest power for combat. The basic concepts of the process are the means by which values are assigned to a weapon system unit and then incorporated into a model to determine the outcome of a simulated battle.

The first day of battle is very important on the Korean peninsula. The question to be answered is which course of action is more effective to survive and to deter the enemy on the first battle day in various air-land combat situations? Specifically, which course of action is best for the Blue force commander in first day battle at the demilitarized zone (DMZ) in Korea with given terrain, organization, and force size? Those questions can be answered by comparing the remaining total force values after one day. In the real battle situation, there will be many courses of action; but in this thesis, two courses of action will be considered as described above. These are compared by using several methods to determine the best course of action.

There are four weapon systems in each battalion for each force. Both forces use tanks, anti-tank weapons, artillery companies, and long-range missiles. The composition of the Blue force is consistent with the structure of a South Korean Army battalion. The structure of the North Korean or Red force is not known with certainty. Because it is an attacker, it is assumed that the Red force has twice as many weapons.

In this thesis the force ratio (FR) of the forces during the first day of battle at the DMZ in Korea is the main focus of the analysis. Attrition rates are computed for the two courses of action for the same organization, terrain, and the same initial force size for each of the Red and Blue forces to determine the difference in force ratio between COA1 and COA2.

B. PURPOSE AND GOAL

The goal of this thesis is to investigate the difference in a defend-in-place tactic versus an attack tactic on the first day of battle. Attrition rates are generated using the JANUS(T) system to conduct twenty simulation experiments. Additionally, two methods of computing weapon system values will be demonstrated.

C. SCOPE

Several methods are used to investigate the difference between the two tactics, them being the JANUS(T) system, the COMAN MLE (Maximum Likelihood Estimate), the Potential-Antipotential Method (PAP), and the Lanchester simulation. The purpose of the JANUS(T) system is to obtain the time-series attrition of both forces, and these data are used to produce the attrition rates in the COMAN MLE. Finally, these attrition rates are used in the Potential-Antipotential Method to compute weapon system values. In the Lanchester simulation these attrition rates and values are used to determine the dynamic change of force ratio for each time step of the simulation.

The comparison of initial and final force ratio will be analyzed to determine the effect of change based on the difference in the opposing forces. The total weapon system losses and individual weapon systems losses at the termination of the battle will be analyzed to suggest the efficacy of the particular weapons for each force. In Chapter II the combat scenario and the JANUS(T) system are discussed. In Chapter III the methods of solution are presented and the analysis of the results are given in Chapter IV. Finally, the conclusions and recommendations are presented in Chapter V.

II. COMBAT SCENARIO AND JANUS(T) SYSTEM

A. BACKGROUND

In order to generate attrition rates using the JANUS(T) system simulation environment, it is necessary to develop a common scenario. A simplified battalion-level battle is created which consists of four different weapon system types in each force. The forces are a South Korean tank heavy-task force and a reinforced North Korean mechanized battalion. The critical assumptions in the scenario are that North Korea always attacks and that South Korea responds with a course of action that is either defensive or offensive. In COA1, the Blue force remains in prepared defensive positions. The prepared positions provide a number of advantages including a fire plan, well-known terrain, communications, and resupply. In COA2, the Blue force mobilizes its forces and takes the initiative against the Red aggression.

B. ENVIRONMENT

1. Terrain

For the scenario, an area in the Republic of Korea (ROK) near the Demilitarized Zone (DMZ) is selected and a network developed having several possible approach paths for Red forces based upon the road conditions of the actual terrain. Generally, Red attempts to attack Blue's fortified positions through the shortest-distance path or shortest-time path which is characterized by abundant concealment, cover and an obscured line of sight.

The Blue force defends an assigned sector of terrain against the attack of a North Korean mechanized battalion, and the Blue force commander distributes his company teams over the terrain to enhance his defensive capability. The battle terminates if the simulation time reaches 30 minutes, because the first group of the Red force arrives in the Blue force area in 30 minutes of simulation.

The battle area in this scenario is taken from one of the ROK Army Regiment's assigned sectors. In Korea, a sector is a relatively large area encompassing 40 kilometers by 40 kilometers. The terrain map of this area is shown in Figure 1 on page 5. The width of the neutral zone for the DMZ is 4 kilometers. Mechanized units cannot travel over the mountains so the routes are limited to Avenue 1, Avenue 2, Avenue 3, and Avenue 4 (from west to east). Artillery on both sides is stationary; batteries are so well protected in the mountains that they cannot be destroyed by tanks or missiles. When

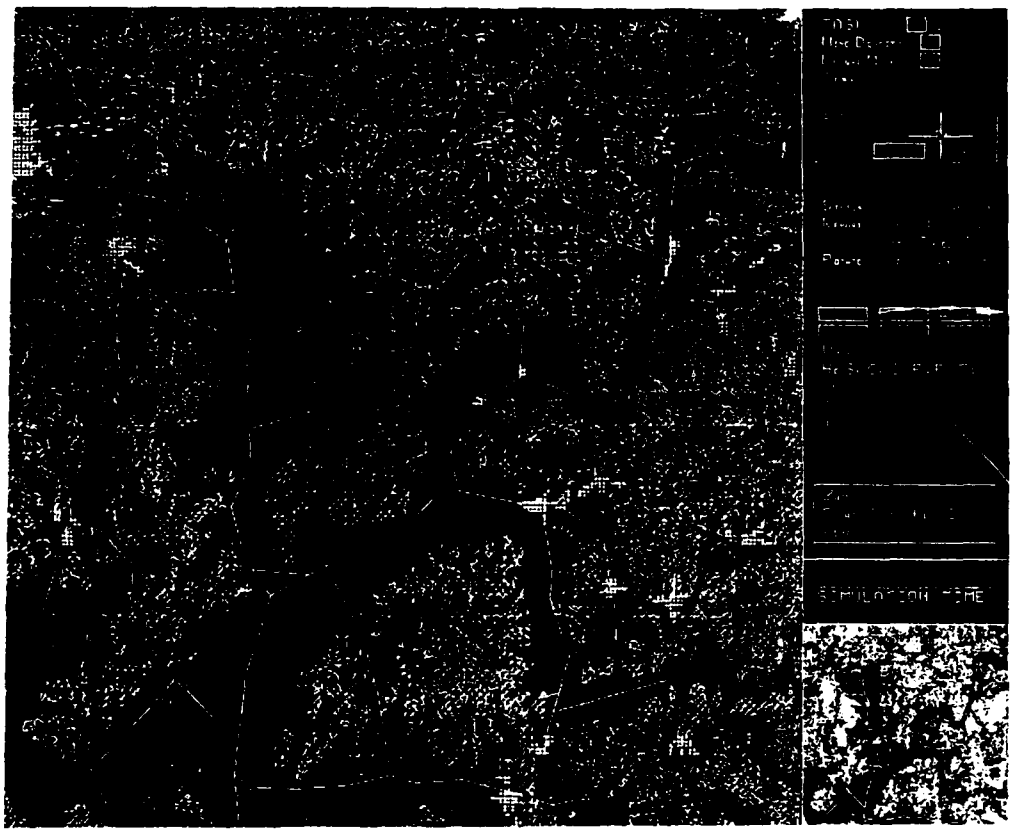

Figure 1. Sector Display on the JANUS(T) System

the Red force starts moving 1 to 2 kilometers from their side of the neutral zone, the action alerts the Blue force immediately.

2. Weapons

Both forces use tanks, anti-tank weapons, artillery companies, and long-range missiles. The composition of the Blue force is consistent with the structure of a South Korean Army battalion. Because it is an attacker, it is assumed that the Red force has twice as many weapons.

The Red force employs Soviet T55 and T62 tanks and rocket propelled grenade (RPG) anti-tank weapons, including the RPG7 and RPG16. Normal Soviet artillery is comprised of 106 mm and 122 mm guns. The long-range weapon is a BMP, which is a

generic term for a Soviet infantry vehicle that transports an infantry squad and also carries an attached anti-tank missile.[Ref. 2]

The Blue force employs American M48 and M60 tanks. Anti-tank weapons include the light anti-tank weapon (LAW) and 90mm recoiless rifle. South Korea artillery is comprised of 105 mm and 155 mm guns. The long-range weapon is commonly called a TOW (tube-launched, optically tracked, wire command-linked guided missile).[Ref. 3]

The Red battalion has forty tanks, twenty anti-tank weapons, thirty BMPs, and two supporting artillery companies. The Blue battalion has twenty tanks, ten anti-tank weapons, eighteen TOWs, and one artillery company. Initial force elements of both sides are shown in Table 1. The composition of the Blue and Red battalions are listed in Table 2 on page 7, and Table 3 on page 8, respectively.

Table 1. INITIAL FORCE STRUCTURE

ROK Force (Blue)		NK Force (Red)	
Weapon Type	No. of Weapons	Weapon Type	No. of Weapons
Tank	20	Tank	40
Artillery	6	Artillery	12
TOW	18	BMP	30
Anti-Tank	10	Anti-Tank	20

C. BATTLE SCENARIO

1. Battle Assumptions

The descriptions and the assumptions of the scenario are straight forward. Course of Action 1 (COA1) is plotted in Figure 2 on page 7 and Course of Action 2 (COA2) is plotted in Figure 3 on page 8. There are no close air-support aircraft, chemicals or minefields employed in this scenario. The battle terminates when the simulation time reaches 30 minutes. The commander of each force has essentially the same military experience and knowledge. Artillery weapon systems support all companies in each force.

In the setting up the JANUS(T) scenario, the Blue commander locates his battalion in tactically appropriate positions. The Blue commander chooses three forts. Fort 1 is comprised of two companies because it is an important area and has good de-

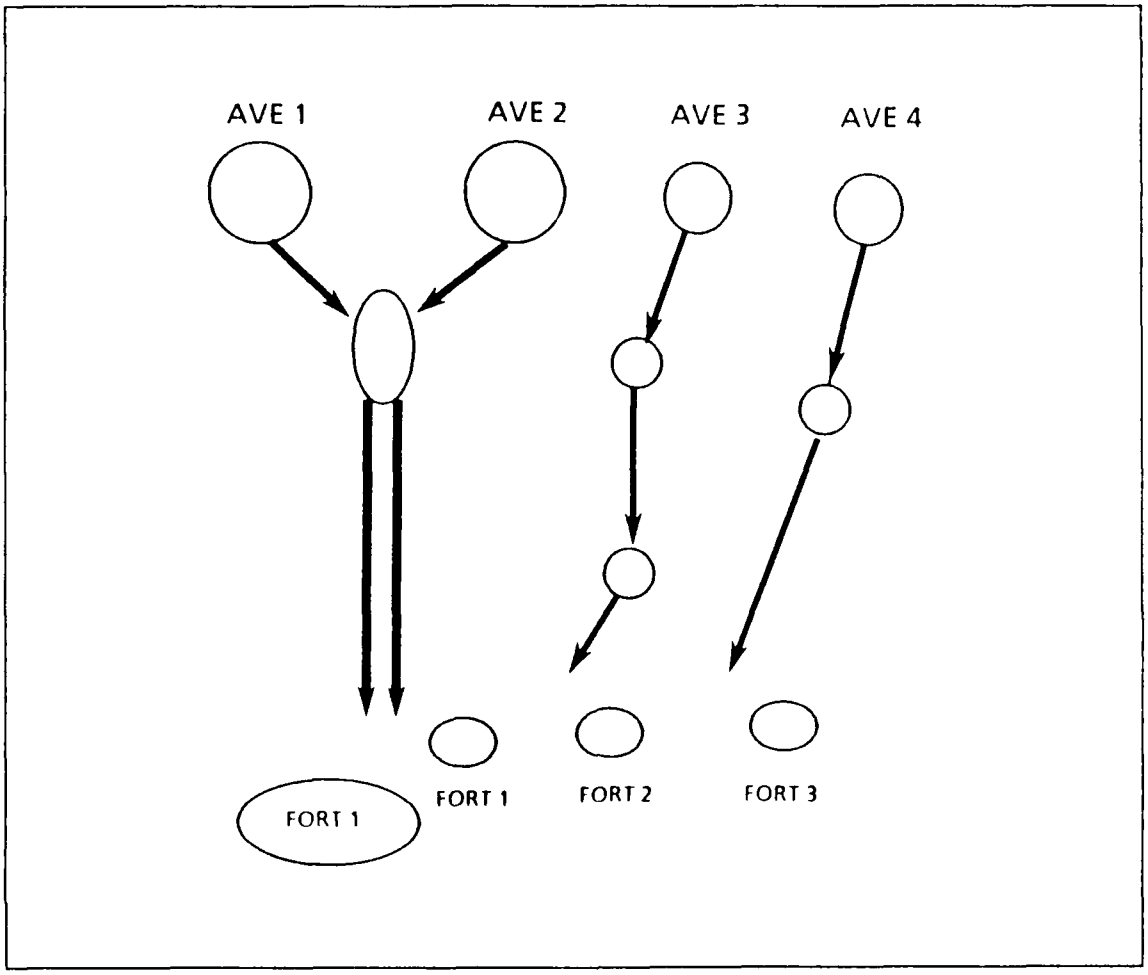

Figure 2. Course of Action 1 in the Scenario

Table 2. COMPOSITION OF THE BLUE FORCE (COMPANY)

Type	A Company	B Company	C Company	D Company
Tank	6	6	4	4
Artillery	6			
TOW	7	7	2	2
Anti-Tank	2	2	3	3

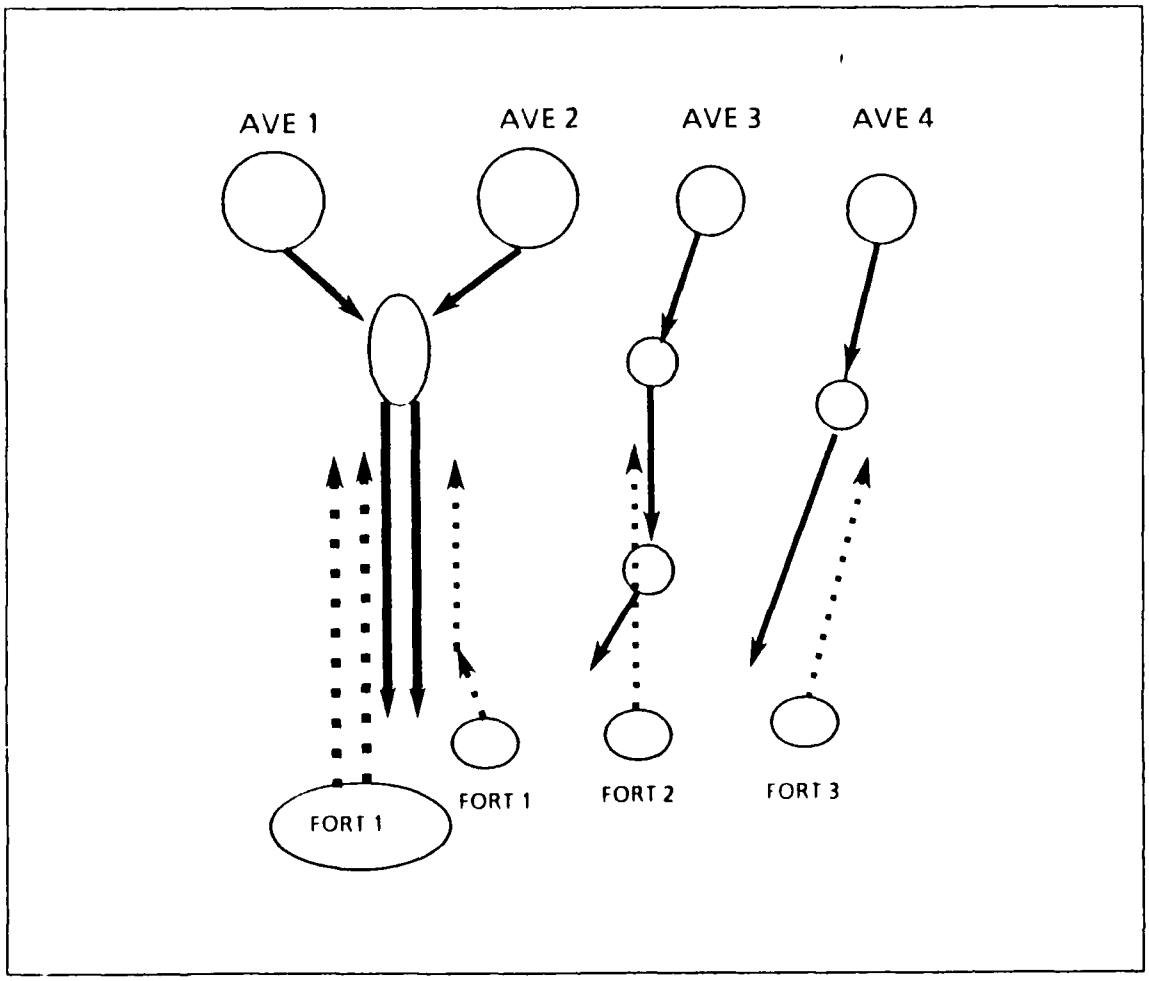

Figure 3. Course of Action 2 in the Scenario

Table 3. COMPOSITION OF THE RED FORCE (COMPANY)

Type	H Company	I Company	J Company	K Company
Tank	12	12	8	8
Artillery	6		6	
BMP	11	11	4	4
Anti-Tank	5	5	5	5

fensive attributes. The concealment, cover, and line of sight to enemy avenues of approach are also better than any other position. Two companies are allocated to Fort 1 because the route supports a large, Red-invasion force. Company C defends Fort 2, which protects Avenue 3. Company D defends Fort 3, which protects Avenue 4. The companies are small because Avenue 3 and Avenue 4 are very narrow and easily defended.

The terrain and line of sight both affect the performance of the weapon systems. The comparative advantage of long and short range weapons depends on the geographical constraints. More long-range systems are allocated to Fort 1 because a longer line of sight of approximately 3000 meters exists down the main approach which connects Avenue 1 and Avenue 2. Medium and short range systems are more effective at Fort 2 and Fort 3. The maximum visual range for Avenue 3 and Avenue 4 is 1000 meters. Thus, Fort 2 and Fort 3 each have only two TOWs.

2. Red Force Positions

The Red commander allocates one company to each avenue. More total weapons are employed against Fort 1 than the other forts. Because of their long-range advantage, relatively more BMPs than tanks are deployed down the first two avenues. In contrast, more tanks than BMPs are directed down the third and fourth avenues. As soon as the Red mechanized battalion starts to move, it fires its artillery at the Blue forts. The Red companies moving down the three major avenues of approach and all arrive at the neutral zone at the same time. The ultimate objective of the Red force is to eliminate Fort 1. The Red offense is the same in either course of action. The Red tactic is constant and the Blue response varies in the two courses of action.

D. BLUE REPONSE

1. Static Defense in Course of Action 1

In Course of Action 1 (COA1), shown in Figure 2 on page 7, Blue defends from prepared positions at the forts. The round symbols in the figure represent time nodes or, conceptually, reference points of the battle. In the defend-in-place tactic (COA1), the Blue force does not move when attacked by the Red force. When Red enters the DMZ, the Blue artillery batteries fire first. The TOWs are launched when the potential for kill is likely. Because of the static defense, the Blue force does not move its tanks forward. In the JANUS(T) system, when the enemy is detected by a Blue weapon, the

Blue system fires. If a Blue system detects two different Red systems simultaneously, then Blue shoots at the more powerful Red system first.

2. Dynamic Defense in Course of Action 2

In Course of Action 2 (COA2), shown in Figure 3 on page 8, whenever the Red force starts the attack the Blue force responds with a counterattack from each of the forts simultaneously. All weapons systems move forward together. The tank and TOW speeds are greater than the antitank system, which moves at 5 kilometers per hour. Although the JANUS(T) system provides casualty numbers on each avenue, the study uses the total number of casualties consistent with the measures of effectiveness defined later. Since the mountains slope from the north down to the south, the North Korean force has the advantage of terrain over the advancing South Korean Force. The closer the two forces are to each other, the greater are the number of casualties, which is expected.

E. THE JANUS(T) COMBAT MODEL

1. Model Description

The JANUS(T) combat model is an interactive, two-sided, closed, stochastic, ground combat simulation. Interactive means that the individual military analyst is responsible for the control, position and movement of his force throughout the sequence of the simulation, based on the combat situation which is presented to him on the graphics screen. The two-sided term implies the existence of two opposing forces which are simultaneously directed by two separated sets of players. It is from this attribute that the model gets its name, in that Janus is a Roman god with one head and two opposing faces. Closed refers to the model's feature that the disposition of the enemy force is unknown to the friendly force with the exception of the information as provided by those friendly forces in contact with an opposing force. Stochastic means that the events of the simulated battle, such as the firing of a weapon and its associated result, occur according to the laws of probability and may or may not occur again if the game is repeated. Ground combat refers to the fact that the focus of the model is on those weapon systems that participate in ground maneuvers. [Ref.4: p. 213]

a. Background of Development

The Lawrence Livermore National Laboratory developed the prototype of the JANUS model called JANUS (Livermore) or JANUS(L) to conduct research on the effects of nuclear weapons on the battlefield. The prototype of the JANUS(L) model was delivered to the United States Army TRADOC Analysis Command at White Sands

Missile Range, New Mexico (TRAC-WSMR), formerly known as the United States Army Systems Analysis Agency (TRASANA), in January 1983. The code, algorithms, and data base used in the model were then standardized and tailored for Army specific studies. This project resulted in the development and subsequent distribution of the JANUS (TRASANA) or JANUS (T) model.

Currently the JANUS (T) model consists of 85,000 lines of code, written in VAX II FORTRAN, a structured Digital Equipment Corporation extension of FORTRAN-77. [Ref.5: p. 22]

b. Model Resolution

The JANUS (T) combat simulation models individual weapon systems which move, search, detect and fire on the ground or in the air over a user specified three dimensional terrain representation. Each weapon system being modeled appears on the graphics screen as an individual symbol. [Ref.4: p. 7] Each symbol must be placed on the terrain, given an orientation, assigned a route if moving, and given an area to search for targets.

The terrain data base includes elevations, roads, rivers, cities, follage, and barriers. Thus, where an actual map shows a ridge line, the same ridge line will offer approximately the same cover and concealment to weapon systems as the real ridge line in actual combat.

Finally, the JANUS (T) model has the resolution and capacity to handle battle scenario sizes up to and including a United States Army battalion task force versus a Soviet motorized rifle regiment. [Ref.4: p. 6]

2. Implementation of the Scenario

As previously stated, the development and implementation of a defense-in-sector scenario is representative of actual battles occurring at the DMZ in Korea and is used to determine simulated battle outcomes. The first step is to load the proper terrain file for the DMZ location into the JANUS (T) model. The next step is to initialize the starting strengths of the Red and Blue forces.

The probability of kill values assigned to each weapon system in the JANUS (T) model are based on the range at which the firing weapon system engages the target and whether that target is moving or stationary. It is assumed that the JANUS (T) model default probability of kill values for each weapon system are equivalent to the laser strength threshold required to disable a vehicle in the MILES system at the Na-

tional Training Center. The detection ability of the participating weapon systems has a direct impact on the outcome of the JANUS (T) battles.

3. Simulation Strategy

Since the JANUS (T) model is stochastic, each battle is run ten times to determine the attrition rates for the scenario which is necessary to compare the force ratio for course of action 1 and course of action 2. The computation of the attrition rates are explained later with the COMAN MLE method. The simulation is allowed to continue for 30 minutes of battle time. Each battle takes approximately two hours to run to completion. The data from the battle are retrieved from the model data processor, the game is reset and then run again.

The Blue force commander was Captain Son, H.C. who is a financial officer and the Red force commander was Captain Park, J.H. who is studying weapon systems at the Naval Postgraduate School. According to their individual military experience and knowledge, they employed troops and planned the attack or defense in separate rooms without specific information about the opposing force. They ran the game several times using the interactive mode for formulating the appropriate battle plan for the systemic mode of operation. Finally, the JANUS(T) system provided the ten replications with no man-in-the-loop execution. The two simulation modes for the JANUS(T) system are described in the next section.

F. JANUS(T) OPERATION MODES

1. Man-in-the-Loop Mode

The interactive mode is usually exercised in the JANUS(T) system. It is more realistic but requires that the operators (commanders) directly interact with the changing game. The commanders can allocate their force and change the fire and movement plans to develop tactics in real time. The movement paths and artillery fire plans are designated for every weapon by the commander.

For this thesis, one plan is defined after several man-in-the-loop trials established the appropriate sequence of events according to the constraints of simulation time and the opposing force plan. The battle was terminated by designating the stopping time or specific destinations. In the man-in-the-loop mode, replications are not independent because they involve human decisions during each simulated battle.

2. Systematic Mode

In the systemic mode, the JANUS(T) system runs the games automatically based on predesigned decisions. The appropriate decisions are scheduled for every weapon system using the appropriate time node before starting the game. Any predesigned decision does not change during a replication, but random number seeds are changed for each run. Replications are assumed to be independent as discussed in Chapter III. After running several games using the interactive mode, the appropriate decisions are determined for each weapon according to their capability for use in the systemic replications. In the systemic mode, only the termination time is used to end a replication. A specific area is not used for terminating the game. After a designated time, predesigned decisions and forces are reset and run again until the assigned number of replications is complete.

For this thesis, the systemic mode is used for the ten replications. The next chapter describes the assumptions and the reasons for using the data from the JANUS(T) system for specific methodologies that are used to calculate the measures of effectiveness.

III. METHODS OF SOLUTION

A. MEASURES OF EFFECTIVENESS

The comparison of fighting tactics is the primary purpose of this thesis. The force ratio is used as the primary measure of effectiveness. If there are two courses of action, the tactic that produces a larger force ratio is better because either the friendly force has relatively fewer losses or the enemy suffers greater damage. The two courses of action are analyzed in order to determine which tactic is better for the Blue force during the first day of battle in Korea. Attrition rates, weapon system values, and the number of survivors are needed to compute the force ratio.

Three measures of effectiveness are defined as FR (Force Ratio), TKR (Tank Kill Ratio), and SFR (Surviving Force Ratio). FR is a relative measure of military power. The TKR is selected as a MOE because the tank is the primary weapon system in the Blue force. SFR assumes that all systems are equally weighted.

All of the analysis methods use FR as a MOE. It is defined in general terms as

$$\text{Force Ratio} = \frac{\text{total value of Blue force weapons}}{\text{total value of Red force weapons}} \qquad \text{(FR)}$$

The two additional MOEs used are

$$\text{Tank Kill Ratio} = \frac{\text{total Red casualties caused by Blue tanks}}{\text{number of Blue tanks killed}} \qquad \text{(TKR)}$$

and

$$\text{Surviving Force Ratio} = \frac{\text{number of Blue surviving weapons}}{\text{number of Red surviving weapons}} \qquad \text{(SFR)}$$

For all three MOEs, a larger value is desirable.

B. METHODOLOGY

The data that are generated from the JANUS(T) model provide the basis for the comparison of methods to calculate force ratios. Other studies have calculated force ratios but the data are derived from less comprehensive methods, such as subjective firepower scores which are guesses based on experience. The data from the Janus(T)

model are important because they are propagated from a database of the actual terrain and of the characteristics of hostile and allied weapons. In addition, the JANUS(T) system is an accepted standard for U.S. Army combat analysis. The model output from a scenario, like the DMZ, may be studied and analyzed to determine the effect of specific strategies. The thesis is not primarily concerned with a particular placement of opposing forces, but rather it uses the data to compare various methods for computing force ratios.

The factors that produce data for the JANUS(T) model are not challenged because the model components have been reviewed and analyzed within the context of military operations research; thus, the analysis of the assumptions underlying the JANUS(T) model are outside the scope of the thesis. The use of standardized data is important because it provides a foundation to compare methods that determine force ratios.

The study begins with data outputs from the JANUS(T) system. The tactical plan for the Korean scenario is the input for the JANUS(T) system. The output provides casualties of the four weapon types for both forces during a simulated time period. The sequence of weapon casualties form a time history or time series. The time series of the casualties is manipulated by the Combat Analysis Model (COMAN) into a four-by-four matrix since each force has four weapons. One cell of the matrix represents the attrition rate for a particular weapon against a particular opposing weapon. These attrition rates are then used by methods known as valuing systems. One system, the potential-antipotential (PAP) method is discussed in depth in Chapter IV. Another system is a Lanchester simulation which incorporates both the attrition rate and the PAP results in each time-step of the simulation. A flow chart describing the analysis methods is shown in Figure 4 on page 16.

1. Generating Quantitative Firepower Scores

Firepower scores are the weighted value of the destructive power of the weapon. Subjective appraisals for firepower effectiveness are based on experience, but they cannot be quantified because the scaling is arbitrarily selected. In addition to using subjective evaluation, the thesis evaluates more robust procedures for firepower scores that determine the weighted value for a particular weapon. Although the JANUS(T) system provides the number of survivors at the end of the simulation, it does not weight the value of a particular weapon.

A recent enhancement to the JANUS(T) system includes the capability for the user to structure a combat scenario and allow it to run several times in an automatic

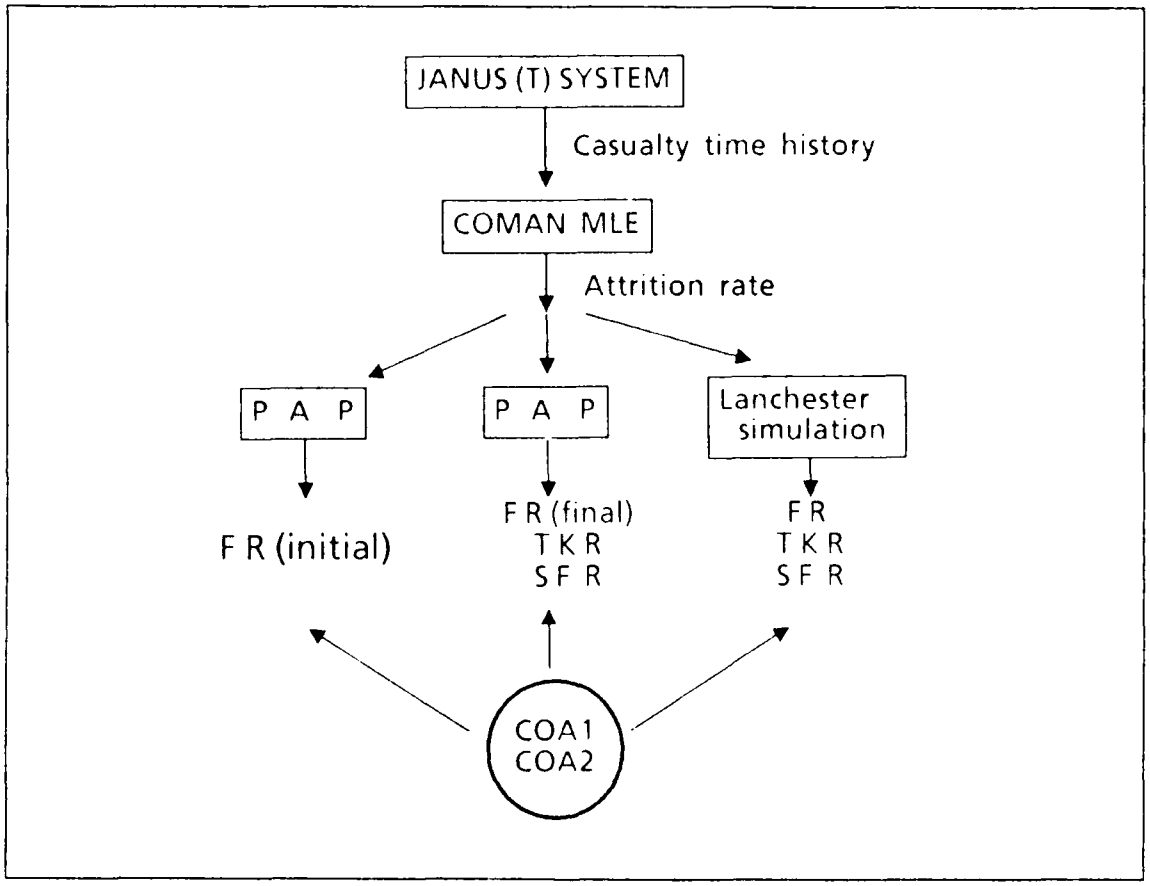

Figure 4. Flow Chart of Analysis

mode. In the initial JANUS(T) run, the author proposed a high-resolution combat plan. That plan is improved by the author (using the man-in-the-loop) and rerun several times to establish the most appropriate plan in terms of the positions of the combatants and the environment that is typical in Korea. The JANUS(T) system uses the final plan for the automated (time node) replications. In other words, all of the components of the entire scenario are predesigned except for different random seed numbers used to simulate detection and firing events. The results from JANUS(T) provide casualty time histories for each pair of firer-target weapon types. The data form a scoreboard that can be used by numerical methods to estimate attrition coefficients.

2. Justification for Using Maximum Likelihood Estimates

Maximum likelihood estimates (MLE) produce efficient and non-biased attrition coefficient estimators. However, the variance of the MLE is affected by a number of factors which include the density of the time series and the spread of the data points. The COMAN MLE methodology is robust and its results cannot be disproved. However, the casualties from the JANUS(T) system do not occur enough times in one replication to justify the use of the COMAN MLE techniques. If too few data points are available for the COMAN MLE technique, the variance of the MLE exceeds a relevant range [Ref. 6]. Conceptually, the variance of the estimators is reduced by increasing the density of the time series. If the casualties are exactly equally spaced, the variance is zero. However, in any one battle the casualties will occur in groups because certain weapon systems operate better at certain ranges. For example, the TOWs are generally used early in the battle to take advantage of their long-range capabilities; later in the battle, they may need to move or else be destroyed.

Although the JANUS(T) system produces a killer-victim scoreboard in a time series, the data may be sparse. In some of the JANUS(T) runs, there may be only one or two casualties of a type-i system on Blue force by a type-j system on Red force for any one replication of a thirty-minute battle. However, a MLE cannot be determined from one or two points in a time series.

a. Obtaining a More Dense Time Series

In order to use the COMAN MLE for the JANUS(T) data used in this thesis, a more dense time series is necessary. More observations of casualties for each (i,j) pair are required. For this analysis, ten replications were consolidated into one data set. To obtain one time series, the action tacitly assumes that those ten battles can be combined as if they were multiple observations from one battle.

There are statistical inferences of ten replications. If a man was in the loop for every run, then replications would not be independent; therefore, the ten replications could not be legitimately combined. In the previous JANUS(T) system, a person made all of the decisions; thus, statistical inferences could not be made from battles that progressed differently due to human decisions. In the current JANUS(T) system, the simulated battle evolves in the same manner in the automatic mode. All of the physical components and their routes are predesigned according to the original battle plan.

b. Independence of Replications

The essential assumption necessary for combining the replications for use in the COMAN MLE is that the replications are independent. If the simulation is truly systemic and if only random number seeds are varied, then each one of the ten observations is essentially a random variable. Regardless of the predesigned plan and as long as there is no man-in-the-loop, the randomness of each replication is a result of Monte Carlo processes on random variables (i.e., detections, hits and kills) which will give different results in each replication. Thus, each replication is an independent observation of the same battle. Since the configuration of the battle and the composition of the force remains constant, the COMAN MLE can be used on the combined time-series of ten replications because the replications are derived from identical Monte Carlo simulations. Due to resource limitations, ten replications are considered to be an appropriate number of trials for this analysis.

3. Advantages and Disadvantages of Valuing Systems

Valuing systems are important in establishing the best tactic in comparison to other alternatives. The valuing system also may be able to reduce the costs for the organization by identifying the best incremental investment in types and quantities of weapons.

With subjective valuing systems the combat capability of a weapon is arbitrarily assigned a number on a scale. The value depends on the experience of the analyst and may be based on historical knowledge.

Quantitative valuing systems measure the weighted value that is assigned to weapons according to their destructive power. Since the results are quantitative, they are not based on the preconceptions or experience of the analyst. However, valuing systems may be technically difficult and complex.

a. Subjective Firepower Method

The advantage of a subjective valuing system is its simplicity. It is usually easy to use and does not require complex computation. The disadvantage lies in the need for experts who have the requisite experience and knowledge. However, the values differ among experts and are not exact.

b. *Potential Anti-Potential Method*

It is straight forward to take the attrition-rate matrix from the COMAN MLE and to calculate the weighted values by using the PAP method [Ref. 7]. The advantage of the potential-antipotential procedure is that it is quantitative and does not require *a priori* military experience. The disadvantage is that the validity of PAP results rely on the calculated attrition rate matrix. If the matrix is incorrect, then the analysis is erroneous. Once the PAP values are determined, the power of a single weapon system type is simply the number of its survivors multiplied by the weighted value for that weapon. The total force power is then the sum of all the weapons for one force.

The PAP methodology assumes that a linear relationship exists between the values and the attrition-rate matrix. The relationship is necessary for the application of the PAP methodology. The validity for assuming a linear relationship between the value vector and the attrition-rate matrix is unknown and is beyond the scope of the thesis. However, empirical evidence and military judgment seem to support the PAP results. Other methods, such as non-linear eigenvalue routines, are not considered in the present study.

The primary objection to the eigenvalue approach proposes that the values are only based on attrition and consequently ignore all the other system functions on the battlefield (e.g., movement, resupply, evasive action) that do not involve firing. In the thesis, the attrition rates from the COMAN MLE are the result of a time series that is derived from a large force-on-force simulation which does take into account movement, supply, and other battlefield functions. Thus, embedded in the COMAN MLE attrition are force considerations for each weapon system. Other derivations of the attrition rates (e.g., estimated probability of kill times number of rounds fired) do not include the factors included in the JANUS(T) system simulation.

c. *Lanchester Simulation*

The Lanchester simulation has the ability to extrapolate after small, incremental changes are made in the scenario. For example, it provides quick and robust results with certain changes in the numbers of a weapon system given a valid attrition matrix. The alternatives, such as the JANUS(T) system, may require a large amount of time and expense to determine the same amount of change. Empirically, the results are similar for reasonable approximations.

4. Comparing Courses of Action

Two courses of action are compared using the three MOEs previously described. The Force Ratio (FR) is computed by using the weapon system values and the number of survivors for each force. These values are computed from the potential-antipotential method using the attrition rates which are calculated with the COMAN MLE from the time histories of casualties from the JANUS(T) system. The use of more than one valuing system provides a check on the results of the other systems. If the results differ, an analysis is required to determine the basis for the disparity. The process of analysis may then discover previously undisclosed factors.

C. ANALYSIS METHODS

Three analytical methods are used to evaluate the alternative courses of action:

1. Subjective Firepower Scores Method,
2. Potential-antipotential Method, and the
3. Heterogeneous Lanchester Simulation.

The subjective firepower score method is used as an example to help understand the basic concept of the force ratio used in this thesis. It is not related to the JANUS(T) system or any other analysis method. The initial and final force ratios will be computed for both courses of action using the values from the PAP method and the number of survivors from the data generated by the JANUS(T) system.

Weapon system values are computed by the potential-antipotential method to compare the force ratio for each course of action. The value of a weapon system is directly proportional to the rate at which it destroys the enemy weapon systems. Thus, the value of a system depends on its kill rates and on the value of the enemy systems that it destroyed.

In the Lanchester simulation, force ratios will be computed for each simulation time step by using weapon values from PAP and the number of survivors from the Lanchester simulation. In this thesis, the ratio of weighted survivors are used as the values for the force ratio MOE. The weighted value of each weapon is determined from Eigenvalues as part of the PAP method. Using the JANUS (T) system, the time series of casualties for each of the enemy's weapons are determined and become inputs to the COMAN MLE to determine attrition rate estimates.

The last three methods are described along with the analysis in Chapter IV. The subjective firepower score method is presented below as an example to clarify the concept of the force ratio used in this thesis.

D. SUBJECTIVE FIREPOWER SCORES

1. General

Lester and Robinson [Ref.8: p.4] define a firepower score (FPS) as the relative value of a weapon based on its firepower. The firepower index (FPI) for a unit is achieved by summing the firepower scores of the weapons within the unit of resolution. Thus, the firepower index of a unit is a linear sum of the firepower scores and represents the aggregation of all weapon systems within the force. The extent of the aggregation may result in a single overall force value in the case of a homogeneous model or several values by weapon system types or unit type in heterogeneous models.

The method of analysis measures the relative combat power of a unit by summing the combat power values for each weapon system in the unit. The firepower index (FPI) for a unit is defined as [Ref.9: p.4-6]

$$FPI = \sum_{i=1}^{n} S_i X_i \tag{3.1}$$

where

n = number of different weapon systems
S_i = firepower score for weapon i
S_j = firepower score for weapon j
X_i = number of weapons of type i
Y_j = number of weapons of type j

The ratio of the Blue force FPI and the Red force FPI is defined as the force ratio (FR). In this analysis the Blue force FPI is the numerator; therefore, a large FR is desirable.

$$FR = \frac{FPI_{blue}}{FPI_{red}} \tag{3.2}$$

The FPI assumes that the weapons system values are additive; i.e., there is no synergistic effect between weapons systems. This formula is also linear in the number of weapons of each type; e.g., doubling the number of weapons doubles the FPI. The firepower score for each weapon system is determined by subjective reasoning based upon the

scenario discussed in Chapter II. As a result, this method produces results which are biased toward the opinions of the analyst.

It should be noted at this point that even though firepower scores and firepower indices are related, they are not synonymous. Firepower scores apply to the weapon systems and the indices apply to the unit. While there exists a general equation for calculating firepower indices, attempts to develop acceptable techniques for the computation of firepower scores values have spawned numerous approaches, but none have been able to capture the complexities of combat.

2. Subjective Firepower Scores and Indices

The most basic form of the subjective firepower score approach is a straightforward assignment of perceived values to weapon systems. These values are bounded over an arbitrarily selected range and the scored units.

Table 4. SUBJECTIVE FIREPOWER SCORES AND INDICES OF BLUE AND RED FORCE

Weapon Type	S_i	X_i	S_iX_i
Tank	100	20	2000
Artillery	70	6	420
TOW	60	18	1080
Anti-Tank	30	10	300
		Blue Force FPI =	**3800**
Weapon Type	S_j	Y_j	S_jY_j
Tank	90	40	3600
Artillery	60	12	720
BMP	35	30	1095
Anti-Tank	20	20	400
		Red Force FPI =	**5815**

The firepower scores shown in Table 4 are selected arbitrarily in this subjective method and the firepower indices are computed by using equation 3.1. Alternatively, the values of S_i can be determined quantitatively using the potential-antipotential method as discussed in Chapter IV.

Since FPI(Red force) = 5815 and FPI(Blue force) = 3800, the resulting force ratio (Blue force / Red force) is 0.653. This indicates that the opposing force (Red) is 1.530 times more powerful than the Blue force.

IV. ANALYSIS OF RESULTS

A. GENERAL

In this chapter, two methods of analysis are used to evaluate the alternative course of action. These are the potential-antipotential method and Lanchester simulation. After describing each method, the results are analyzed. The order of analysis is as follows :

1) Potential-antipotential method

2) Heterogeneous Lanchester simulation.

B. POTENTIAL-ANTIPOTENTIAL METHOD

The Eigenvalue method (potential-antipotential method) considers how the weapon capabilities interact with enemy vulnerabilities in a particular combat scenario. This section is a summary of the description presented in [Ref. 9 : pp. 49-55]. The computations include elements of the heterogeneous approach to aggregation, but eventually yield scores, indices, and force ratio for a homogeneous representation of unit combat power.

1. The Basic Principle

The value (score) of a weapon system is directly proportional to the rate at which it destroys the value of opposing enemy weapon systems. Thus, the value of a system depends on its kill rates and on the value of the enemy systems it kills. Conversely, the values of on enemy system depend on the values of the friendly systems which it kills.

This method is significantly different from the subjective firepower score method in assigning values (i.e., firepower scores) to each weapon system. The value of a weapon is directly proportional to its kill rates and the value of what it kills.

2. Notation and Definitions

Consider two opposing forces (X and Y) made up of heterogeneous weapon systems. Suppose that the X force contains m different weapon system types and that the Y force contains n types. Let

K_{ij} = rate at which one X_i system kills Y_j systems
L_{ji} = rate at which one Y_j system kills X_i systems
S_i^X = value of one type i system in the X force
S_j^Y = value of one type j system in the Y force

The kill rates are assumed to have known nonnegative values. Kill rate values are obtained from the time series of casualties from a high resolution simulation model. They will implicitly depend on scenario details such as the composition of both forces, the force missions, target-acquisition conditions, target-selection rules, and the outcomes of one-on-one engagements. This attrition rate determination will be discussed later in the COMAN MLE method.

In terms of these definitions, the basic valuation principle can be written as a system of equations. The value for a system of type i in the X force is given by summing the values of every enemy system that it kills :

$$C_x \times S_i^X = \sum_{j=1}^{n} K_{ij} \times S_j^Y$$

and similarly the value of a system of type j in the Y force is

$$C_y \times S_j^Y = \sum_{i=1}^{m} L_{ji} \times S_i^X$$

where C_x and C_y are the proportionality constants for the two forces.

Combining the equations gives a system of m + n linear equations in the m+n unknowns S_i^X and S_j^Y for any given values of the proportionality constants. The values of C_x and C_y will be selected which guarantee a solution in which all the scores are nonnegative.

The value equations can be expressed more compactly in matrix notation. Define

$\vec{X} = (X_1, \ldots\ldots, X_m)$,
$\vec{Y} = (Y_1, \ldots\ldots, Y_n)$,

$\vec{S}^X = (S_1^X, \ldots\ldots, S_m^X)$,
$\vec{S}^Y = (S_1^Y, \ldots\ldots, S_n^Y)$,

$\vec{K}$ = the $m \times n$ matrix whose elements are K_{ij}
$\vec{L}$ = the $n \times m$ matrix whose elements are L_{ji}

Then the value equations can be expressed as

$$C_x \times \vec{S}^X = \vec{K} \times \vec{S}^Y \tag{4.1}$$

and

$$C_y \times \vec{S}^Y = \vec{L} \times \vec{S}^X \tag{4.2}$$

3. Eigenvalue Solution

To solve the value equations, the expression for $\vec{S}^Y$ from Equation (4.2) is substituted into Equation (4.1) yielding

$$C_x \times C_y \times \vec{S}^X = \vec{K} \times \vec{L} \times \vec{S}^X.$$

Similarly, substituting for $\vec{S}^X$ in Equation (4.2) yields

$$C_x \times C_y \times \vec{S}^Y = \vec{L} \times \vec{K} \times \vec{S}^Y.$$

If we define $E = C_x \times C_y$, then the above becomes

$$E \times \vec{S}^X = (\vec{K} \times \vec{L}) \times \vec{S}^X \text{ and}$$
$$E \times \vec{S}^Y = (\vec{L} \times \vec{K}) \times \vec{S}^Y ,$$

which can be recognized as a pair of Eigenvalue problems for the nonnegative matrices

$$\vec{K} \times \vec{L} \ (m \times m) \text{ and } \vec{L} \times \vec{K}(n \times n).$$

The Eigenvalue is E and the Eigenvectors are $\vec{S}^X$ and $\vec{S}^Y$.

The Frobenius Theorum guarantees [Ref. 9: p. 52] that

a. there exists a real, non-negative, largest Eigenvalue E (the same for both systems of equations), and

b. exists non-negative Eigenvectors $\vec{S}^X$ and $\vec{S}^Y$ (unique up to a scale factor) which satisfy the equations of the Eigenvalue problem.

Using the scores S_i^X and S_j^Y, the aggregated unit index values and force ratios can be computed.

C. COMBAT ANALYSIS MODEL (COMAN)

The COMAN model is developed to fill a need for a more efficient aggregated attrition model that can approximate the output of a more time intensive, high-resolution model. This section is a summary of the description presented in [Ref. 9: pp. 122-127]. The assumptions are as follows :

- The firepower allocation is dynamic and weapon effectiveness changes as forces move about the battlefield.
- The attrition rate at any point in time is equal to the sum of the individual weapon kill rates.
- Each firer-target pair interaction is considered as an independent event. As such, each time interval represents an individual battle that is independent of preceding and succeeding intervals of time.

The approach develops a series of maximum likelihood estimates for weapon kill rates which are balanced with values for probability that an opposing target will be undetected and with the prioritization of targets. These factors are then used to determine attrition within each time step in the aggregated simulation. To achieve this end, COMAN use input parameters from a high resolution model, based on various force mixes, tactical situations, weapon characteristics and terrain combinations in order to generate the corresponding attrition coefficients.

The maximum likelihood estimates for the attrition coefficients are computed for successive time intervals based only on the data relevant to that specific interval. The estimators are defined by analyzing the data from several replications of a high resolution battle which have similar tactical, force and terrain factors, where a battle is defined by firer-target pairings. For each set of battle data (i.e., the observations of each type firer-target pair) a maximum likelihood estimate is calculated and applied to a specific time interval within the aggregated model. This process is then repeated for all the time steps of the aggregated model. By using the maximum likelihood estimators of the parameters, the COMAN attrition rates are considered to be asymptotically unbiased and normally distributed with the smallest possible variance for any unbiased estimator.

The key to the COMAN methodology lies in the method that determines the time between casualties for the various firer-target groupings. Once this is achieved, the use of the maximum likelihood estimator produces a mathematically sound approximation of attrition for each interval. Since each interval is considered to be independent of the surrounding time steps and only data specific to that time step is considered, the resulting parameter is considered to be a valid estimator of combat intensity for that interval.

1. Derivation of the COMAN Maximum Likelihood Function

The complete description for the MLE is presented for the homogeneous case. The results for the heterogeneous case are given in the following section.

a. Homogeneous Combat

The description of the variables is as follows:

F|F is an aimed fire (square law) battle for both forces,

a = attrition rate of the X force by the Y force,

b = attrition rate of the Y force by the X force,

m = number of survivors in the X force,

n = number of survivors in the Y force,

S_x = random variables for the time until the next x casualty occurs, and

S_y = random variables for the time until the next y casualty occurs.

Homogeneous F|F combat is modelled either deterministically as

$$\frac{dx}{dt} = -ay$$

and

$$\frac{dy}{dt} = -bx$$

or stochastically as

$$P(x \text{ casualties in } \Delta t) = an\Delta t$$
$$p(y \text{ casualties in } \Delta t) = bm\Delta t$$

where casualties are assumed to occur randomly in accordance with a memoryless Markov process. If a casualty has just occurred which places the system into state

(m,n), then S_x and S_y are random variables for the time until the next x or y casualty occurs. Then the probability density functions can be written as

$$f_{S_x} = an\, e^{-(an+bm)s} \text{ and}$$
$$f_{S_y} = bm\, e^{-(bm+an)s} .$$

Given a detailed casualty history of a battle (i.e., high resolution simulation casualty data) with K equal to the total casualties to both sides, define

t_k = time of occurrence of the k-th casualty

$$C_k^X = \begin{bmatrix} 1 \sim & k-th \ casualty \ to \ X \\ 0 \sim & otherwise \end{bmatrix}$$

$$C_k^Y = \begin{bmatrix} 1 \sim & k-th \ casualty \ to \ Y \\ 0 \sim & otherwise \end{bmatrix}$$

C_T^X = total casualties to the X force
C_T^Y = total casualties to the Y force

$$C_T^X = \sum_{k=1}^{K} C_k^X$$

$$C_T^Y = \sum_{k=1}^{K} C_k^Y$$

and

m_k = size of X force after the k-th casualty
n_k = size of Y force after the k-th casualty.

It follows that

m_0 = X force size after 0 casualties (starting strength)
n_0 = Y force size after 0 casualties (starting strength).

From this information the maximum likelihood estimators, $\hat{a}$ and $\hat{b}$, can be determined for a and b.

By the memoryless property of the Markov process, the likelihood function is the simple product of the likelihoods for each of the independent kill-time events. The contribution of the k-th casualty to the likelihood function equals the probability that it uses the recorded amount of time to occur. In other words, if the k-th casualty is to X, it then contributes $f_{S_X}(t_k - t_{k-1})$ to the total casualty function, or

$$f_{S_X}(t_k - t_{k-1}) = an_{k-1}\ e^{-(an_{k-1} + bm_{k-1})(t_k - t_{k-1})}$$

and if the k-th casualty is to Y, then

$$f_{S_Y}(t_k - t_{k-1}) = bm_{k-1}\ e^{-(bm_{k-1} + an_{k-1})(t_k - t_{k-1})}.$$

The likelihood function is expressed for the k-th casualty as

$$l_k = (an_{k-1})^{C_k^X}(bm_{k-1})^{C_k^Y}\ e^{-(bm_{k-1} + an_{k-1})(t_k - t_{k-1})}$$

and for the whole battle as

$$L(a,b) = \prod_{k=1}^{K} l_k.$$

The MLEs for a and b are determined as follows :

$$\ln L(a,b) = \sum_{k=1}^{K} C_k^X \ln(an_{k-1}) + \sum_{k=1}^{K} C_k^Y \ln(bm_{k-1}) - \sum_{k=1}^{K}(an_{k-1} + bm_{k-1})(t_k - t_{k-1}).$$

Taking the partial derivates with respect to a and b, setting each to zero and solving for $\hat{a}$ and $\hat{b}$ yields :

$$\hat{a} = \frac{C_T^X}{\sum_{k=1}^{K} n_{k-1}(t_k - t_{k-1})}$$

and

$$\hat{b} = \frac{C_T^Y}{\sum_{k=1}^{K} m_{k-1}(t_k - t_{k-1})}$$

Note that the units for $\hat{a}$ are

$$\hat{a} = \frac{\text{total X force casualties}}{\text{total number of enemy-firer time units against X}}$$

and similarly for $\hat{b}$.

Comparing this to the standard definition for an F|F attrition coefficient,

a = number of X casualties / (Y firer × time) indicates that the MLE is a true estimator for attrition coefficients and not just a surrogate value such as firepower scores.

b. *Heterogeneous Combat*

The procedure for determinating attrition rate estimates, $\hat{a}$, and $\hat{b}$ in the heterogeneous combat model is the same as for homogeneous combat. The final estimated attrition rates for heterogeneous combat are as follows :

$$\hat{a}_{ij} = \frac{C_i^Y}{\sum_{k=1}^{K} n_{k-1}(t_k - t_{k-1})}$$

and

$$\hat{b}_{ij} = \frac{C_i^X}{\sum_{k=1}^{K} m_{k-1}(t_k - t_{k-1})}$$

$$\hat{a}_{ij} = \frac{\text{total X force i-type casualties caused by Y force j-type firers}}{\text{total Y force j-type firer time units against entire X force}}.$$

c. *Computation of attrition rates using COMAN MLE*

(1) An example for understanding the concept. Subsets of the JANUS(T) output are shown in Table 6 on page 34 and Table 5 on page 33. This output is used to illustrate the method of computing the attrition rate in COMAN MLE. The description of the variables is as follows :

OBS : sequence number of observations (casualties)

CIRIT : Y force casualties occurrence time

CIBIT : X force casualties occurrence time

C1R1V : Y casualty type

C1B1V : X casualty type

C1R1K : Y firer type (C1R1KT : numerical value)

C1B1K : X firer type (C1B1KT : numerical value)

SRTIME : sorted time for same type Y casualties by X force

SBTIME : sorted time for same type X casualties by Y force

DRTIME : time between casualties for same type Y force by X force

DBTIME : time between casualties for same type X force by Y force

The attrition rate is computed using A Programming Language (APL). The APL program is in Appendix D.

To compute the attrition rate for the homogeneous case, $\dot{a}$ equals the number of X force casualties divided by the number of Y force firer time units against X force. For the heterogeneous case, $\dot{a}_{ij}$ is the total number X force i-type casualties that are caused by Y force j-type firers divided by the total Y force j-type survivors multiplied by time. For example, a_{13} is computed in the following way. In Table 6 on page 34 the total number of X force type-1 (C1B1VT : 1 or Blue Tank) casualties caused by Y firer type3 is 3, and the initial size of Y force type-3 (C1R1VT : 3 or Red BMP) is 30 as discussed in Chapter II. The key point is the sorting of the time of occurrence of Red force casualties (C1R1T) in which C1R1VT equals 3, and then computing the time between casualties (called DRTIME). Thus, the total Y force type 3 firer time units are the sum of $30 \times 0.05 + 29 \times 0.48 + \ldots\ldots + 9 \times 2.02 = 548.8$. Finally, the attrition rate is computed as 3, the number of X force type 1 casualties caused by Y force type 3, divided by 548.8 which is 0.005466 for one replication.

(2) How the attrition rates are computed. An example of the computation of the attrition rates is shown in the previous section. The ten replications of the JANUS(T) simulation for each COA were combined as previously discussed.

The resulting A and B matrices from the COMAN MLE method using the data generated by the JANUS(T) system are then used in the potential anti-potential (Eigenvalue) method to determine the scores for each weapon system in the thesis. The weapon values are obtained using the APL function PAP listed in Appendix A.

Table 5. SAMPLE TABLE 1 (TOTAL RED CASUALTIES CAUSED BY ALL BLUE WEAPONS)

OBS	C1R1T	C1R1V	C1B1K	C1R1VT	C1B1KT	SRTIME	DRTIME
1	10.02	RTANK9	BTANK1	1	1	0.24	0.24
2	13.03	RTANK9	BTANK1	1	1	1.07	0.83
3	13.57	RTANK9	BTANK1	1	1	1.50	0.43
4	15.06	RTANK9	BTANK1	1	1	2.02	0.52
5	19.15	RTANK9	BTANK1	1	1	2.44	0.42
6	19.43	RTANK9	BTANK1	1	1	4.09	1.65
7	19.49	RTANK9	BTANK1	1	1	10.02	5.93
8	21.33	RTANK9	BTANK1	1	1	13.03	3.01
9	25.48	RTANK9	BTANK1	1	1	13.57	3.54
10	0.24	RTANK9	BAPC1	1	3	14.34	0.77
11	1.07	RTANK9	BAPC1	1	3	15.06	0.72
12	1.50	RTANK9	BAPC1	1	3	18.18	3.12
13	2.02	RTANK9	BAPC1	1	3	19.15	0.97
14	2.44	RTANK9	BAPC1	1	3	19.43	0.28
15	4.09	RTANK9	BAPC1	1	3	19.49	0.06
16	14.34	RTANK9	BAPC1	1	3	19.55	0.06
17	18.18	RTANK9	BAPC1	1	3	20.32	0.77
18	19.55	RTANK9	BAPC1	1	3	20.56	0.24
19	20.32	RTANK9	BAPC1	1	3	21.33	0.77
20	20.56	RTANK9	BAPC1	1	3	25.48	4.15
21	6.27	RAPC5	BTANK1	3	1	0.05	0.05
22	20.20	RAPC5	BTANK1	3	1	0.53	0.48
23	21.47	RAPC5	BTANK1	3	1	1.15	0.62
24	24.26	RAPC5	BTANK1	3	1	2.29	1.14
25	25.34	RAPC5	BTANK1	3	1	2.55	0.26
26	26.21	RAPC5	BTANK1	3	1	3.39	0.84
27	28.23	RAPC5	BTANK1	3	1	6.27	2.88
28	0.05	RAPC5	BAPC1	3	3	15.01	8.74
29	0.53	RAPC5	BAPC1	3	3	15.30	0.29
30	1.15	RAPC5	BAPC1	3	3	15.56	0.26
31	2.29	RAPC5	BAPC1	3	3	16.11	0.55
32	2.55	RAPC5	BAPC1	3	3	17.17	1.06
33	3.39	RAPC5	BAPC1	3	3	19.01	1.84
34	15.01	RAPC5	BAPC1	3	3	20.20	1.19
35	15.30	RAPC5	BAPC1	3	3	20.27	0.07
36	15.56	RAPC5	BAPC1	3	3	21.06	0.79
37	16.11	RAPC5	BAPC1	3	3	21.47	0.41
38	17.17	RAPC5	BAPC1	3	3	21.53	0.06
39	19.01	RAPC5	BAPC1	3	3	24.26	2.73
40	20.27	RAPC5	BAPC1	3	3	25.34	1.08
41	21.06	RAPC5	BAPC1	3	3	26.21	0.87
42	21.53	RAPC5	BAPC1	3	3	28.23	2.02
43	1.08	RSLD11	BAPC1	4	3	1.08	1.08
44	11.06	RSLD11	BAPC1	4	3	11.06	9.98
45	15.51	RSLD11	BSLDR9	4	4	15.51	4.45

D. ANALYSIS OF FORCE RATIO USING THE ATTRITION RATE

1. Overview

Using the attrition rates, the values for weapon systems are computed in the PAP. The total force values are calculated by multiplying the weapon system value times the number of that weapon system then summing their product. Finally, the force ratio

Table 6. SAMPLE TABLE 2 (TOTAL BLUE CASUALTIES CAUSED BY ALL RED WEAPONS)

OBS	C1B1T	C1B1V	C1R1K	C1R1KT	C1B1VT	SBTIME	DBTIME
1	9.29	BTANK1	RTANK9	1	1	2.38	2.38
2	20.41	BTANK1	RTANK9	1	1	9.29	6.91
3	2.38	BTANK1	RAPC5	3	1	15.01	5.72
4	15.01	BTANK1	RAPC5	3	1	20.41	5.40
5	25.34	BTANK1	RAPC5	3	1	25.34	4.93
6	2.29	BAPC1	RTANK9	1	3	0.07	0.07
7	5.19	BAPC1	RTANK9	1	3	2.29	2.22
8	6.40	BAPC1	RTANK9	1	3	2.53	0.24
9	8.58	BAPC1	RTANK9	1	3	4.11	1.58
10	16.03	BAPC21	RTANK9	1	3	5.19	1.08
11	19.12	BAPC1	RTANK9	1	3	6.26	1.07
12	0.07	BAPC1	RAPC5	3	3	6.40	0.14
13	2.53	BAPC1	RAPC5	3	3	8.58	2.18
14	4.11	BAPC1	RAPC5	3	3	13.12	4.54
15	6.26	BAPC1	RAPC5	3	3	13.38	0.26
16	13.12	BAPC21	RAPC5	3	3	13.49	0.11
17	13.38	BAPC1	RAPC5	3	3	16.03	2.54
18	13.49	BAPC1	RAPC5	3	3	19.12	3.09
19	22.33	BAPC1	RAPC5	3	3	22.33	3.21

is computed to determine the best course of action for the Blue force. In this section the total casualties, attrition rates, weighted values, and force ratio are analyzed.

2. Total Casualties from the JANUS(T) System

The total casualties of both forces with COA1 are listed in Table 7 on page 35 and Table 8 on page 35. Casualties with COA2 are shown in Table 9 on page 36 and Table 10 on page 36. The casualties of the Red force with COA1 are larger than with COA2 and the casualties of the Blue force with COA1 are less than COA2 because of the offensive tactic of the Blue force. The Blue force tank and TOW and the Red force tank and BMP are the primary weapon systems for each force.

There are two apparent anomalies that merit comment in the JANUS(T) runs. First, all of the artillery survives and the artillery does not kill any of the opposing force. The reasons for no attrition by artillery may be explained by the following:

- PK is very small for moving target when using high explosive ammunition,
- Rounds limited to 18 per total replication,
- Target is moved from predetermined target area, and
- Suppression--weapon is hit by the artillery and it is not killed but it can not fire.

The lack of artillery casualties may be explained because the artillery is in defilade and well covered by the mountainous terrain. Therefore, there is no line space of sight with direct-fire weapons and counter-battery efforts are ineffective.

The second apparent anomaly is that Red BMPs kill more than twice as many Blue tanks than Red tanks in COA2. Possible reasons are the following:

- BMP guided missile has a range longer than the tank and
- battle engagements are from long ranges in the scenario.

The BMPs are particularly effective on Avenue 1 and Avenue 2 because there is more open space and greater engagement ranges than on Avenues 3 and 4.

Table 7 and Table 8 present total casualties by weapon system in the ten runs of the JANUS(T) system for COA1.

Table 7. TOTAL CASUALTIES OF THE RED BY THE BLUE WITH COA1 IN JANUS(T) SYSTEM

Weapon Type BLUE	Tank Red	Artillery Red	BMP Red	Anti-Tank Red	Total
Tank	115	0	43	0	258
Artillery	0	0	0	0	0
TOW	98	0	170	20	288
Anti-Tank	0	0	2	2	4
Total	213	0	215	22	450

Table 8. TOTAL CASUALTIES OF THE BLUE BY THE RED WITH COA1 IN JANUS(T) SYSTEM

Weapon Type RED	Tank Blue	Artillery Blue	TOW Blue	Anti-Tank Blue	Total
Tank	17	0	36	2	55
Artillery	0	0	0	0	0
BMP	26	0	89	0	115
Anti-Tank	0	0	2	0	2
Total	43	0	127	2	172

Table 9 on page 36 and Table 10 on page 36 present casualties by weapon system for the dynamic defense or Course of Action 2. In comparing the total casualties

in the two courses of action Blue has 172 total casualties with COA1 and 391 with COA2 while those of the Red force change from 450 to 551. Based on total casualty figures, COA1 appears to be clearly better for the Blue force.

Table 9. TOTAL CASUALTIES OF THE RED BY THE BLUE WITH COA2 USING THE JANUS(T) SYSTEM

Weapon Type BLUE	Tank Red	Artillery Red	BMP Red	Anti-Tank Red	Total
Tank	142	0	78	31	251
Artillery	0	0	0	0	0
TOW	86	0	170	11	267
Anti-Tank	5	0	2	26	33
Total	233	0	250	68	551

Table 10. TOTAL CASUALTIES OF THE BLUE BY THE RED WITH COA2 USING THE JANUS(T) SYSTEM

Weapon Type RED	Tank Blue	Artillery Blue	TOW Blue	Anti-Tank Blue	Total
Tank	56	0	13	41	110
Artillery	0	0	0	0	0
BMP	108	0	165	0	273
Anti-Tank	6	0	2	0	8
Total	170	0	180	41	391

Table 11 on page 37 and Table 12 on page 37 summarize total casualties and survivors for both course of action in the ten runs of the JANUS(T) system. Blue kills more Red in COA2 (than COA1) but at a cost of more than twice as many Blue casualties. By moving from its prepared positions (of COA1), Blue is easier for Red to detect and kill.

3. Attrition rates from the COMAN MLE

Attrition rates are a core part of this thesis because they are necessary for the determination of the weapon system values. There are two attrition rates, a_i and b_i for COA1 and COA2. The COMAN MLE attrition rates of both forces with COA1 are

Table 11. TOTAL CASUALTIES FROM 10 RUNS IN THE JANUS(T) SYSTEM

Course of Action	Tank Blue	Arty Blue	TOW Blue	A-T Blue	Total Blue	Tank Red	Arty Red	BMP Red	A-T Red	Total Red
COA1	43	0	127	2	172	213	0	215	22	450
COA2	170	0	180	41	391	233	0	250	68	551

Table 12. TOTAL SURVIVORS FROM 10 RUNS IN THE JANUS(T) SYSTEM

Course of Action	Tank Blue	Arty Blue	TOW Blue	A-T Blue	Total Blue	Tank Red	Arty Red	BMP Red	A-T Red	Total Red
COA1	157	60	53	98	368	187	120	85	178	570
COA2	30	60	0	59	149	147	120	50	132	449

listed in Table 13 on page 38 and Table 14 on page 38 and attrition rates for COA2 are listed in Table 15 on page 38 and Table 16 on page 39.

The attrition rate of the Red force by the Blue force is quite different in COA1 and COA2. Not only does the Blue force acts differently, but the Red force may have additional targets from which to choose.

As would be expected from the analysis of the total casualties, the COMAN MLE rates for each weapon system parallel the number of casualties because attrition rates are computed from casualty time-series data. The attrition rates of the Blue force by Red force with COA1 are slightly less than those of COA2. The attrition rate by artillery is zero because the artillery is not effective for either force in either course of action.

4. Weighted Values from the PAP Method

Table 17 on page 39 and Figure 5 on page 40 show the values of each weapon system which are computed using the PAP method. The initial and final value for the weapon systems are the same because the same attrition rates are used in PAP. The

Table 13. ATTRITION RATE OF RED FORCE BY BLUE FORCE IN COMAN MLE (COA1)

Weapon Type BLUE	Tank Red	Artillery Red	BMP Red	Anti-Tank Red
Tank b_1	0.0253	0	0.0095	0
Artillery b_2	0	0	0	0
TOW b_3	0.0379	0	0.0658	0.0077
Anti-Tank b_4	0	0	0.0017	0.0017

Table 14. ATTRITION RATE OF BLUE FORCE BY RED FORCE IN COMAN MLE (COA1)

Weapon Type RED	Tank Blue	Artillery Blue	TOW Blue	Anti-Tank Blue
Tank a_1	0.0020	0	0.0042	0.0002
Artillery a_2	0	0	0	0
BMP a_3	0.0044	0	0.0153	0
Anti-Tank a_4	0	0	0.0005	0

Table 15. ATTRITION RATE OF RED FORCE BY BLUE FORCE IN COMAN MLE (COA2)

Weapon Type BLUE	Tank Red	Artillery Red	BMP Red	Anti-Tank Red
Tank b_1	0.0432	0	0.0237	0.0094
Artillery b_2	0	0	0	0
TOW b_3	0.0321	0	0.0634	0.0041
Anti-Tank b_4	0.0019	0	0.0008	0.0101

most effective weapon of either force in both courses of action is TOW (in the Blue force) because its long-range capability gives it a comparative advantage in the battle scenario. A comparison of COA1 and COA2 in Figure 5 on page 40 shows that the value of the Red force is increased and the Blue force is decreased with COA2. It means

Table 16. ATTRITION RATE OF BLUE FORCE BY RED FORCE IN COMAN MLE (COA2)

Weapon Type RED	Tank Blue	Artillery Blue	TOW Blue	Anti-Tank Blue
Tank a_1	0.0069	0	0.0016	0.0050
Artillery a_2	0	0	0	0
BMP a_3	0.0209	0	0.0319	0
Anti-Tank a_4	0.0012	0	0.0004	0

that the relative force of the Red force increases thus force ratio (for Blue) is reduced with COA2.

The weapon system values are computed by PAP method to be used for calculating the total force ratio.

Table 17. THE VALUE OF EACH WEAPON USING PAP

Course of Action	Tank Blue	Arty Blue	TOW Blue	A-T Blue	Tank Red	Arty Red	BMP Red	A-T Red
COA1	1	0	4.5884	0.1028	0.6074	0	2.1127	0.0693
COA2	1	0	2.3260	0.0426	0.2066	0	1.8136	0.0415

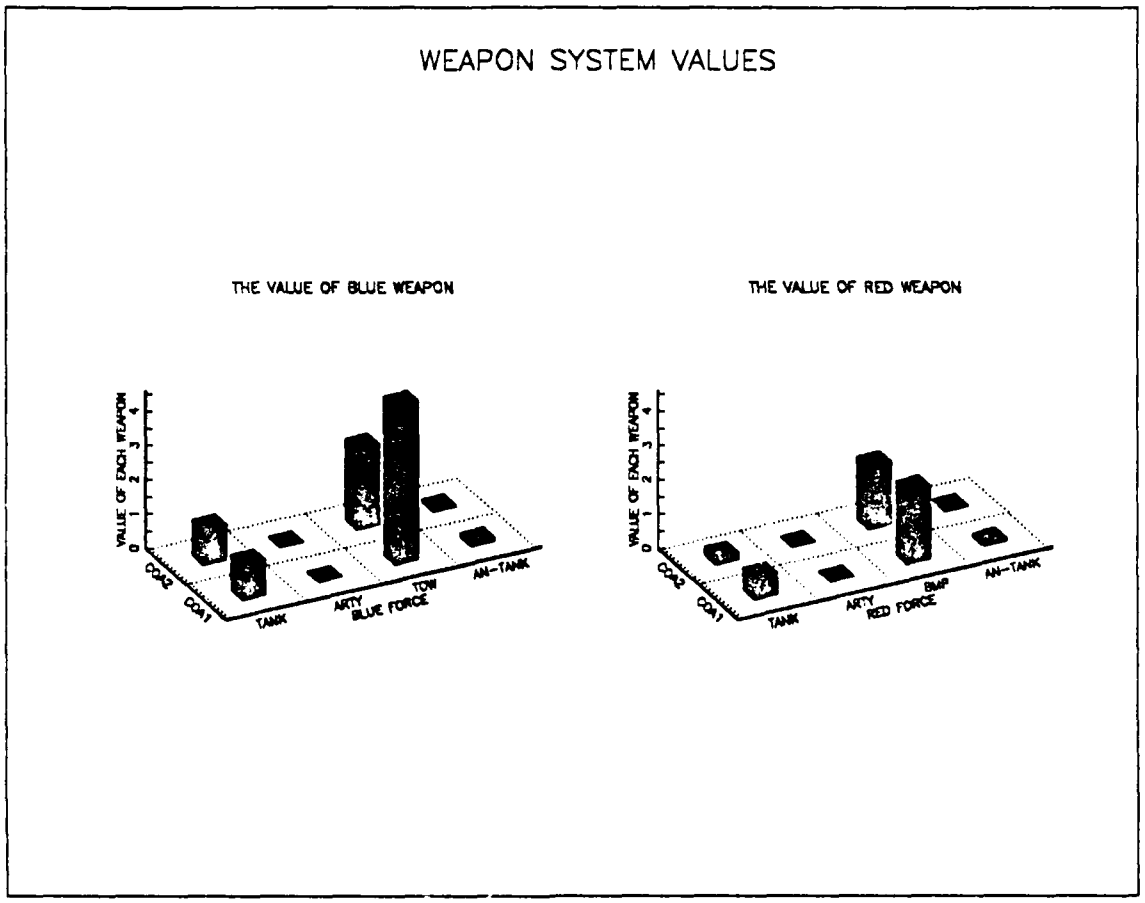

Figure 5. The Values of Each Weapon Using PAP

5. Force and Force Ratio using PAP

The PAP initial values for each weapon system are shown in Table 18 on page 42 and Table 19 on page 42 and the initial total force value is shown in Table 20 on page 43 and Figure 6 on page 43. The initial Blue force value is slightly larger than the Red force value with COA1 but it is smaller with COA2. This is because weapon system values were computed from the attrition rate coefficients which are different for the two courses of action. The initial force ratio for COA1 is

$$FR_{COA1} = \frac{1128.7}{890.61} = 1.2673$$

For COA2, the resulting force ratio is .

$$FR_{COA2} = \frac{622.94}{634.99} = 0.98102$$

$$\text{Initial FR change with COA1 and COA2} = \frac{0.98102 - 1.2673}{1.2673} = -0.2259$$

These results show that COA2 produces a 23 percent decrease in the initial force ratio over COA1. Based upon this method of analysis, COA1 is preferred to COA2.

The PAP final force values for each weapon system are shown in Table 21 on page 44 and Table 22 on page 44. The final total force values and force ratios are shown in Table 23 on page 45.

The final force ratio is computed by using the weighted value and the final survivors for each weapon system. The final force ratio with COA1 is

$$FR_{COA1} = \frac{410.26}{305.48} = 1.3430$$

and with COA2 it is

$$FR_{COA2} = \frac{32.51}{126.5} = 0.2570$$

$$\text{Final FR change with COA1 and COA2} = \frac{0.2570 - 1.3430}{1.3430} = -0.81$$

$$\text{FR change from initial to final with COA1} = \frac{1.3430 - 1.2673}{1.2673} = 0.0597$$

$$\text{FR change from initial to final with COA2} = \frac{0.2570 - 0.98102}{0.98102} = -0.7452$$

The initial force ratio with COA1 is 1.2673 and with COA2 is 0.98 (from Table 20 on page 43). The final force ratio is 1.3430 with COA1 and 0.2570 with COA2. The conclusion is that COA1 is better than the COA2 in terms of the force ratio. The force ratio is increased by 5.9 percent with COA1 and 74.5 percent less with COA2 because the Red force has more casualties at a closer range with COA1 and the Blue force has more casualties with COA2 as the battle progresses.

Table 18. INITIAL FORCE WITH COA1 USING PAP

Weapon System	S_i^x	X_i	$S_i^x X_i$
Tank	1	200	200
Artillery	0	60	0
TOW	4.5884	180	825.9
Anti-Tank	0.1028	100	102.8
		$V_x =$	1128.7
Weapon System	S_j^y	Y_j	$S_j^y Y_j$
Tank	0.6074	400	243.0
Artillery	0	120	0
BMP	2.1127	300	633.8
Anti-Tank	0.0693	200	13.8
		$V_y =$	890.6

Table 19. INITIAL FORCE WITH COA2 USING PAP

Weapon System	S_i^x	X_i	$S_i^x X_i$
Tank	1	200	200
Artillery	0	60	0
TOW	2.3260	180	418.7
Anti-Tank	0.0425	100	4.3
		$V_x =$	622.9
Weapon System	S_j^y	Y_j	$S_j^y Y_j$
Tank	0.2066	400	82.6
Artillery	0	120	0
BMP	1.8135	300	544.1
Anti-Tank	0.0415	200	8.3
		$V_y =$	635.0

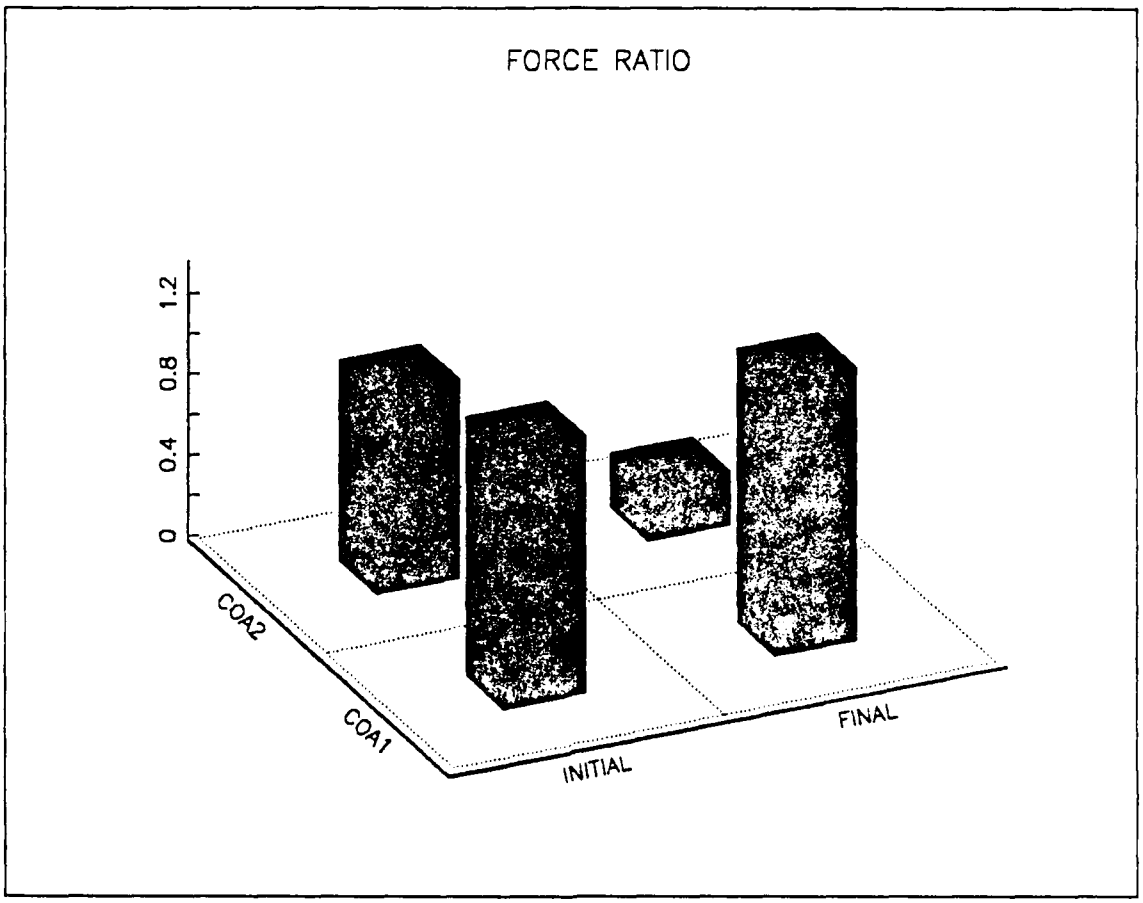

Figure 6. The Initial Total Force

Table 20. INITIAL TOTAL FORCE AND RATIO

Course of Action	Blue	Red	FR
COA1	1128.7	890.6	1.267
COA2	622.9	635.0	0.98

Table 21. FINAL FORCE WITH COA1 USING PAP

Weapon System	S_i^x	X_i	$S_i^x X_i$
Tank	1	157	157
Artillery	0	60	0
TOW	4.5884	53	243.2
Anti-Tank	0.1028	98	10.1
		$F_x =$	410.3
Weapon System	S_j^y	Y_j	$S_j^y Y_j$
Tank	0.6094	187	113.6
Artillery	0	120	0
BMP	2.1127	85	179.6
Anti-Tank	0.0693	178	12.3
		$F_y =$	305.5

Table 22. FINAL FORCE WITH COA2 USING PAP

Weapon System	S_i^x	X_i	$S_i^x X_i$
Tank	1	30	30
Artillery	0	60	0
TOW	2.3260	0	0
Anti-Tank	0.0425	59	2.5
		$F_x =$	32.5
Weapon System	S_j^y	Y_j	$S_j^y Y_j$
Tank	0.2066	147	30.4
Artillery	0	120	0
BMP	1.8135	50	90.7
Anti-Tank	0.0415	132	5.5
		$F_y =$	126.5

Table 23. FINAL FORCE AND RATIO

Course of Action	Blue	Red	FR
COA1	410.3	305.58	1.343
COA2	32.5	126.50	0.2569

E. HETEROGENEOUS LANCHESTER SIMULATION

1. Overview

The Lanchester simulation incorporates both the attrition rate and the PAP results in each time-step of the simulation. The force ratio can be computed for each time step as needed. First, the raw data from the JANUS(T) system are manipulated by the COMAN MLE in the usual manner to produce the attrition rates for COA1 and COA2. The weapon system value of each weapon in the time-step simulation is computed by the potential-antipotential method. The number of survivors are computed to calculate the changing force ratio corresponding to the increased simulation time with a different ω parameter. The Helmbold parameter, ω_X, is related to the degree to which the X force conducts aimed area fire against the Y force and ω_Y similarly relates the Y force engaging the X force.

For the Lanchester simulation, the accepted ω for the linear (area fire) law is close to a value of 0.5 and for the square (aimed fire) law is a value close to 1.0. The casualties of each force are computed using Equation 4.7 and 4.8 in the Lanchester simulation. The program is listed in Appendix F. The Hembold attrition model performs the evaluation.

The Hembold version of the Lanchester model accounts for the effect of the force ratio on the relative fire effectiveness of each force. Limitations of space, terrain, masking and target engagement opportunities affect the value of ω. The Hembold model is given by

$$\frac{dX_i}{dt} = -A_{ij}\left(\frac{X_i}{Y_j}\right)^{1-\omega_Y} Y_j \text{, for all } i \tag{4.7}$$

and

$$\frac{dY_j}{dt} = -B_{ji}\left(\frac{Y_j}{X_i}\right)^{1-\omega_X} X_i \text{, for all } j \tag{4.8}$$

where

$X_i =$ current number of X force type i weapons
$Y_j =$ current number of Y force type j weapons
$A_{ij} =$ rate at which one Y_j system kills X_i systems
$B_{ji} =$ rate at which one X_i system kills Y_j systems.
$\omega_X, \omega_Y =$ Hembold shaping parameters for X,Y .

The reason that the A_{ij} and B_{ji} matrices are not changed during the Lanchester simulation run is that they were estimated for the entire battle as opposed to battle phase estimates. Had different A_{ij} and B_{ji} estimates been generated in the JANUS(T) system for various ranges of engagements, these could be used in the Lanchester simulation.

2. Simulation Procedures

a. Overview

The range changes for each time step of the simulation. It caused a change in the force sizes and the force ratio with each time-step. Four pairs of the Hembold shape parameters are used to evaluate the change of force ratio in each simulation for various combinations of Lanchester aimed area fire combat. The simulation is conducted using the APL function LANSIM listed in Appendix F. The battle begins at a range of 5500 meters, with both forces advancing at a rate of 200 meters minute. The distance of 5500 meters was used in the JANUS(T) system at the start of the game except for the special troop mission. The starting range for the Lanchester simulation must correspond to the ranges used in the JANUS(T) system. At each one minute time step, the simulation performs the following sequence of calculations:

1) Determines the current weapon values and force ratio using the potential anti-potential method.

2) Determines the Red force and Blue force losses as given by Equations (4.8) and (4.7), respectively.

3) Increments the time, decrements the range, and updates the current force levels.

4) Checks whether either force has reached its breakpoint (45 % of the original force level for both forces).

5) Checks whether the range between Red and Blue is less than or equal to 500 meters. If not, loop back to (1). If it is, the battle is terminated and the final output is produced.

The simulation is run four times each for COA1 and COA2 with different Hembold shaping parameters. The output is presented in Appendix G.

b. Lanchester Simulation Results

Table 24 shows the simulation results using an ω value of 0.9 for each force. The value of Survivor Force Ratio (SFR) differs from the value of the PAP-force ratio in this case.

Table 24. LANCHESTER SIMULATION RESULTS

Course of Action	Final Range	Blue % Remaining	Red % Remaining	TKR	SFR	PAP FR
COA 1	200	72.9	59.95	3.74	0.64	1.1325
COA 2	200	46.89	46.11	2.0	0.54	1.34

Both of the SFR values are less than PAP-FR because the valuing system is different even though the total number of casualties are the same for SFR and PAP-FR. A smaller SFR in comparison to the PAP-FR indicates that either more of the less-effective Blue force weapons are killed or more of the valuable Red force weapons are killed proportionally in each force. In COA2, both Red and Blue have more casualties than COA1 because it is a more destructive battle than COA1. In COA2, the percent survivors for each force are almost the same, but the SFR is 0.54. More of the valuable Blue force and less-effective Red force weapons survive in relative terms. The value of SFR with COA1 is larger than COA2 because more Blue casualties occur in COA2. The key point is that the valued FR provides insights into the actual combat power of the two forces as opposed to the unweighted ratio, SFR.

Finally, the effect on FR of various combinations of aimed area fire battles are shown in Figure 7 on page 48. The values of FR are substantially affected by the

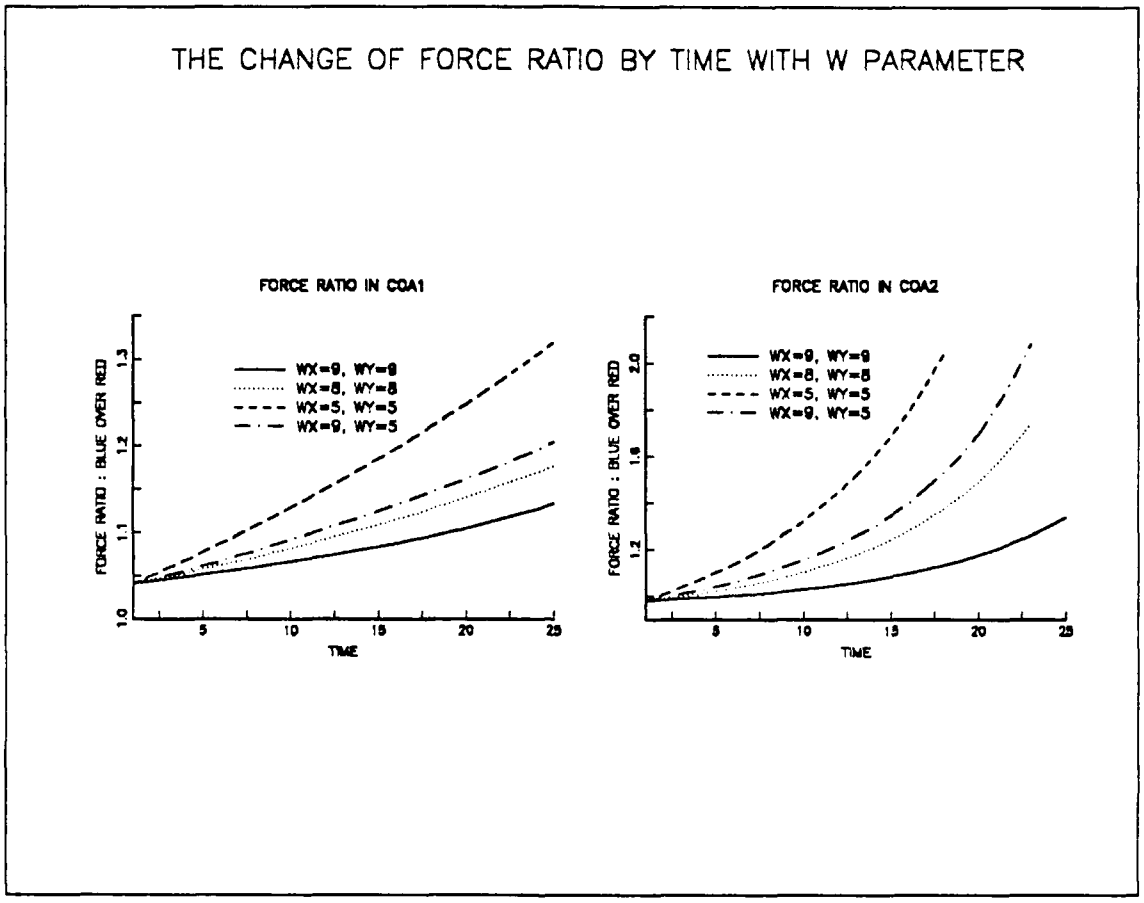

Figure 7. The Change of Force Ratio with W Parameter in Simulation

type of battle being conducted. For example, when $\omega_X = \omega_Y = 0.9$, both sides are conducting primarily aimed fire. This case is least favorable to Blue because of Red's advantage in numbers. In contrast, the linear law battle (where $\omega_X = \omega_Y = 0.5$) is most favorable to Blue because it negates the effect of a larger force.

An interesting area for future research is to develop relationships between terrain, environment, force dispositions, and appropriate values of ω_X and ω_Y . It is suggested that data from the National Training Center may be useful for this research.

V. SUMMARY AND RECOMMENDATIONS

A. SUMMARY

The purpose of this thesis has been to compare alternative tactics using several methodological approaches. As previously discussed the killer victim data generated by JANUS (T) was the start point of the analysis. The attrition rates and weapon system values for the other analytical methods were then computed using the JANUS (T) data. The comparison is based on the analysis of the attrition rates for each course of action. The results from the three analysis methods are summarized in Table 25.

Table 25. ANALYSIS SUMMARY

Method	MOE	COA1	COA2	Recommended COA
PAP Initial	FR	1.267	0.981	COA1
PAP Final	FR	1.343	0.257	COA1
JANUS(T) System	TKR SFR	6 0.646	1.476 0.332	COA1 COA1
Lanchester Simulation	FR TKR SFR	1.13 3.74 0.64	1.34 2.0 0.54	COA2 COA1 COA1

The three methods indicate that COA1 is consistently better than COA2. Although there are easier methods to determine the better course of action for the Blue force in this scenario, sophisticated analysis methods are used for the purpose of establishing quantitative values to ultimately provide force ratios. The results of the JANUS(T) system and the Lanchester simulation compare favorably, especially the unweighted SFR. The Lanchester simulation may be a good surrogate for the JANUS(T) system, given that the attrition rates are valid.

Although the quantitative methods for determining force ratios are not comparable with subjective methods, it is significant that the force ratios derived from the final PAP values were on either side of the value of 0.653 which is based on military experience of the author (see Chapter III). A bias would be indicated if all of the values were above

or below the subjective force ratio (ie., if the analytic values were very far removed from the subjective results, then the validity of either the subjective or analytical assumptions would be in question). The subjective values were determined before the analytical results were available.

B. RECOMMENDATION

It is recommended that additional scenarios, possibly using a different high resolution simulation, be evaluated using the methodologies described in this thesis. Because of the possible anomolies of the performance of field artillery and North Korean BMP's, the actual force ratios from this study should be subjected to further investigations.

Future research should focus on ultilization of the total methodological approach of this thesis to investigate a variety of scenarios facing South Korean forces.

APPENDIX A. POTENTIAL-ANTIPOTENTIAL METHOD (PAP)

The APL program, **A PAP B**, uses a series of subroutines to compute the weapon system values from the respective attrition matrices of the Blue and Red forces. The routines are available as public libraries on the Naval Postgraduate School computer system. The attrition matrix is used by the potential-antipotential method to compute weapon system values.

APL PROGRAM

```
      ∇ A PAP B
[1]   AB←A+.×B
[2]   BA←B+.×A
[3]   N←4
[4]   LAM←((EIGENR AB)[1;1])
[5]   RTLAM←LAM*0.5
[6]   ID←((N,N)ρ1,Nρ0)
[7]   ID←((N,N)ρ1,Nρ0
[8]   ABID←AB-(LAM×ID)
[9]   ABID←(1,((N-1)ρ0)),[1] ABID
[10]  D← 5 1 ρ 1 0 0 0 0
[11]  SX←D⌹ABID
[12]  BAID←BA-(LAM×ID)
[13]  BAID←(A[1;]),[1] BAID
[14]  E←(RTLAM),(Nρ0)
[15]  SY←E⌹BAID
[16]  VXSUB←+/[1](SX×(4 1 ρX[T;]))
[17]  VYSUB←+/(SY×Y[T;])
[18]  FSUB←VXSUB+VYSUB
      ∇


      ∇ VEC←EIGENR H
[1]  ⍝REVISED MARCH 15, 1978
[2]   VEC←(EIGEN H)[1;;]
      ∇


      ∇ VEC←EIGEN H;L1;K1;D;DD;Z;WR;WI
[1]  ⍝REVISED OCTOBER 6, 1977
[2]   →L100×⍳0<EQRH3F EHBCKF EHESSF EBALAF H
[3]   →L200,,VEC←SEPR EBBCKF Z
[4]  L100:VEC←(2 1 ,ρWR)ρWR,WI
[5]  L200:→0
```

APPENDIX B. THE JANUS SYSTEM DATA

EXAMPLE DATA FOR JANUS(T) SYSTEM TO BE USED IN SAS PROGRAM

The JANUS(T) output is sequential in terms of occurrence time. In the sample below, the Blue casualties from Red firers is listed according to weapon type. The data is then used by SAS procedures. This is the JANUS data file from which the example in Chapter IV., pp 33-35, was produced.

	BLUE FORCE CASUALTY							RED FORCE FIRER						
Time		ID		Type	Area			ID		Type	Area			Weapon
0.07	DF	58	BLUE	BAPC1	297.8	198.8	1	153	RED	RAPC5	299.4	198.7	1.69	MISSILE-1
2.29	DF	66	BLUE	BAPC1	293.2	198.4	1	34	RED	RTANK9	292.1	197.7	1.23	TANK RND8
2.38	DF	4	BLUE	BTANK1	298.5	198.0	1	153	RED	RAPC5	299.4	198.5	0.97	MISSILE-1
2.53	DF	61	BLUE	BAPC1	293.4	198.3	1	141	RED	RAPC5	292.2	197.7	1.30	MISSILE-1
4.11	DF	53	BLUE	BAPC1	297.6	198.3	1	153	RED	RAPC5	299.3	198.3	1.70	MISSILE-1
5.19	DF	64	BLUE	BAPC1	293.4	196.9	1	34	RED	RTANK9	292.3	197.5	1.21	TANK RND8
6.26	DF	57	BLUE	BAPC1	296.2	196.6	1	141	RED	RAPC5	292.3	197.5	3.99	MISSILE-1
6.40	DF	65	BLUE	BAPC1	292.9	196.8	1	34	RED	RTANK9	292.3	197.4	0.83	TANK RND5
8.58	DF	63	BLUE	BAPC1	297.6	198.2	1	24	RED	RTANK9	299.1	198.6	1.57	TANK RND8
9.29	DF	19	BLUE	BTANK1	293.4	197.1	1	17	RED	RTANK9	292.4	197.4	1.13	TANK RND8
13.12	DF	52	BLUE	BAPC21	296.3	196.5	1	153	RED	RAPC5	298.5	197.5	2.40	LT ARMOR2
13.38	DF	69	BLUE	BAPC1	296.8	196.6	1	153	RED	RAPC5	298.5	197.5	1.89	LT ARMOR2
13.49	DF	71	BLUE	BAPC1	297.4	198.3	1	153	RED	RAPC5	298.5	197.5	1.34	LT ARMOR2
15.01	DF	2	BLUE	BTANK1	293.9	196.8	1	139	RED	RAPC5	292.3	197.4	1.65	MISSILE-1
16.03	DF	53	BLUE	BAPC21	293.4	196.6	1	34	RED	RTANK9	293.0	196.7	0.37	TANK RND8
19.12	DF	62	BLUE	BAPC1	298.5	197.7	1	24	RED	RTANK9	298.6	197.7	0.09	TANK RND5
20.41	DF	12	BLUE	BTANK1	298.2	197.8	1	24	RED	RTANK9	298.5	197.6	0.37	TANK RND5
22.33	DF	68	BLUE	BAPC1	293.8	196.4	1	148	RED	RAPC5	293.8	197.8	1.35	MISSILE-1
25.34	DF	20	BLUE	BTANK1	294.1	196.4	1	136	RED	RAPC5	293.8	197.9	1.57	MISSILE-1

APPENDIX C. SAS STATEMENTS

PROGRAM LISTING WITHOUT DATA FILE

The SAS software takes the JANUS(T) output file and generates a data file which is then used by the APL program. For example, the Blue casualties by Red firers are read. The SAS program sorts the Blue casualties by weapon type and establishes the intervals for that specific casualty.

```
DATA C1b1;
     CMS FILEDEF DD1 DISK C1b1 DATA;
     INFILE DD1;
     INPUT                    C1B1T       2-6     C1B1V  $   30-35
          c1r1K    $ 76-81;

     IF      UPCASE(c1R1k) = 'RTANK9'     THEN c1R1kT = 01;
     ELSE IF UPCASE(c1R1k) = 'RARTY4'     THEN c1R1kT = 02;
     ELSE IF UPCASE(c1R1k) = 'RAPC5'      THEN c1R1kT = 03;
     ELSE IF UPCASE(c1R1k) = 'RSLD11'     THEN c1R1kT = 04;
     ELSE IF UPCASE(c1R1k) = 'RSLD14'     THEN c1R1kT = 04;

     IF      UPCASE(c1b1v) = 'BTANK1'     THEN c1B1vT = 01;
     ELSE IF UPCASE(c1B1v) = 'BARTY3'     THEN c1B1vT = 02;
     ELSE IF UPCASE(c1B1v) = 'BAPC1'      THEN c1B1vT = 03;
     ELSE IF UPCASE(c1B1v) = 'BAPC21'     THEN c1B1vT = 03;
     ELSE IF UPCASE(c1B1v) = 'BSLDR6'     THEN c1B1vT = 04;
     ELSE IF UPCASE(c1B1v) = 'BSLDR9'     THEN c1B1vT = 04;

proc sort data=c1b1;
     by c1b1vt c1r1kt c1b1t;
data sasfile.c1b1;
     set c1b1;
     dtime=c1b1t-lag(c1b1t);
     IF C1B1VT ¬= LAG(C1B1VT) | C1R1KT ¬= LAG(C1R1KT) THEN
     dtime=c1b1t;
```

```
options linesize=80;
title 'clblvt by clrlkt';
proc print data=sasfile.clbl;

options linesize=80;
title 'clblvt by clrlkt';
proc means data=sasfile.clbl;
var dtime;
by clblvt clrlkt;
```

APPENDIX D. COMAN MLE PROGRAM

APL PROGRAM TO CALCULATE ATTRITION RATES

The COMAN MLE methodology is programmed in APL to produce attrition rate estimates from the JANUS(T) casualty time histories.

```
      ∇ ATTRITION
[1]   ⍝THIS PROGRAM IS TO COMPUTE THE ATTRITION RATE
[2]   ⍝OF RED AND BLUE FORCE BY USING COMAN MLE.
[3]    INBLUE← 200 60 180 100
[4]    INRED← 400 120 300 200
[5]    I←MATAIJ←1
[6]   LOOP1:→(I>4)/FINISH
[7]    J←1
[8]   LOOP2:→(J>4)/GO
[9]    RCAS←+/((C1B1KT=I)∧(C1R1VT=J))
[10]   TBCAS←+/(C1B1VT=I)
[11]   BLUET←(C1B1VT=I)/C1B1T
[12]   B1TIME←BLUET[⍋BLUET]
[13]   AG←1+SOTB←0
[14]   B1TIME←0,B1TIME
[15]  AGAINB:→(AG>TBCAS)/LAGAINB
[16]   AG←AG+1
[17]   B2TIME←B1TIME[AG]-B1TIME[AG-1]
[18]   SOTB←SOTB,B2TIME
[19]   →AGAINB
[20]  LAGAINB:SOTB←1↓SOTB
[21]   →((C1B1VT=I)≠0)/SPECIAL
[22]   HANSUM←(INBLUE[I])×30
[23]   AIJ←RCAS÷HANSUM
[24]   →BYPASS
[25]  SPECIAL:REPEAT←⍴SOTB
[26]   SUMM←0
[27]   P←1
[28]  LOOP3:→(P>REPEAT)/DONE
[29]   SUMMT←(INBLUE[I]+1-P)×SOTB[P]
[30]   SUMM←SUMM+SUMMT
[31]   P←P+1
[32]   →LOOP3
[33]  DONE:→(SUMM≠0)/TRANS
[34]   AIJ←0
[35]   →BYPASS
[36]  TRANS:AIJ←(RCAS÷SUMM)
```

```
[37] BYPASS:MATAIJ←MATAIJ,AIJ
[38]  J←J+1
[39]  →LOOP2
[40] GO:I←I+1
[41]  →LOOP1
[42] FINISH:MATAIJ←1↓MATAIJ
[43] ⍝TO COMPUTE ATTRITION RATE OF BLUE FORCE BY RED FORCE
[44]  J←MATBJI←1
[45] LOOP11:→(J>4)/HAHA
[46]  I←1
[47] LOOP12:→(I>4)/KEEPGO
[48]  BCAS←+/((C1R1KT=J)∧(C1B1VT=I))
[49]  TRCAS←+/(C1R1VT=J)
[50]  REDT←(C1R1VT=J)/C1R1T
[51]  R1TIME←REDT[⍋REDT]
[52]  BG←1+SOTR←0
[53]  R1TIME←0,R1TIME
[54] AGAINR:→(BG>TRCAS)/LAGAINR
[55]  BG←BG+1
[56]  R2TIME←R1TIME[BG]-R1TIME[BG-1]
[57]  SOTR←SOTR,R2TIME
[58]  →AGAINR
[59] LAGAINR:SOTR←1↓SOTR
[60]  →((C1R1VT=J)≠0)/SPECIALR
[61]  HANSUMR←(INRED[J])×30
[62]  BJI←BCAS÷HANSUMR
[63]  →DIFFERENCE
[64] SPECIALR:REPLI←⍴SOTR
[65]  SUMMR←0
[66]  Q←1
[67] LOOP13:→(Q>REPLI)/LAST
[68]  SUMMRT←(INRED[J]+1-Q)×SOTR[Q]
[69]  SUMMR←SUMMR+SUMMRT
[70]  Q←Q+1
[71]  →LOOP13
[72] LAST:→(SUMMR≠0)/TRANSFER
[73]  BJI←0
[74]  →DIFFERENCE
[75] TRANSFER:BJI←(BCAS÷SUMMR)
[76] DIFFERENCE:MATBJI←MATBJI,BJI
[77]  I←I+1
[78]  →LOOP12
[79] KEEPGO:J←J+1
[80]  →LOOP11
[81] HAHA:MATBJI←1↓MATBJI
[82]  →⍳0
      ∇
```

APPENDIX E. THE ATTRITION RATE MATRICES FOR EACH COURSE OF ACTION

THE ATTRITION RATES WITH COA1

b_{ji}

The attrition rate for the Red by the Blue.

0.02535228656	0	0.009479550625	0
0	0	0	0
0.0379227614	0	0.06578438201	0.00773933906
0	0	0.001669212215	0.001669212215

a_{ij}

The attrition rate for the Blue by the Red.

BJI1

0.002005741139	0	0.004247451824	0.0002359695458
0	0	0	0
0.004479954787	0	0.01533522985	0
0	0	0.0005348036869	0

THE ATTRITION RATES WITH COA2

b_{ji}

The attrition rate for the Red by the Blue.

0.04323284235	0	0.02374761763	0.009438155723
0	0	0	0
0.03209625892	0	0.06344609321	0.004105335443
0.001943883958	0	0.0007775535832	0.01010819658

a_{ij}

The attrition rate for the Blue by the Red.

0.006889823116	0	0.001599423223	0.005044334781
0	0	0	0
0.02086629919	0	0.0318790682	0
0.001225332525	0	0.0004084441749	0

APPENDIX F. LANCHESTER SIMULATION PROGRAM

The Lanchester simulation program is written in APL. Using the constant attrition rate, the program computes the force ratio for each time step. The constant, or weapon system value, is derived by taking the attrition rate for the weapon. The Helmbold parameters (w_x, w_y) and the initial force size are copied into the same APL work space. The simulation is updated by range and time.

APL PROGRAM

```
      ∇LANSIM[⎕]
      ∇ LANSIM
[1]   X←Y←M1KILL← 30 4 ρ0
[2]   VX←VY←F←30ρ0
[3]   KVXY←KVYX←XLOSS←YLOSS← 4 4 ρ0
[4]   A←B← 4 4 ρ0
[5]   TLOSSX←TLOSSY←4ρ0
[6]   T←1
[7]   AR←200
[8]   R←5000
[9]   X[T;]←X0
[10]  Y[T;]←Y0
[11] L1:I←J←1
[12]  A←AL1
[13]  B←BL1
[14] L9: A PAP B
[15]  VX[T]←VXSUB
[16]  VY[T]←VYSUB
[17]  F[T]←FSUB
[18]  I←J←1
[19] L10:→((X[T;I]≤0)∨(Y[T;J]≤0))ρL11
[20]  XLOSS[J;I]←Y[T;J]×B[J;I]×(X[T;I]÷Y[T;J])*(1-WJ[J])
[21]  →(XLOSS[J;I]≤X[T;I])ρL12
[22]  XLOSS[J;I]←X[T;I]
[23]  →L12
[24] L11:XLOSS[J;I]←0
[25] L12:I←I+1
[26]  →(I≤4)ρL10
[27]  I←1
[28]  J←J+1
[29]  →(J≤4)ρL10
[30]  TLOSSX←(+/[1] XLOSS)
[31]  KVYX←KVYX+XLOSS
[32]  'TIME OF BATTLE IS: ',(⍕T)
[33]  'CURRENT RANGE IS: ',(⍕R)
```

```
[34]   ' '
[35]   'KVYX SCOREBOARD (ROW/FIRER IS RED, COLUM/TARGET IS BLUE): '
[36]   ' '
[37]   8 2 ⍕KVYX
[38]   ' '
[39]   8 2 ⍕(+/[1] KVYX)
[40]   ' '
[41]   I←J←1
[42] L13:→((Y[T;J]≤0)∨(X[T;I]≤0))⍴L14
[43]   YLOSS[I;J]←X[T;I]×A[I;J]×(Y[T;J]÷X[T;I])*(1-WI[I])
[44]   →(YLOSS[I;J]≤Y[T;J])⍴L15
[45]   YLOSS[I;J]←Y[T;J]
[46]   →L15
[47] L14:YLOSS[I;J]←0
[48] L15:J←J+1
[49]   →(J≤4)⍴L13
[50]   J←1
[51]   I←I+1
[52]   →(I≤4)⍴L13
[53]   M1KILL[T;]←YLOSS[1;]
[54]   TLOSSY←(+/[1] YLOSS)
[55]   KVXY←KVXY+YLOSS
[56]   'KVXY SCOREBOARD (ROW/FIRER IS BLUE, COLUMN/TARGET IS RED): '
[57]   ' '
[58]   8 2 ⍕KVXY
[59]   ' '
[60]   8 2 ⍕(+/[1] KVXY)
[61]   T←T+1
[62]   R←R-AR
[63]   X[T;]←X[(T-1);]-TLOSSX
[64]   Y[T;]←Y[(T-1);]-TLOSSY
[65]   I←1
[66] L16:→(X[T;I]≥0)⍴L17
[67]   X[T;I]←0
[68] L17:→(Y[T;I]≥0)⍴L18
[69]   Y[T;I]←0
[70] L18:I←I+1
[71]   →(I≤4)⍴L16
[72]   'CURRENT FORCE LEVELS: '
[73]   ' '
[74]   'BLUE FORCE: ',(8 2 ⍕X[T;])
[75]   'RED  FORCE: ',(8 2 ⍕Y[T;])
[76]   ' '
[77]   ' '
[78]   →((+/X[T;])≤(XBP×(+/X[1;])))⍴L19
[79]   →((+/Y[T;])≤(YBP×(+/Y[1;])))⍴L20
[80]   →((R≤50)∧((+/Y[T;])>(+/X[T;])))⍴L19
[81]   →((R≤50)∧((+/X[T;])>(+/Y[T;])))⍴L20
[82]   →L1
[83]   ' '
[84] L19:'---------- RED WINS ----------'
[85]   →L21
[86] L20:'--------- BLUE WINS ----------'
[87] L21:FINXFR←(+/X[T;])÷(+/X[1;])
[88]   FINYFR←(+/Y[T;])÷(+/Y[1;])
[89]   ' '
```

```
[90]   'BLUE PERCENT OF FORCES REMAINING = ',(8 2 ⍕(100×FINXFR))
[91]   'RED  PERCENT OF FORCES REMAINING = ',(8 2 ⍕(100×FINYFR))
[92]   ' '
[93]   'BLUE KILLS OF RED SYSTEMS BY ONE MIN TIME INCREMENT: '
[94]   ' '
[95]   8 2 ⍕(T,4)↑M1KILL
[96]   ' '
[97]   'BLUE SYSTEM FORCE LEVELS BY ONE MIN TIME INCREMENT: '
[98]   ' '
[99]   8 2 ⍕(T,4)↑X
[100]   ' '
[101]   'RED  SYSTEM FORCE LEVELS BY ONE MIN TIME INCREMENT: '
[102]   8 2 ⍕(T,4)↑Y
[103]   ' '
[104]   'P-AP FORCE RATIOS BY TIME INCREMENT: FR '
[105]   8 2 ⍕F
[106]   ' '
[107]   TKR←(+/KVXY[1;])÷(+/KVYX[;1])
[108]   'TOTAL BLUE TANK KILLS/TOTAL BLUE TANKS KILLED = ', 8 2 ⍕TKR
[109]   ' '
[110]   SFR←(+/X[T;])÷(+/Y[T;])
[111]   'FINAL BLUE FORCE/FINAL RED FORCE = ', 8 2 ⍕SFR
[112]   ''
[113]   'END OF SIMULATIOM'
      ∇
```

APPENDIX G. RESULT OF SIMULATION WITH COA2

APL OUTPUT FROM LANCHESTER SIMULATION

The casualties are computed for each time step of the simulation. The constant attrition rates and weapon system values are employed to compute the force. Finally, various force ratios are computed.

```
TIME OF BATTLE IS: 1
CURRENT RANGE IS: 5000

KVYX SCOREBOARD (ROW/FIRER IS RED, COLUM/TARGET IS BLUE):

    2.57     .00     .59    1.74
     .00     .00     .00     .00
    5.99     .00    9.08     .00
     .25     .00     .08     .00

    8.81     .00    9.76    1.74

KVXY SCOREBOARD (ROW/FIRER IS BLUE, COLUMN/TARGET IS RED):

    9.27     .00    4.94    1.89
     .00     .00     .00     .00
    6.26     .00   12.02     .75
     .22     .00     .09    1.08

   15.75     .00   17.05    3.72
CURRENT FORCE LEVELS:

BLUE FORCE:   191.19   60.00  170.24   98.26
RED  FORCE:   384.25  120.00  282.95  196.28
```

TIME OF BATTLE IS: 5
CURRENT RANGE IS: 4200

KVYX SCOREBOARD (ROW/FIRER IS RED, COLUM/TARGET IS BLUE):

11.88	.00	2.72	8.09
.00	.00	.00	.00
26.80	.00	40.54	.00
1.18	.00	.39	.00
39.85	.00	43.66	8.09

KVXY SCOREBOARD (ROW/FIRER IS BLUE, COLUMN/TARGET IS RED):

42.49	.00	22.59	8.69
.00	.00	.00	.00
28.17	.00	53.90	3.38
1.07	.00	.42	5.23
71.73	.00	76.91	17.31

CURRENT FORCE LEVELS:

BLUE FORCE:	160.15	60.00	136.34	91.91
RED FORCE:	328.27	120.00	223.09	182.69

TIME OF BATTLE IS: 10
CURRENT RANGE IS: 3200

KVYX SCOREBOARD (ROW/FIRER IS RED, COLUM/TARGET IS BLUE):

21.63	.00	4.95	14.82
.00	.00	.00	.00
46.80	.00	70.64	.00
2.24	.00	.74	.00
70.68	.00	76.33	14.82

KVXY SCOREBOARD (ROW/FIRER IS BLUE, COLUMN/TARGET IS RED):

76.70	.00	40.59	15.77
.00	.00	.00	.00
49.70	.00	94.68	5.99

```
   2.05      .00      .79   10.06

 128.46      .00  136.06   31.82
CURRENT FORCE LEVELS:

BLUE FORCE:   129.32   60.00  103.67   85.18
RED  FORCE:   271.54  120.00  163.94  168.18



TIME OF BATTLE IS: 15
CURRENT RANGE IS: 2200

KVYX SCOREBOARD (ROW/FIRER IS RED, COLUM/TARGET IS BLUE):

  29.71      .00    6.77   20.47
    .00      .00     .00     .00
  61.57      .00   92.72     .00
   3.21      .00    1.05     .00

  94.48      .00  100.54   20.47

KVXY SCOREBOARD (ROW/FIRER IS BLUE, COLUMN/TARGET IS RED):

 104.50      .00   55.03   21.58
    .00      .00     .00     .00
  66.26      .00  125.64    8.02
   2.95      .00    1.13   14.54

 173.71      .00  181.79   44.14
CURRENT FORCE LEVELS:

BLUE FORCE:   105.52   60.00   79.46   79.53
RED  FORCE:   226.29  120.00  118.21  155.86



TIME OF BATTLE IS: 20
CURRENT RANGE IS: 1200

KVYX SCOREBOARD (ROW/FIRER IS RED, COLUM/TARGET IS BLUE):

  36.44      .00    8.29   25.24
```

```
     .00      .00      .00      .00
   72.25      .00   108.59      .00
    4.10      .00     1.34      .00

  112.78      .00   118.22    25.24

KVXY SCOREBOARD (ROW/FIRER IS BLUE, COLUMN/TARGET IS RED):

  127.33      .00    66.70    26.40
     .00      .00      .00      .00
   79.12      .00   149.30     9.61
    3.78      .00     1.44    18.73

  210.23      .00   217.43    54.74
CURRENT FORCE LEVELS:

BLUE FORCE:    87.22   60.00   61.78   74.76
RED  FORCE:   189.77  120.00   82.57  145.26



TIME OF BATTLE IS: 25
CURRENT RANGE IS: 200

KVYX SCOREBOARD (ROW/FIRER IS RED, COLUM/TARGET IS BLUE):

   42.09      .00     9.55    29.30
     .00      .00      .00      .00
   79.71      .00   119.61      .00
    4.91      .00     1.61      .00

  126.71      .00   130.77    29.30

KVXY SCOREBOARD (ROW/FIRER IS BLUE, COLUMN/TARGET IS RED):

  146.34      .00    76.22    30.46
     .00      .00      .00      .00
   89.27      .00   167.60    10.88
    4.55      .00     1.72    22.68

  240.16      .00   245.54    64.02
CURRENT FORCE LEVELS:
```

BLUE FORCE:	73.29	60.00	49.23	70.70
RED FORCE:	159.84	120.00	54.46	135.98

---------- RED WINS ----------

BLUE PERCENT OF FORCES REMAINING = 46.89
RED PERCENT OF FORCES REMAINING = 46.11

BLUE TANK KILLS OF RED SYSTEMS BY ONE MIN TIME INCREMENT:

9.27	.00	4.94	1.89
8.86	.00	4.72	1.81
8.48	.00	4.51	1.73
8.11	.00	4.31	1.66
7.77	.00	4.11	1.60
7.44	.00	3.93	1.53
7.13	.00	3.76	1.47
6.83	.00	3.59	1.41
6.55	.00	3.43	1.36
6.28	.00	3.29	1.30
6.02	.00	3.14	1.25
5.78	.00	3.01	1.21
5.55	.00	2.88	1.16
5.33	.00	2.76	1.12
5.12	.00	2.64	1.08
4.92	.00	2.53	1.04
4.74	.00	2.43	1.00
4.56	.00	2.33	.96
4.39	.00	2.23	.93
4.23	.00	2.14	.90
4.08	.00	2.06	.87
3.93	.00	1.98	.84
3.79	.00	1.90	.81
3.66	.00	1.83	.78
3.54	.00	1.76	.76
.00	.00	.00	.00

BLUE SYSTEM FORCE LEVELS BY ONE MIN TIME INCREMENT:

200.00	60.00	180.00	100.00
191.19	60.00	170.24	98.26
182.82	60.00	161.03	96.58
174.88	60.00	152.32	94.97
167.32	60.00	144.10	93.41

160.15	60.00	136.34	91.91
153.33	60.00	129.02	90.47
146.86	60.00	122.12	89.07
140.71	60.00	115.60	87.73
134.87	60.00	109.46	86.43
129.32	60.00	103.67	85.18
124.06	60.00	98.22	83.97
119.06	60.00	93.09	82.80
114.31	60.00	88.26	81.68
109.80	60.00	83.72	80.59
105.52	60.00	79.46	79.53
101.46	60.00	75.45	78.51
97.61	60.00	71.69	77.53
93.96	60.00	68.17	76.57
90.50	60.00	64.87	75.65
87.22	60.00	61.78	74.76
84.12	60.00	58.90	73.89
81.18	60.00	56.21	73.06
78.40	60.00	53.71	72.25
75.77	60.00	51.38	71.46
73.29	60.00	49.23	70.70

RED SYSTEM FORCE LEVELS BY ONE MIN TIME INCREMENT:

400.00	120.00	300.00	200.00
384.25	120.00	282.95	196.28
369.24	120.00	266.78	192.70
354.93	120.00	251.44	189.24
341.29	120.00	236.89	185.91
328.27	120.00	223.09	182.69
315.85	120.00	210.00	179.59
304.00	120.00	197.57	176.59
292.68	120.00	185.77	173.69
281.87	120.00	174.57	170.89
271.54	120.00	163.94	168.18
261.67	120.00	153.84	165.56
252.23	120.00	144.24	163.02
243.20	120.00	135.12	160.56
234.56	120.00	126.45	158.18
226.29	120.00	118.21	155.86
218.36	120.00	110.36	153.62
210.77	120.00	102.90	151.44
203.48	120.00	95.79	149.32
196.49	120.00	89.02	147.26
189.77	120.00	82.57	145.26
183.32	120.00	76.41	143.31

```
177.11  120.00   70.54  141.41
171.14  120.00   64.94  139.55
165.38  120.00   59.58  137.75
159.84  120.00   54.46  135.98

P-AP FORCE RATIOS BY TIME INCREMENT: FR
     .98     .98     .99     .99    1.00    1.00    1.01    1.01    1.02    1.0
      3    1.04    1.05    1.06    1.07    1.08    1.10    1.11    1.13    1.15
          1.18    1.20    1.23    1.26    1.30    1.34     .00     .00     .00
          .00     .00

TOTAL BLUE TANK KILLS/TOTAL BLUE TANKS KILLED =     2.00  = TKR

FINAL BLUE FORCE/FINAL RED FORCE =      .54    = SFR

END OF SIMULATIOM
```

APPENDIX H. TOTAL DATA FOR COMPUTING THE ATTRITION RATE BY APL

These data are used in APL program " ATTRITION " to compute the attrition rates. The time column is sorted for each firer-target pair, which represents the time at which each casualty occurred.

WITH COA1

****

1. Blue casualties by Red with COA1

OBS	TIME	TARGET	FIRER	FIRER	TARGET
1	4.39	BTANK1	RTANK9	1	1
2	9.29	BTANK1	RTANK9	1	1
3	10.48	BTANK1	RTANK9	1	1
4	11.58	BTANK1	RTANK9	1	1
5	13.00	BTANK1	RTANK9	1	1
6	16.22	BTANK1	RTANK9	1	1
7	18.24	BTANK1	RTANK9	1	1
8	18.58	BTANK1	RTANK9	1	1
9	19.00	BTANK1	RTANK9	1	1
10	19.14	BTANK1	RTANK9	1	1
11	19.18	BTANK1	RTANK9	1	1
12	19.36	BTANK1	RTANK9	1	1
13	19.53	BTANK1	RTANK9	1	1
14	20.10	BTANK1	RTANK9	1	1
15	20.38	BTANK1	RTANK9	1	1
16	20.41	BTANK1	RTANK9	1	1
17	21.24	BTANK1	RTANK9	1	1
18	0.48	BTANK1	RAPC5	3	1
19	1.06	BTANK1	RAPC5	3	1
20	1.42	BTANK1	RAPC5	3	1
21	1.47	BTANK1	RAPC5	3	1
22	2.23	BTANK1	RAPC5	3	1

23	2.38	BTANK1	RAPC5	3	1
24	2.40	BTANK1	RAPC5	3	1
25	3.08	BTANK1	RAPC5	3	1
26	3.35	BTANK1	RAPC5	3	1
27	3.51	BTANK1	RAPC5	3	1
28	5.11	BTANK1	RAPC5	3	1
29	7.08	BTANK1	RAPC5	3	1
30	8.18	BTANK1	RAPC5	3	1
31	11.15	BTANK1	RAPC5	3	1
32	11.22	BTANK1	RAPC5	3	1
33	12.47	BTANK1	RAPC5	3	1
34	12.58	BTANK1	RAPC5	3	1
35	13.10	BTANK1	RAPC5	3	1
36	15.01	BTANK1	RAPC5	3	1
37	20.30	BTANK1	RAPC5	3	1
38	21.34	BTANK1	RAPC5	3	1
39	22.31	BTANK1	RAPC5	3	1
40	22.40	BTANK1	RAPC5	3	1
41	24.25	BTANK1	RAPC5	3	1
42	24.36	BTANK1	RAPC5	3	1
43	25.34	BTANK1	RAPC5	3	1
44	0.23	BAPC1	RTANK9	1	3
45	0.33	BAPC1	RTANK9	1	3
46	0.43	BAPC1	RTANK9	1	3
47	1.11	BAPC1	RTANK9	1	3
48	1.20	BAPC1	RTANK9	1	3
49	1.22	BAPC1	RTANK9	1	3
50	1.43	BAPC1	RTANK9	1	3
51	1.52	BAPC1	RTANK9	1	3
52	1.53	BAPC1	RTANK9	1	3
53	1.56	BAPC1	RTANK9	1	3
54	2.12	BAPC1	RTANK9	1	3
55	2.16	BAPC1	RTANK9	1	3
56	2.29	BAPC1	RTANK9	1	3
57	2.50	BAPC1	RTANK9	1	3
58	3.24	BAPC1	RTANK9	1	3
59	3.43	BAPC1	RTANK9	1	3
60	3.59	BAPC1	RTANK9	1	3
61	4.35	BAPC1	RTANK9	1	3
62	4.42	BAPC1	RTANK9	1	3
63	4.55	BAPC1	RTANK9	1	3
64	5.19	BAPC1	RTANK9	1	3
65	5.50	BAPC1	RTANK9	1	3
66	6.40	BAPC1	RTANK9	1	3
67	8.58	BAPC1	RTANK9	1	3

68	11.26	BAPC1	RTANK9	1	3
69	11.28	BAPC1	RTANK9	1	3
70	12.03	BAPC21	RTANK9	1	3
71	12.10	BAPC21	RTANK9	1	3
72	13.23	BAPC21	RTANK9	1	3
73	15.16	BAPC1	RTANK9	1	3
74	16.03	BAPC21	RTANK9	1	3
75	16.33	BAPC21	RTANK9	1	3
76	18.55	BAPC1	RTANK9	1	3
77	19.12	BAPC1	RTANK9	1	3
78	20.24	BAPC1	RTANK9	1	3
79	24.41	BAPC1	RTANK9	1	3
80	0.07	BAPC1	RAPC5	3	3
81	0.11	BAPC1	RAPC5	3	3
82	0.15	BAPC1	RAPC5	3	3
83	0.19	BAPC1	RAPC5	3	3
84	0.21	BAPC1	RAPC5	3	3
85	0.24	BAPC1	RAPC5	3	3
86	0.27	BAPC1	RAPC5	3	3
87	0.28	BAPC1	RAPC5	3	3
88	0.34	BAPC1	RAPC5	3	3
89	0.39	BAPC1	RAPC5	3	3
90	0.42	BAPC1	RAPC5	3	3
91	0.52	BAPC1	RAPC5	3	3
92	0.58	BAPC1	RAPC5	3	3
93	1.06	BAPC1	RAPC5	3	3
94	1.10	BAPC1	RAPC5	3	3
95	1.42	BAPC1	RAPC5	3	3
96	1.42	BAPC1	RAPC5	3	3
97	1.46	BAPC1	RAPC5	3	3
98	1.50	BAPC1	RAPC5	3	3
99	1.50	BAPC1	RAPC5	3	3
100	2.15	BAPC1	RAPC5	3	3
101	2.22	BAPC1	RAPC5	3	3
102	2.24	BAPC1	RAPC5	3	3
103	2.28	BAPC1	RAPC5	3	3
104	2.31	BAPC1	RAPC5	3	3
105	2.36	BAPC1	RAPC5	3	3
106	2.37	BAPC1	RAPC5	3	3
107	2.41	BAPC1	RAPC5	3	3
108	2.44	BAPC1	RAPC5	3	3
109	2.53	BAPC1	RAPC5	3	3
110	3.01	BAPC1	RAPC5	3	3
111	3.08	BAPC1	RAPC5	3	3
112	3.12	BAPC1	RAPC5	3	3

113	3.45	BAPC1	RAPC5	3	3
114	3.46	BAPC1	RAPC5	3	3
115	3.46	BAPC1	RAPC5	3	3
116	3.47	BAPC1	RAPC5	3	3
117	3.57	BAPC1	RAPC5	3	3
118	4.03	BAPC1	RAPC5	3	3
119	4.11	BAPC1	RAPC5	3	3
120	4.59	BAPC1	RAPC5	3	3
121	5.03	BAPC1	RAPC5	3	3
122	5.14	BAPC1	RAPC5	3	3
123	6.18	BAPC1	RAPC5	3	3
124	6.26	BAPC1	RAPC5	3	3
125	6.33	BAPC1	RAPC5	3	3
126	6.44	BAPC1	RAPC5	3	3
127	7.28	BAPC1	RAPC5	3	3
128	7.54	BAPC1	RAPC5	3	3
129	8.52	BAPC1	RAPC5	3	3
130	8.52	BAPC1	RAPC5	3	3
131	10.16	BAPC1	RAPC5	3	3
132	11.01	BAPC1	RAPC5	3	3
133	11.08	BAPC1	RAPC5	3	3
134	11.15	BAPC1	RAPC5	3	3
135	11.21	BAPC1	RAPC5	3	3
136	12.02	BAPC1	RAPC5	3	3
137	12.57	BAPC1	RAPC5	3	3
138	13.01	BAPC1	RAPC5	3	3
139	13.12	BAPC21	RAPC5	3	3
140	13.38	BAPC1	RAPC5	3	3
141	13.49	BAPC1	RAPC5	3	3
142	14.58	BAPC1	RAPC5	3	3
143	15.17	BAPC1	RAPC5	3	3
144	15.43	BAPC21	RAPC5	3	3
145	16.19	BAPC1	RAPC5	3	3
146	16.30	BAPC1	RAPC5	3	3
147	16.48	BAPC1	RAPC5	3	3
148	16.49	BAPC1	RAPC5	3	3
149	16.50	BAPC1	RAPC5	3	3
150	16.51	BAPC1	RAPC5	3	3
151	17.28	BAPC1	RAPC5	3	3
152	19.40	BAPC1	RAPC5	3	3
153	20.08	BAPC1	RAPC5	3	3
154	20.23	BAPC1	RAPC5	3	3
155	20.59	BAPC1	RAPC5	3	3
156	21.01	BAPC1	RAPC5	3	3
157	21.09	BAPC1	RAPC5	3	3

158	22.03	BAPC1	RAPC5	3	3
159	22.31	BAPC1	RAPC5	3	3
160	22.33	BAPC1	RAPC5	3	3
161	22.37	BAPC21	RAPC5	3	3
162	23.01	BAPC1	RAPC5	3	3
163	23.02	BAPC21	RAPC5	3	3
164	23.24	BAPC21	RAPC5	3	3
165	23.31	BAPC1	RAPC5	3	3
166	24.02	BAPC21	RAPC5	3	3
167	26.19	BAPC1	RAPC5	3	3
168	28.33	BAPC1	RAPC5	3	3
169	1.05	BAPC1	RSLD11	4	3
170	4.22	BAPC1	RSLD11	4	3
171	1.26	BSLDR9	RTANK9	1	4
172	12.09	BSLDR9	RTANK9	1	4

2. Red casualties by Blue with COA1

OBS	TIME	TARGET	FIRER	TARGET	FIRER
1	8.35	RTANK9	BTANK1	1	1
2	8.47	RTANK9	BTANK1	1	1
3	9.23	RTANK9	BTANK1	1	1
4	9.24	RTANK9	BTANK1	1	1
5	9.25	RTANK9	BTANK1	1	1
6	9.32	RTANK9	BTANK1	1	1
7	9.32	RTANK9	BTANK1	1	1
8	9.34	RTANK9	BTANK1	1	1
9	9.43	RTANK9	BTANK1	1	1
10	10.02	RTANK9	BTANK1	1	1
11	12.01	RTANK9	BTANK1	1	1
12	12.13	RTANK9	BTANK1	1	1
13	12.37	RTANK9	BTANK1	1	1
14	12.43	RTANK9	BTANK1	1	1
15	12.45	RTANK9	BTANK1	1	1
16	12.45	RTANK9	BTANK1	1	1
17	13.03	RTANK9	BTANK1	1	1
18	13.11	RTANK9	BTANK1	1	1
19	13.15	RTANK9	BTANK1	1	1
20	13.17	RTANK9	BTANK1	1	1
21	13.21	RTANK9	BTANK1	1	1

22	13.25	RTANK9	BTANK1	1	1
23	13.25	RTANK9	BTANK1	1	1
24	13.41	RTANK9	BTANK1	1	1
25	13.49	RTANK9	BTANK1	1	1
26	13.51	RTANK9	BTANK1	1	1
27	13.51	RTANK9	BTANK1	1	1
28	13.51	RTANK9	BTANK1	1	1
29	13.53	RTANK9	BTANK1	1	1
30	13.55	RTANK9	BTANK1	1	1
31	13.57	RTANK9	BTANK1	1	1
32	14.02	RTANK9	BTANK1	1	1
33	14.03	RTANK9	BTANK1	1	1
34	14.35	RTANK9	BTANK1	1	1
35	14.41	RTANK9	BTANK1	1	1
36	14.45	RTANK9	BTANK1	1	1
37	15.02	RTANK9	BTANK1	1	1
38	15.06	RTANK9	BTANK1	1	1
39	15.08	RTANK9	BTANK1	1	1
40	15.27	RTANK9	BTANK1	1	1
41	15.51	RTANK9	BTANK1	1	1
42	16.05	RTANK9	BTANK1	1	1
43	16.07	RTANK9	BTANK1	1	1
44	16.11	RTANK9	BTANK1	1	1
45	17.00	RTANK9	BTANK1	1	1
46	17.04	RTANK9	BTANK1	1	1
47	17.30	RTANK9	BTANK1	1	1
48	17.33	RTANK9	BTANK1	1	1
49	17.41	RTANK9	BTANK1	1	1
50	17.51	RTANK9	BTANK1	1	1
51	17.53	RTANK9	BTANK1	1	1
52	17.53	RTANK9	BTANK1	1	1
53	17.57	RTANK9	BTANK1	1	1
54	18.11	RTANK9	BTANK1	1	1
55	18.23	RTANK9	BTANK1	1	1
56	18.39	RTANK9	BTANK1	1	1
57	18.39	RTANK9	BTANK1	1	1
58	19.03	RTANK9	BTANK1	1	1
59	19.03	RTANK9	BTANK1	1	1
60	19.07	RTANK9	BTANK1	1	1
61	19.15	RTANK9	BTANK1	1	1
62	19.15	RTANK9	BTANK1	1	1
63	19.17	RTANK9	BTANK1	1	1
64	19.17	RTANK9	BTANK1	1	1
65	19.17	RTANK9	BTANK1	1	1
66	19.21	RTANK9	BTANK1	1	1

67	19.43	RTANK9	BTANK1	1	1
68	19.45	RTANK9	BTANK1	1	1
69	19.45	RTANK9	BTANK1	1	1
70	19.49	RTANK9	BTANK1	1	1
71	19.59	RTANK9	BTANK1	1	1
72	20.01	RTANK9	BTANK1	1	1
73	20.07	RTANK9	BTANK1	1	1
74	20.13	RTANK9	BTANK1	1	1
75	20.13	RTANK9	BTANK1	1	1
76	20.29	RTANK9	BTANK1	1	1
77	20.31	RTANK9	BTANK1	1	1
78	20.31	RTANK9	BTANK1	1	1
79	20.35	RTANK9	BTANK1	1	1
80	20.35	RTANK9	BTANK1	1	1
81	20.37	RTANK9	BTANK1	1	1
82	20.56	RTANK9	BTANK1	1	1
83	20.58	RTANK9	BTANK1	1	1
84	20.59	RTANK9	BTANK1	1	1
85	21.00	RTANK9	BTANK1	1	1
86	21.01	RTANK9	BTANK1	1	1
87	21.07	RTANK9	BTANK1	1	1
88	21.19	RTANK9	BTANK1	1	1
89	21.33	RTANK9	BTANK1	1	1
90	21.34	RTANK9	BTANK1	1	1
91	21.37	RTANK9	BTANK1	1	1
92	21.37	RTANK9	BTANK1	1	1
93	21.39	RTANK9	BTANK1	1	1
94	21.53	RTANK9	BTANK1	1	1
95	21.53	RTANK9	BTANK1	1	1
96	21.55	RTANK9	BTANK1	1	1
97	21.55	RTANK9	BTANK1	1	1
98	22.15	RTANK9	BTANK1	1	1
99	22.16	RTANK9	BTANK1	1	1
100	22.19	RTANK9	BTANK1	1	1
101	23.11	RTANK9	BTANK1	1	1
102	23.14	RTANK9	BTANK1	1	1
103	24.07	RTANK9	BTANK1	1	1
104	24.08	RTANK9	BTANK1	1	1
105	24.08	RTANK9	BTANK1	1	1
106	24.10	RTANK9	BTANK1	1	1
107	24.11	RTANK9	BTANK1	1	1
108	24.17	RTANK9	BTANK1	1	1
109	24.18	RTANK9	BTANK1	1	1
110	24.28	RTANK9	BTANK1	1	1
111	25.20	RTANK9	BTANK1	1	1

112	25.34	RTANK9	BTANK1	1	1
113	25.40	RTANK9	BTANK1	1	1
114	25.48	RTANK9	BTANK1	1	1
115	27.14	RTANK9	BTANK1	1	1
116	0.23	RTANK9	BAPC1	1	3
117	0.23	RTANK9	BAPC1	1	3
118	0.24	RTANK9	BAPC1	1	3
119	0.24	RTANK9	BAPC1	1	3
120	0.25	RTANK9	BAPC1	1	3
121	0.28	RTANK9	BAPC1	1	3
122	0.29	RTANK9	BAPC1	1	3
123	0.29	RTANK9	BAPC1	1	3
124	0.32	RTANK9	BAPC1	1	3
125	0.35	RTANK9	BAPC1	1	3
126	0.36	RTANK9	BAPC1	1	3
127	0.36	RTANK9	BAPC1	1	3
128	0.38	RTANK9	BAPC1	1	3
129	0.43	RTANK9	BAPC1	1	3
130	0.50	RTANK9	BAPC1	1	3
131	0.53	RTANK9	BAPC1	1	3
132	1.07	RTANK9	BAPC1	1	3
133	1.21	RTANK9	BAPC1	1	3
134	1.45	RTANK9	BAPC1	1	3
135	1.49	RTANK9	BAPC1	1	3
136	1.50	RTANK9	BAPC1	1	3
137	1.51	RTANK9	BAPC1	1	3
138	1.52	RTANK9	BAPC1	1	3
139	1.54	RTANK9	BAPC1	1	3
140	1.54	RTANK9	BAPC1	1	3
141	1.55	RTANK9	BAPC1	1	3
142	1.59	RTANK9	BAPC1	1	3
143	2.02	RTANK9	BAPC1	1	3
144	2.02	RTANK9	BAPC1	1	3
145	2.05	RTANK9	BAPC1	1	3
146	2.06	RTANK9	BAPC1	1	3
147	2.06	RTANK9	BAPC1	1	3
148	2.10	RTANK9	BAPC1	1	3
149	2.14	RTANK9	BAPC1	1	3
150	2.17	RTANK9	BAPC1	1	3
151	2.17	RTANK9	BAPC1	1	3
152	2.29	RTANK9	BAPC1	1	3
153	2.33	RTANK9	BAPC1	1	3
154	2.38	RTANK9	BAPC1	1	3
155	2.39	RTANK9	BAPC1	1	3
156	2.39	RTANK9	BAPC1	1	3

157	2.44	RTANK9	BAPC1	1	3
158	2.45	RTANK9	BAPC1	1	3
159	2.51	RTANK9	BAPC1	1	3
160	2.54	RTANK9	BAPC1	1	3
161	3.44	RTANK9	BAPC1	1	3
162	3.45	RTANK9	BAPC1	1	3
163	3.45	RTANK9	BAPC1	1	3
164	3.47	RTANK9	BAPC1	1	3
165	4.09	RTANK9	BAPC1	1	3
166	4.22	RTANK9	BAPC1	1	3
167	7.16	RTANK9	BAPC1	1	3
168	7.26	RTANK9	BAPC1	1	3
169	7.31	RTANK9	BAPC1	1	3
170	7.32	RTANK9	BAPC1	1	3
171	7.34	RTANK9	BAPC1	1	3
172	7.35	RTANK9	BAPC1	1	3
173	8.43	RTANK9	BAPC1	1	3
174	8.57	RTANK9	BAPC1	1	3
175	10.07	RTANK9	BAPC1	1	3
176	10.09	RTANK9	BAPC1	1	3
177	14.28	RTANK9	BAPC1	1	3
178	14.30	RTANK9	BAPC1	1	3
179	14.32	RTANK9	BAPC1	1	3
180	14.34	RTANK9	BAPC1	1	3
181	14.36	RTANK9	BAPC1	1	3
182	18.10	RTANK9	BAPC1	1	3
183	18.12	RTANK9	BAPC1	1	3
184	18.12	RTANK9	BAPC1	1	3
185	18.16	RTANK9	BAPC1	1	3
186	18.18	RTANK9	BAPC1	1	3
187	18.18	RTANK9	BAPC1	1	3
188	18.18	RTANK9	BAPC1	1	3
189	18.28	RTANK9	BAPC1	1	3
190	18.28	RTANK9	BAPC1	1	3
191	18.57	RTANK9	BAPC1	1	3
192	19.44	RTANK9	BAPC1	1	3
193	19.55	RTANK9	BAPC1	1	3
194	19.57	RTANK9	BAPC1	1	3
195	20.32	RTANK9	BAPC1	1	3
196	20.38	RTANK9	BAPC1	1	3
197	20.43	RTANK9	BAPC1	1	3
198	20.50	RTANK9	BAPC1	1	3
199	20.56	RTANK9	BAPC1	1	3
200	20.56	RTANK9	BAPC1	1	3
201	20.58	RTANK9	BAPC1	1	3

202	21.10	RTANK9	BAPC1	1	3
203	22.31	RTANK9	BAPC1	1	3
204	22.57	RTANK9	BAPC1	1	3
205	23.02	RTANK9	BAPC1	1	3
206	23.29	RTANK9	BAPC1	1	3
207	23.53	RTANK9	BAPC1	1	3
208	24.31	RTANK9	BAPC1	1	3
209	24.33	RTANK9	BAPC1	1	3
210	25.45	RTANK9	BAPC1	1	3
211	25.51	RTANK9	BAPC1	1	3
212	28.36	RTANK9	BAPC1	1	3
213	29.55	RTANK9	BAPC1	1	3
214	4.11	RAPC5	BTANK1	3	1
215	5.49	RAPC5	BTANK1	3	1
216	5.51	RAPC5	BTANK1	3	1
217	6.09	RAPC5	BTANK1	3	1
218	6.11	RAPC5	BTANK1	3	1
219	6.11	RAPC5	BTANK1	3	1
220	6.15	RAPC5	BTANK1	3	1
221	6.27	RAPC5	BTANK1	3	1
222	6.27	RAPC5	BTANK1	3	1
223	6.29	RAPC5	BTANK1	3	1
224	6.47	RAPC5	BTANK1	3	1
225	10.49	RAPC5	BTANK1	3	1
226	11.03	RAPC5	BTANK1	3	1
227	18.59	RAPC5	BTANK1	3	1
228	19.17	RAPC5	BTANK1	3	1
229	19.25	RAPC5	BTANK1	3	1
230	20.07	RAPC5	BTANK1	3	1
231	20.14	RAPC5	BTANK1	3	1
232	20.14	RAPC5	BTANK1	3	1
233	20.20	RAPC5	BTANK1	3	1
234	21.47	RAPC5	BTANK1	3	1
235	21.51	RAPC5	BTANK1	3	1
236	22.51	RAPC5	BTANK1	3	1
237	23.07	RAPC5	BTANK1	3	1
238	23.10	RAPC5	BTANK1	3	1
239	23.35	RAPC5	BTANK1	3	1
240	23.37	RAPC5	BTANK1	3	1
241	23.51	RAPC5	BTANK1	3	1
242	24.05	RAPC5	BTANK1	3	1
243	24.21	RAPC5	BTANK1	3	1
244	24.26	RAPC5	BTANK1	3	1
245	24.47	RAPC5	BTANK1	3	1
246	25.19	RAPC5	BTANK1	3	1

247	25.27	RAPC5	BTANK1	3	1
248	25.34	RAPC5	BTANK1	3	1
249	26.21	RAPC5	BTANK1	3	1
250	26.27	RAPC5	BTANK1	3	1
251	26.59	RAPC5	BTANK1	3	1
252	28.01	RAPC5	BTANK1	3	1
253	28.15	RAPC5	BTANK1	3	1
254	28.23	RAPC5	BTANK1	3	1
255	28.48	RAPC5	BTANK1	3	1
256	29.13	RAPC5	BTANK1	3	1
257	0.05	RAPC5	BAPC1	3	3
258	0.08	RAPC5	BAPC1	3	3
259	0.12	RAPC5	BAPC1	3	3
260	0.14	RAPC5	BAPC1	3	3
261	0.14	RAPC5	BAPC1	3	3
262	0.19	RAPC5	BAPC1	3	3
263	0.20	RAPC5	BAPC1	3	3
264	0.20	RAPC5	BAPC1	3	3
265	0.21	RAPC5	BAPC1	3	3
266	0.26	RAPC5	BAPC1	3	3
267	0.32	RAPC5	BAPC1	3	3
268	0.36	RAPC5	BAPC1	3	3
269	0.36	RAPC5	BAPC1	3	3
270	0.36	RAPC5	BAPC1	3	3
271	0.37	RAPC5	BAPC1	3	3
272	0.38	RAPC5	BAPC1	3	3
273	0.44	RAPC5	BAPC1	3	3
274	0.50	RAPC5	BAPC1	3	3
275	0.53	RAPC5	BAPC1	3	3
276	0.55	RAPC5	BAPC1	3	3
277	1.05	RAPC5	BAPC1	3	3
278	1.07	RAPC5	BAPC1	3	3
279	1.09	RAPC5	BAPC1	3	3
280	1.09	RAPC5	BAPC1	3	3
281	1.15	RAPC5	BAPC1	3	3
282	1.18	RAPC5	BAPC1	3	3
283	1.19	RAPC5	BAPC1	3	3
284	1.24	RAPC5	BAPC1	3	3
285	1.24	RAPC5	BAPC1	3	3
286	1.31	RAPC5	BAPC1	3	3
287	1.33	RAPC5	BAPC1	3	3
288	1.33	RAPC5	BAPC1	3	3
289	1.35	RAPC5	BAPC1	3	3
290	1.57	RAPC5	BAPC1	3	3
291	2.05	RAPC5	BAPC1	3	3

292	2.13	RAPC5	BAPC1	3	3
293	2.29	RAPC5	BAPC1	3	3
294	2.48	RAPC5	BAPC1	3	3
295	2.55	RAPC5	BAPC1	3	3
296	2.56	RAPC5	BAPC1	3	3
297	3.39	RAPC5	BAPC1	3	3
298	4.07	RAPC5	BAPC1	3	3
299	7.45	RAPC5	BAPC1	3	3
300	8.04	RAPC5	BAPC1	3	3
301	8.18	RAPC5	BAPC1	3	3
302	8.34	RAPC5	BAPC1	3	3
303	8.37	RAPC5	BAPC1	3	3
304	9.13	RAPC5	BAPC1	3	3
305	10.59	RAPC5	BAPC1	3	3
306	11.02	RAPC5	BAPC1	3	3
307	11.13	RAPC5	BAPC1	3	3
308	13.48	RAPC5	BAPC1	3	3
309	14.17	RAPC5	BAPC1	3	3
310	14.47	RAPC5	BAPC1	3	3
311	14.52	RAPC5	BAPC1	3	3
312	14.60	RAPC5	BAPC1	3	3
313	15.01	RAPC5	BAPC1	3	3
314	15.01	RAPC5	BAPC1	3	3
315	15.07	RAPC5	BAPC1	3	3
316	15.11	RAPC5	BAPC1	3	3
317	15.15	RAPC5	BAPC1	3	3
318	15.17	RAPC5	BAPC1	3	3
319	15.30	RAPC5	BAPC1	3	3
320	15.33	RAPC5	BAPC1	3	3
321	15.36	RAPC5	BAPC1	3	3
322	15.38	RAPC5	BAPC1	3	3
323	15.48	RAPC5	BAPC1	3	3
324	15.49	RAPC5	BAPC1	3	3
325	15.50	RAPC5	BAPC1	3	3
326	15.51	RAPC5	BAPC1	3	3
327	15.55	RAPC5	BAPC1	3	3
328	15.56	RAPC5	BAPC1	3	3
329	16.05	RAPC5	BAPC1	3	3
330	16.05	RAPC5	BAPC1	3	3
331	16.05	RAPC5	BAPC1	3	3
332	16.11	RAPC5	BAPC1	3	3
333	16.11	RAPC5	BAPC1	3	3
334	16.16	RAPC5	BAPC1	3	3
335	16.21	RAPC5	BAPC1	3	3
336	16.30	RAPC5	BAPC1	3	3

337	16.31	RAPC5	BAPC1	3	3
338	16.36	RAPC5	BAPC1	3	3
339	16.37	RAPC5	BAPC1	3	3
340	16.41	RAPC5	BAPC1	3	3
341	16.41	RAPC5	BAPC1	3	3
342	16.41	RAPC5	BAPC1	3	3
343	16.43	RAPC5	BAPC1	3	3
344	16.45	RAPC5	BAPC1	3	3
345	16.47	RAPC5	BAPC1	3	3
346	16.51	RAPC5	BAPC1	3	3
347	16.52	RAPC5	BAPC1	3	3
348	16.58	RAPC5	BAPC1	3	3
349	17.01	RAPC5	BAPC1	3	3
350	17.01	RAPC5	BAPC1	3	3
351	17.01	RAPC5	BAPC1	3	3
352	17.02	RAPC5	BAPC1	3	3
353	17.03	RAPC5	BAPC1	3	3
354	17.03	RAPC5	BAPC1	3	3
355	17.05	RAPC5	BAPC1	3	3
356	17.06	RAPC5	BAPC1	3	3
357	17.17	RAPC5	BAPC1	3	3
358	17.25	RAPC5	BAPC1	3	3
359	17.27	RAPC5	BAPC1	3	3
360	17.33	RAPC5	BAPC1	3	3
361	18.02	RAPC5	BAPC1	3	3
362	18.09	RAPC5	BAPC1	3	3
363	18.11	RAPC5	BAPC1	3	3
364	18.36	RAPC5	BAPC1	3	3
365	18.42	RAPC5	BAPC1	3	3
366	18.43	RAPC5	BAPC1	3	3
367	18.46	RAPC5	BAPC1	3	3
368	18.55	RAPC5	BAPC1	3	3
369	19.01	RAPC5	BAPC1	3	3
370	19.03	RAPC5	BAPC1	3	3
371	19.15	RAPC5	BAPC1	3	3
372	19.26	RAPC5	BAPC1	3	3
373	19.34	RAPC5	BAPC1	3	3
374	19.35	RAPC5	BAPC1	3	3
375	19.60	RAPC5	BAPC1	3	3
376	20.00	RAPC5	BAPC1	3	3
377	20.07	RAPC5	BAPC1	3	3
378	20.08	RAPC5	BAPC1	3	3
379	20.11	RAPC5	BAPC1	3	3
380	20.15	RAPC5	BAPC1	3	3
381	20.23	RAPC5	BAPC1	3	3

382	20.27	RAPC5	BAPC1	3	3
383	20.29	RAPC5	BAPC1	3	3
384	20.31	RAPC5	BAPC1	3	3
385	20.32	RAPC5	BAPC1	3	3
386	20.39	RAPC5	BAPC1	3	3
387	20.41	RAPC5	BAPC1	3	3
388	20.55	RAPC5	BAPC1	3	3
389	21.06	RAPC5	BAPC1	3	3
390	21.16	RAPC5	BAPC1	3	3
391	21.18	RAPC5	BAPC1	3	3
392	21.25	RAPC5	BAPC1	3	3
393	21.37	RAPC5	BAPC1	3	3
394	21.40	RAPC5	BAPC1	3	3
395	21.40	RAPC5	BAPC1	3	3
396	21.53	RAPC5	BAPC1	3	3
397	21.56	RAPC5	BAPC1	3	3
398	22.05	RAPC5	BAPC1	3	3
399	22.05	RAPC5	BAPC1	3	3
400	22.07	RAPC5	BAPC1	3	3
401	22.30	RAPC5	BAPC1	3	3
402	22.32	RAPC5	BAPC1	3	3
403	22.37	RAPC5	BAPC1	3	3
404	23.00	RAPC5	BAPC1	3	3
405	23.04	RAPC5	BAPC1	3	3
406	23.07	RAPC5	BAPC1	3	3
407	23.22	RAPC5	BAPC1	3	3
408	23.23	RAPC5	BAPC1	3	3
409	23.28	RAPC5	BAPC1	3	3
410	23.48	RAPC5	BAPC1	3	3
411	24.08	RAPC5	BAPC1	3	3
412	25.10	RAPC5	BAPC1	3	3
413	26.13	RAPC5	BAPC1	3	3
414	26.42	RAPC5	BAPC1	3	3
415	26.44	RAPC5	BAPC1	3	3
416	26.53	RAPC5	BAPC1	3	3
417	27.03	RAPC5	BAPC1	3	3
418	27.08	RAPC5	BAPC1	3	3
419	27.46	RAPC5	BAPC1	3	3
420	28.27	RAPC5	BAPC1	3	3
421	28.32	RAPC5	BAPC1	3	3
422	28.40	RAPC5	BAPC1	3	3
423	29.16	RAPC5	BAPC1	3	3
424	29.17	RAPC5	BAPC1	3	3
425	29.55	RAPC5	BAPC1	3	3
426	29.57	RAPC5	BAPC1	3	3

427	22.29	RAPC5	BSLDR9	3	4
428	23.28	RAPC5	BSLDR9	3	4
429	0.01	RSLD11	BAPC1	4	3
430	0.03	RSLD11	BAPC1	4	3
431	0.19	RSLD11	BAPC1	4	3
432	0.23	RSLD11	BAPC1	4	3
433	0.27	RSLD11	BAPC1	4	3
434	0.31	RSLD11	BAPC1	4	3
435	0.34	RSLD11	BAPC1	4	3
436	1.03	RSLD11	BAPC1	4	3
437	1.06	RSLD11	BAPC1	4	3
438	1.08	RSLD11	BAPC1	4	3
439	1.36	RSLD11	BAPC1	4	3
440	1.45	RSLD11	BAPC1	4	3
441	3.29	RSLD11	BAPC1	4	3
442	3.35	RSLD11	BAPC1	4	3
443	5.08	RSLD11	BAPC1	4	3
444	8.20	RSLD11	BAPC1	4	3
445	8.41	RSLD11	BAPC1	4	3
446	11.06	RSLD11	BAPC1	4	3
447	18.35	RSLD11	BAPC1	4	3
448	20.35	RSLD11	BAPC1	4	3
449	15.51	RSLD11	BSLDR9	4	4
450	16.43	RSLD11	BSLDR9	4	4

WITH COA2

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1. Blue casualties by Red with COA2

OBS	TIME	TARGET	FIRER	FIRER	TARGET
1	6.23	BTANK1	RTANK9	1	1
2	6.24	BTANK1	RTANK9	1	1
3	8.55	BTANK1	RTANK9	1	1
4	10.11	BTANK1	RTANK9	1	1
5	10.11	BTANK1	RTANK9	1	1
6	11.34	BTANK1	RTANK9	1	1
7	11.34	BTANK1	RTANK9	1	1
8	11.36	BTANK1	RTANK9	1	1
9	12.07	BTANK1	RTANK9	1	1

10	12.28	BTANK1	RTANK9	1	1
11	12.32	BTANK1	RTANK9	1	1
12	12.34	BTANK1	RTANK9	1	1
13	12.38	BTANK1	RTANK9	1	1
14	12.42	BTANK1	RTANK9	1	1
15	12.46	BTANK1	RTANK9	1	1
16	12.46	BTANK1	RTANK9	1	1
17	13.22	BTANK1	RTANK9	1	1
18	14.10	BTANK1	RTANK9	1	1
19	14.26	BTANK1	RTANK9	1	1
20	14.33	BTANK1	RTANK9	1	1
21	14.37	BTANK1	RTANK9	1	1
22	15.18	BTANK1	RTANK9	1	1
23	15.18	BTANK1	RTANK9	1	1
24	15.18	BTANK1	RTANK9	1	1
25	15.18	BTANK1	RTANK9	1	1
26	15.20	BTANK1	RTANK9	1	1
27	15.24	BTANK1	RTANK9	1	1
28	15.46	BTANK1	RTANK9	1	1
29	15.46	BTANK1	RTANK9	1	1
30	16.00	BTANK1	RTANK9	1	1
31	16.02	BTANK1	RTANK9	1	1
32	16.10	BTANK1	RTANK9	1	1
33	16.10	BTANK1	RTANK9	1	1
34	16.10	BTANK1	RTANK9	1	1
35	16.10	BTANK1	RTANK9	1	1
36	16.46	BTANK1	RTANK9	1	1
37	16.50	BTANK1	RTANK9	1	1
38	16.51	BTANK1	RTANK9	1	1
39	16.54	BTANK1	RTANK9	1	1
40	17.17	BTANK1	RTANK9	1	1
41	17.18	BTANK1	RTANK9	1	1
42	17.50	BTANK1	RTANK9	1	1
43	17.50	BTANK1	RTANK9	1	1
44	18.04	BTANK1	RTANK9	1	1
45	18.36	BTANK1	RTANK9	1	1
46	18.53	BTANK1	RTANK9	1	1
47	20.56	BTANK1	RTANK9	1	1
48	22.14	BTANK1	RTANK9	1	1
49	22.14	BTANK1	RTANK9	1	1
50	22.14	BTANK1	RTANK9	1	1
51	22.14	BTANK1	RTANK9	1	1
52	22.14	BTANK1	RTANK9	1	1
53	22.32	BTANK1	RTANK9	1	1
54	22.34	BTANK1	RTANK9	1	1

55	25.49	BTANK1	RTANK9	1	1
56	26.05	BTANK1	RTANK9	1	1
57	5.21	BTANK1	RAPC5	3	1
58	5.25	BTANK1	RAPC5	3	1
59	5.31	BTANK1	RAPC5	3	1
60	6.16	BTANK1	RAPC5	3	1
61	6.26	BTANK1	RAPC5	3	1
62	6.28	BTANK1	RAPC5	3	1
63	9.14	BTANK1	RAPC5	3	1
64	9.14	BTANK1	RAPC5	3	1
65	9.14	BTANK1	RAPC5	3	1
66	9.16	BTANK1	RAPC5	3	1
67	9.16	BTANK1	RAPC5	3	1
68	9.18	BTANK1	RAPC5	3	1
69	9.24	BTANK1	RAPC5	3	1
70	9.35	BTANK1	RAPC5	3	1
71	9.35	BTANK1	RAPC5	3	1
72	10.10	BTANK1	RAPC5	3	1
73	10.11	BTANK1	RAPC5	3	1
74	10.11	BTANK1	RAPC5	3	1
75	11.26	BTANK1	RAPC5	3	1
76	12.25	BTANK1	RAPC5	3	1
77	12.27	BTANK1	RAPC5	3	1
78	12.31	BTANK1	RAPC5	3	1
79	12.37	BTANK1	RAPC5	3	1
80	12.37	BTANK1	RAPC5	3	1
81	12.40	BTANK1	RAPC5	3	1
82	12.42	BTANK1	RAPC5	3	1
83	12.52	BTANK1	RAPC5	3	1
84	12.54	BTANK1	RAPC5	3	1
85	12.55	BTANK1	RAPC5	3	1
86	12.55	BTANK1	RAPC5	3	1
87	13.00	BTANK1	RAPC5	3	1
88	13.05	BTANK1	RAPC5	3	1
89	13.08	BTANK1	RAPC5	3	1
90	13.10	BTANK1	RAPC5	3	1
91	13.14	BTANK1	RAPC5	3	1
92	13.16	BTANK1	RAPC5	3	1
93	13.22	BTANK1	RAPC5	3	1
94	13.26	BTANK1	RAPC5	3	1
95	13.26	BTANK1	RAPC5	3	1
96	13.30	BTANK1	RAPC5	3	1
97	13.31	BTANK1	RAPC5	3	1
98	13.31	BTANK1	RAPC5	3	1
99	13.32	BTANK1	RAPC5	3	1

100	13.33	BTANK1	RAPC5	3	1
101	13.34	BTANK1	RAPC5	3	1
102	13.36	BTANK1	RAPC5	3	1
103	13.37	BTANK1	RAPC5	3	1
104	13.49	BTANK1	RAPC5	3	1
105	13.51	BTANK1	RAPC5	3	1
106	13.55	BTANK1	RAPC5	3	1
107	14.02	BTANK1	RAPC5	3	1
108	14.09	BTANK1	RAPC5	3	1
109	14.12	BTANK1	RAPC5	3	1
110	14.18	BTANK1	RAPC5	3	1
111	14.29	BTANK1	RAPC5	3	1
112	14.44	BTANK1	RAPC5	3	1
113	14.45	BTANK1	RAPC5	3	1
114	14.47	BTANK1	RAPC5	3	1
115	14.50	BTANK1	RAPC5	3	1
116	14.56	BTANK1	RAPC5	3	1
117	15.04	BTANK1	RAPC5	3	1
118	15.05	BTANK1	RAPC5	3	1
119	15.06	BTANK1	RAPC5	3	1
120	15.06	BTANK1	RAPC5	3	1
121	15.08	BTANK1	RAPC5	3	1
122	15.14	BTANK1	RAPC5	3	1
123	15.16	BTANK1	RAPC5	3	1
124	15.22	BTANK1	RAPC5	3	1
125	15.22	BTANK1	RAPC5	3	1
126	15.24	BTANK1	RAPC5	3	1
127	15.27	BTANK1	RAPC5	3	1
128	15.28	BTANK1	RAPC5	3	1
129	15.29	BTANK1	RAPC5	3	1
130	15.29	BTANK1	RAPC5	3	1
131	15.30	BTANK1	RAPC5	3	1
132	15.30	BTANK1	RAPC5	3	1
133	15.32	BTANK1	RAPC5	3	1
134	15.35	BTANK1	RAPC5	3	1
135	15.38	BTANK1	RAPC5	3	1
136	15.48	BTANK1	RAPC5	3	1
137	15.60	BTANK1	RAPC5	3	1
138	16.18	BTANK1	RAPC5	3	1
139	16.19	BTANK1	RAPC5	3	1
140	16.25	BTANK1	RAPC5	3	1
141	16.30	BTANK1	RAPC5	3	1
142	16.37	BTANK1	RAPC5	3	1
143	16.45	BTANK1	RAPC5	3	1
144	17.18	BTANK1	RAPC5	3	1

145	17.21	BTANK1	RAPC5	3	1
146	17.38	BTANK1	RAPC5	3	1
147	18.07	BTANK1	RAPC5	3	1
148	18.21	BTANK1	RAPC5	3	1
149	18.35	BTANK1	RAPC5	3	1
150	18.39	BTANK1	RAPC5	3	1
151	18.51	BTANK1	RAPC5	3	1
152	19.02	BTANK1	RAPC5	3	1
153	19.02	BTANK1	RAPC5	3	1
154	19.04	BTANK1	RAPC5	3	1
155	19.10	BTANK1	RAPC5	3	1
156	19.17	BTANK1	RAPC5	3	1
157	19.19	BTANK1	RAPC5	3	1
158	19.21	BTANK1	RAPC5	3	1
159	19.23	BTANK1	RAPC5	3	1
160	19.29	BTANK1	RAPC5	3	1
161	20.03	BTANK1	RAPC5	3	1
162	20.19	BTANK1	RAPC5	3	1
163	23.38	BTANK1	RAPC5	3	1
164	23.54	BTANK1	RAPC5	3	1
165	12.49	BTANK1	RSLD11	4	1
166	15.20	BTANK1	RSLD11	4	1
167	17.11	BTANK1	RSLD11	4	1
168	17.13	BTANK1	RSLD11	4	1
169	17.48	BTANK1	RSLD11	4	1
170	18.47	BTANK1	RSLD11	4	1
171	11.41	BAPC1	RTANK9	1	3
172	12.06	BAPC1	RTANK9	1	3
173	12.12	BAPC1	RTANK9	1	3
174	12.12	BAPC1	RTANK9	1	3
175	12.14	BAPC21	RTANK9	1	3
176	12.26	BAPC1	RTANK9	1	3
177	12.34	BAPC1	RTANK9	1	3
178	12.38	BAPC1	RTANK9	1	3
179	12.39	BAPC1	RTANK9	1	3
180	13.21	BAPC1	RTANK9	1	3
181	13.24	BAPC21	RTANK9	1	3
182	24.43	BAPC1	RTANK9	1	3
183	25.53	BAPC1	RTANK9	1	3
184	4.52	BAPC21	RAPC5	3	3
185	7.42	BAPC21	RAPC5	3	3
186	7.56	BAPC21	RAPC5	3	3
187	8.05	BAPC21	RAPC5	3	3
188	8.23	BAPC21	RAPC5	3	3
189	8.37	BAPC21	RAPC5	3	3

190	8.43	BAPC21	RAPC5	3	3
191	8.60	BAPC1	RAPC5	3	3
192	9.02	BAPC1	RAPC5	3	3
193	9.10	BAPC1	RAPC5	3	3
194	9.20	BAPC1	RAPC5	3	3
195	9.20	BAPC1	RAPC5	3	3
196	9.22	BAPC1	RAPC5	3	3
197	9.24	BAPC1	RAPC5	3	3
198	9.32	BAPC1	RAPC5	3	3
199	9.40	BAPC1	RAPC5	3	3
200	9.41	BAPC1	RAPC5	3	3
201	9.42	BAPC1	RAPC5	3	3
202	9.49	BAPC1	RAPC5	3	3
203	9.50	BAPC1	RAPC5	3	3
204	9.53	BAPC1	RAPC5	3	3
205	10.03	BAPC1	RAPC5	3	3
206	10.04	BAPC1	RAPC5	3	3
207	10.06	BAPC1	RAPC5	3	3
208	10.12	BAPC1	RAPC5	3	3
209	10.21	BAPC1	RAPC5	3	3
210	10.24	BAPC1	RAPC5	3	3
211	10.34	BAPC1	RAPC5	3	3
212	10.36	BAPC1	RAPC5	3	3
213	10.44	BAPC1	RAPC5	3	3
214	10.49	BAPC1	RAPC5	3	3
215	10.51	BAPC1	RAPC5	3	3
216	10.51	BAPC1	RAPC5	3	3
217	10.52	BAPC1	RAPC5	3	3
218	10.52	BAPC1	RAPC5	3	3
219	10.52	BAPC1	RAPC5	3	3
220	10.56	BAPC1	RAPC5	3	3
221	10.57	BAPC1	RAPC5	3	3
222	10.57	BAPC1	RAPC5	3	3
223	10.58	BAPC1	RAPC5	3	3
224	10.59	BAPC1	RAPC5	3	3
225	10.60	BAPC1	RAPC5	3	3
226	11.02	BAPC1	RAPC5	3	3
227	11.10	BAPC1	RAPC5	3	3
228	11.11	BAPC1	RAPC5	3	3
229	11.15	BAPC1	RAPC5	3	3
230	11.16	BAPC1	RAPC5	3	3
231	11.17	BAPC1	RAPC5	3	3
232	11.40	BAPC1	RAPC5	3	3
233	11.44	BAPC1	RAPC5	3	3
234	11.60	BAPC1	RAPC5	3	3

235	12.12	BAPC1	RAPC5	3	3
236	12.16	BAPC1	RAPC5	3	3
237	12.17	BAPC1	RAPC5	3	3
238	12.26	BAPC1	RAPC5	3	3
239	12.34	BAPC1	RAPC5	3	3
240	12.40	BAPC1	RAPC5	3	3
241	12.42	BAPC1	RAPC5	3	3
242	12.44	BAPC21	RAPC5	3	3
243	12.45	BAPC1	RAPC5	3	3
244	12.46	BAPC21	RAPC5	3	3
245	12.48	BAPC1	RAPC5	3	3
246	12.50	BAPC1	RAPC5	3	3
247	12.53	BAPC1	RAPC5	3	3
248	12.55	BAPC1	RAPC5	3	3
249	12.60	BAPC21	RAPC5	3	3
250	13.03	BAPC21	RAPC5	3	3
251	13.03	BAPC1	RAPC5	3	3
252	13.10	BAPC21	RAPC5	3	3
253	13.21	BAPC21	RAPC5	3	3
254	13.22	BAPC21	RAPC5	3	3
255	13.24	BAPC21	RAPC5	3	3
256	13.25	BAPC1	RAPC5	3	3
257	13.25	BAPC1	RAPC5	3	3
258	13.32	BAPC21	RAPC5	3	3
259	13.33	BAPC1	RAPC5	3	3
260	13.33	BAPC1	RAPC5	3	3
261	13.35	BAPC1	RAPC5	3	3
262	13.40	BAPC1	RAPC5	3	3
263	13.42	BAPC1	RAPC5	3	3
264	13.60	BAPC1	RAPC5	3	3
265	14.02	BAPC1	RAPC5	3	3
266	14.04	BAPC1	RAPC5	3	3
267	14.07	BAPC1	RAPC5	3	3
268	14.10	BAPC1	RAPC5	3	3
269	14.10	BAPC1	RAPC5	3	3
270	14.10	BAPC1	RAPC5	3	3
271	14.12	BAPC1	RAPC5	3	3
272	14.14	BAPC1	RAPC5	3	3
273	14.17	BAPC1	RAPC5	3	3
274	14.18	BAPC1	RAPC5	3	3
275	14.20	BAPC1	RAPC5	3	3
276	14.20	BAPC1	RAPC5	3	3
277	14.22	BAPC1	RAPC5	3	3
278	14.24	BAPC1	RAPC5	3	3
279	14.24	BAPC1	RAPC5	3	3

280	14.26	BAPC1	RAPC5	3	3
281	14.27	BAPC21	RAPC5	3	3
282	14.28	BAPC1	RAPC5	3	3
283	14.29	BAPC1	RAPC5	3	3
284	14.32	BAPC1	RAPC5	3	3
285	14.40	BAPC1	RAPC5	3	3
286	14.58	BAPC1	RAPC5	3	3
287	14.58	BAPC1	RAPC5	3	3
288	14.60	BAPC1	RAPC5	3	3
289	15.05	BAPC1	RAPC5	3	3
290	15.12	BAPC1	RAPC5	3	3
291	15.12	BAPC1	RAPC5	3	3
292	15.15	BAPC21	RAPC5	3	3
293	15.22	BAPC1	RAPC5	3	3
294	16.24	BAPC1	RAPC5	3	3
295	16.59	BAPC1	RAPC5	3	3
296	16.59	BAPC1	RAPC5	3	3
297	17.29	BAPC1	RAPC5	3	3
298	17.35	BAPC21	RAPC5	3	3
299	17.49	BAPC1	RAPC5	3	3
300	17.51	BAPC21	RAPC5	3	3
301	17.56	BAPC21	RAPC5	3	3
302	17.58	BAPC1	RAPC5	3	3
303	17.59	BAPC1	RAPC5	3	3
304	18.04	BAPC1	RAPC5	3	3
305	18.06	BAPC1	RAPC5	3	3
306	18.11	BAPC21	RAPC5	3	3
307	18.12	BAPC1	RAPC5	3	3
308	18.12	BAPC21	RAPC5	3	3
309	18.21	BAPC21	RAPC5	3	3
310	18.25	BAPC21	RAPC5	3	3
311	18.27	BAPC1	RAPC5	3	3
312	18.32	BAPC1	RAPC5	3	3
313	18.41	BAPC21	RAPC5	3	3
314	19.20	BAPC1	RAPC5	3	3
315	20.08	BAPC1	RAPC5	3	3
316	20.24	BAPC1	RAPC5	3	3
317	20.34	BAPC1	RAPC5	3	3
318	20.39	BAPC1	RAPC5	3	3
319	20.43	BAPC1	RAPC5	3	3
320	21.01	BAPC1	RAPC5	3	3
321	21.03	BAPC1	RAPC5	3	3
322	21.08	BAPC1	RAPC5	3	3
323	21.10	BAPC1	RAPC5	3	3
324	21.14	BAPC1	RAPC5	3	3

325	21.18	BAPC1	RAPC5	3	3
326	21.23	BAPC21	RAPC5	3	3
327	21.24	BAPC1	RAPC5	3	3
328	21.54	BAPC1	RAPC5	3	3
329	22.12	BAPC1	RAPC5	3	3
330	22.17	BAPC1	RAPC5	3	3
331	22.23	BAPC1	RAPC5	3	3
332	23.42	BAPC1	RAPC5	3	3
333	24.03	BAPC1	RAPC5	3	3
334	24.20	BAPC1	RAPC5	3	3
335	24.26	BAPC1	RAPC5	3	3
336	24.48	BAPC1	RAPC5	3	3
337	24.59	BAPC1	RAPC5	3	3
338	25.00	BAPC1	RAPC5	3	3
339	25.11	BAPC1	RAPC5	3	3
340	25.20	BAPC1	RAPC5	3	3
341	25.23	BAPC1	RAPC5	3	3
342	25.35	BAPC1	RAPC5	3	3
343	25.41	BAPC1	RAPC5	3	3
344	26.07	BAPC1	RAPC5	3	3
345	27.18	BAPC1	RAPC5	3	3
346	27.46	BAPC1	RAPC5	3	3
347	27.49	BAPC1	RAPC5	3	3
348	28.26	BAPC1	RAPC5	3	3
349	12.07	BAPC21	RSLD11	4	3
350	13.45	BAPC1	RSLD11	4	3
351	5.49	BSLDR9	RTANK9	1	4
352	8.48	BSLDR9	RTANK9	1	4
353	8.56	BSLDR9	RTANK9	1	4
354	9.55	BSLDR9	RTANK9	1	4
355	11.20	BSLDR9	RTANK9	1	4
356	15.31	BSLDR9	RTANK9	1	4
357	17.09	BSLDR9	RTANK9	1	4
358	17.12	BSLDR9	RTANK9	1	4
359	17.29	BSLDR9	RTANK9	1	4
360	17.34	BSLDR9	RTANK9	1	4
361	17.54	BSLDR9	RTANK9	1	4
362	18.03	BSLDR9	RTANK9	1	4
363	18.07	BSLDR9	RTANK9	1	4
364	18.10	BSLDR9	RTANK9	1	4
365	18.19	BSLDR9	RTANK9	1	4
366	18.37	BSLDR9	RTANK9	1	4
367	20.12	BSLDR9	RTANK9	1	4
368	20.38	BSLDR9	RTANK9	1	4
369	21.38	BSLDR9	RTANK9	1	4

370	22.17	BSLDR9	RTANK9	1	4
371	22.33	BSLDR9	RTANK9	1	4
372	22.41	BSLDR9	RTANK9	1	4
373	23.08	BSLDR9	RTANK9	1	4
374	23.24	BSLDR9	RTANK9	1	4
375	23.40	BSLDR9	RTANK9	1	4
376	23.46	BSLDR9	RTANK9	1	4
377	24.22	BSLDR9	RTANK9	1	4
378	24.32	BSLDR9	RTANK9	1	4
379	24.44	BSLDR9	RTANK9	1	4
380	25.10	BSLDR9	RTANK9	1	4
381	25.14	BSLDR9	RTANK9	1	4
382	25.29	BSLDR9	RTANK9	1	4
383	25.42	BSLDR9	RTANK9	1	4
384	26.00	BSLDR9	RTANK9	1	4
385	26.53	BSLDR9	RTANK9	1	4
386	27.03	BSLDR9	RTANK9	1	4
387	27.56	BSLDR9	RTANK9	1	4
388	28.08	BSLDR9	RTANK9	1	4
389	28.42	BSLDR9	RTANK9	1	4
390	28.52	BSLDR9	RTANK9	1	4
391	29.14	BSLDR9	RTANK9	1	4

2. Red casualties by Blue with COA2

OBS	TIME	TARGET	FIRER	TARGET	FIRER
1	5.14	RTANK9	BTANK1	1	1
2	6.16	RTANK9	BTANK1	1	1
3	6.22	RTANK9	BTANK1	1	1
4	6.38	RTANK9	BTANK1	1	1
5	6.46	RTANK9	BTANK1	1	1
6	6.48	RTANK9	BTANK1	1	1
7	7.06	RTANK9	BTANK1	1	1
8	7.24	RTANK9	BTANK1	1	1
9	7.28	RTANK9	BTANK1	1	1
10	7.45	RTANK9	BTANK1	1	1
11	7.46	RTANK9	BTANK1	1	1
12	7.56	RTANK9	BTANK1	1	1
13	8.12	RTANK9	BTANK1	1	1
14	8.18	RTANK9	BTANK1	1	1
15	8.50	RTANK9	BTANK1	1	1
16	8.54	RTANK9	BTANK1	1	1

17	9.03	RTANK9	BTANK1	1	1
18	9.06	RTANK9	BTANK1	1	1
19	9.10	RTANK9	BTANK1	1	1
20	9.14	RTANK9	BTANK1	1	1
21	9.14	RTANK9	BTANK1	1	1
22	9.26	RTANK9	BTANK1	1	1
23	9.38	RTANK9	BTANK1	1	1
24	9.44	RTANK9	BTANK1	1	1
25	9.44	RTANK9	BTANK1	1	1
26	9.44	RTANK9	BTANK1	1	1
27	9.44	RTANK9	BTANK1	1	1
28	9.46	RTANK9	BTANK1	1	1
29	9.46	RTANK9	BTANK1	1	1
30	9.55	RTANK9	BTANK1	1	1
31	9.60	RTANK9	BTANK1	1	1
32	10.04	RTANK9	BTANK1	1	1
33	10.12	RTANK9	BTANK1	1	1
34	10.14	RTANK9	BTANK1	1	1
35	10.14	RTANK9	BTANK1	1	1
36	10.16	RTANK9	BTANK1	1	1
37	10.18	RTANK9	BTANK1	1	1
38	10.20	RTANK9	BTANK1	1	1
39	10.20	RTANK9	BTANK1	1	1
40	10.21	RTANK9	BTANK1	1	1
41	10.24	RTANK9	BTANK1	1	1
42	10.28	RTANK9	BTANK1	1	1
43	10.32	RTANK9	BTANK1	1	1
44	10.34	RTANK9	BTANK1	1	1
45	10.34	RTANK9	BTANK1	1	1
46	10.34	RTANK9	BTANK1	1	1
47	10.36	RTANK9	BTANK1	1	1
48	10.38	RTANK9	BTANK1	1	1
49	10.38	RTANK9	BTANK1	1	1
50	10.46	RTANK9	BTANK1	1	1
51	10.48	RTANK9	BTANK1	1	1
52	10.49	RTANK9	BTANK1	1	1
53	10.50	RTANK9	BTANK1	1	1
54	10.54	RTANK9	BTANK1	1	1
55	10.55	RTANK9	BTANK1	1	1
56	10.58	RTANK9	BTANK1	1	1
57	11.08	RTANK9	BTANK1	1	1
58	11.10	RTANK9	BTANK1	1	1
59	11.14	RTANK9	BTANK1	1	1
60	11.20	RTANK9	BTANK1	1	1
61	11.22	RTANK9	BTANK1	1	1

62	11.22	RTANK9	BTANK1	1	1
63	11.28	RTANK9	BTANK1	1	1
64	11.32	RTANK9	BTANK1	1	1
65	11.36	RTANK9	BTANK1	1	1
66	11.38	RTANK9	BTANK1	1	1
67	11.49	RTANK9	BTANK1	1	1
68	12.01	RTANK9	BTANK1	1	1
69	12.12	RTANK9	BTANK1	1	1
70	12.13	RTANK9	BTANK1	1	1
71	12.14	RTANK9	BTANK1	1	1
72	12.16	RTANK9	BTANK1	1	1
73	12.16	RTANK9	BTANK1	1	1
74	12.16	RTANK9	BTANK1	1	1
75	12.17	RTANK9	BTANK1	1	1
76	12.18	RTANK9	BTANK1	1	1
77	12.18	RTANK9	BTANK1	1	1
78	12.20	RTANK9	BTANK1	1	1
79	12.33	RTANK9	BTANK1	1	1
80	12.33	RTANK9	BTANK1	1	1
81	12.45	RTANK9	BTANK1	1	1
82	12.48	RTANK9	BTANK1	1	1
83	12.52	RTANK9	BTANK1	1	1
84	13.06	RTANK9	BTANK1	1	1
85	13.10	RTANK9	BTANK1	1	1
86	13.23	RTANK9	BTANK1	1	1
87	13.24	RTANK9	BTANK1	1	1
88	13.24	RTANK9	BTANK1	1	1
89	13.28	RTANK9	BTANK1	1	1
90	13.28	RTANK9	BTANK1	1	1
91	13.30	RTANK9	BTANK1	1	1
92	13.30	RTANK9	BTANK1	1	1
93	13.49	RTANK9	BTANK1	1	1
94	13.52	RTANK9	BTANK1	1	1
95	13.54	RTANK9	BTANK1	1	1
96	13.54	RTANK9	BTANK1	1	1
97	13.54	RTANK9	BTANK1	1	1
98	13.54	RTANK9	BTANK1	1	1
99	13.54	RTANK9	BTANK1	1	1
100	14.00	RTANK9	BTANK1	1	1
101	14.02	RTANK9	BTANK1	1	1
102	14.08	RTANK9	BTANK1	1	1
103	14.11	RTANK9	BTANK1	1	1
104	14.21	RTANK9	BTANK1	1	1
105	14.25	RTANK9	BTANK1	1	1
106	14.34	RTANK9	BTANK1	1	1

107	14.38	RTANK9	BTANK1	1	1
108	14.40	RTANK9	BTANK1	1	1
109	15.22	RTANK9	BTANK1	1	1
110	15.45	RTANK9	BTANK1	1	1
111	15.45	RTANK9	BTANK1	1	1
112	16.11	RTANK9	BTANK1	1	1
113	16.14	RTANK9	BTANK1	1	1
114	16.21	RTANK9	BTANK1	1	1
115	16.35	RTANK9	BTANK1	1	1
116	16.41	RTANK9	BTANK1	1	1
117	16.47	RTANK9	BTANK1	1	1
118	16.47	RTANK9	BTANK1	1	1
119	16.58	RTANK9	BTANK1	1	1
120	17.00	RTANK9	BTANK1	1	1
121	17.14	RTANK9	BTANK1	1	1
122	17.14	RTANK9	BTANK1	1	1
123	17.18	RTANK9	BTANK1	1	1
124	17.25	RTANK9	BTANK1	1	1
125	17.30	RTANK9	BTANK1	1	1
126	17.30	RTANK9	BTANK1	1	1
127	17.31	RTANK9	BTANK1	1	1
128	17.55	RTANK9	BTANK1	1	1
129	18.07	RTANK9	BTANK1	1	1
130	19.17	RTANK9	BTANK1	1	1
131	19.38	RTANK9	BTANK1	1	1
132	20.03	RTANK9	BTANK1	1	1
133	20.05	RTANK9	BTANK1	1	1
134	20.05	RTANK9	BTANK1	1	1
135	20.39	RTANK9	BTANK1	1	1
136	20.57	RTANK9	BTANK1	1	1
137	20.57	RTANK9	BTANK1	1	1
138	20.57	RTANK9	BTANK1	1	1
139	20.57	RTANK9	BTANK1	1	1
140	20.59	RTANK9	BTANK1	1	1
141	22.13	RTANK9	BTANK1	1	1
142	22.13	RTANK9	BTANK1	1	1
143	11.31	RTANK9	BAPC1	1	3
144	11.41	RTANK9	BAPC1	1	3
145	12.04	RTANK9	BAPC1	1	3
146	12.22	RTANK9	BAPC1	1	3
147	12.38	RTANK9	BAPC1	1	3
148	12.42	RTANK9	BAPC1	1	3
149	13.29	RTANK9	BAPC1	1	3
150	13.55	RTANK9	BAPC1	1	3
151	13.57	RTANK9	BAPC1	1	3

152	14.01	RTANK9	BAPC1	1	3
153	14.03	RTANK9	BAPC1	1	3
154	14.05	RTANK9	BAPC1	1	3
155	14.07	RTANK9	BAPC1	1	3
156	14.16	RTANK9	BAPC1	1	3
157	14.20	RTANK9	BAPC1	1	3
158	14.32	RTANK9	BAPC1	1	3
159	15.45	RTANK9	BAPC1	1	3
160	16.12	RTANK9	BAPC1	1	3
161	16.23	RTANK9	BAPC1	1	3
162	16.52	RTANK9	BAPC1	1	3
163	16.53	RTANK9	BAPC1	1	3
164	17.22	RTANK9	BAPC1	1	3
165	17.49	RTANK9	BAPC1	1	3
166	17.51	RTANK9	BAPC1	1	3
167	17.55	RTANK9	BAPC1	1	3
168	17.56	RTANK9	BAPC1	1	3
169	18.01	RTANK9	BAPC1	1	3
170	18.02	RTANK9	BAPC1	1	3
171	18.05	RTANK9	BAPC1	1	3
172	18.05	RTANK9	BAPC1	1	3
173	18.07	RTANK9	BAPC1	1	3
174	18.09	RTANK9	BAPC1	1	3
175	18.17	RTANK9	BAPC1	1	3
176	18.18	RTANK9	BAPC1	1	3
177	18.24	RTANK9	BAPC1	1	3
178	18.24	RTANK9	BAPC1	1	3
179	18.24	RTANK9	BAPC1	1	3
180	18.32	RTANK9	BAPC1	1	3
181	18.34	RTANK9	BAPC1	1	3
182	18.38	RTANK9	BAPC1	1	3
183	18.56	RTANK9	BAPC1	1	3
184	19.05	RTANK9	BAPC1	1	3
185	19.06	RTANK9	BAPC1	1	3
186	19.21	RTANK9	BAPC1	1	3
187	19.24	RTANK9	BAPC1	1	3
188	19.32	RTANK9	BAPC1	1	3
189	19.33	RTANK9	BAPC1	1	3
190	20.07	RTANK9	BAPC1	1	3
191	20.11	RTANK9	BAPC1	1	3
192	20.27	RTANK9	BAPC1	1	3
193	20.52	RTANK9	BAPC1	1	3
194	20.53	RTANK9	BAPC1	1	3
195	20.54	RTANK9	BAPC1	1	3
196	21.01	RTANK9	BAPC1	1	3

197	21.31	RTANK9	BAPC1	1	3
198	21.31	RTANK9	BAPC1	1	3
199	21.35	RTANK9	BAPC1	1	3
200	21.57	RTANK9	BAPC1	1	3
201	22.11	RTANK9	BAPC1	1	3
202	22.24	RTANK9	BAPC1	1	3
203	22.32	RTANK9	BAPC1	1	3
204	22.35	RTANK9	BAPC1	1	3
205	22.41	RTANK9	BAPC1	1	3
206	23.17	RTANK9	BAPC1	1	3
207	23.18	RTANK9	BAPC1	1	3
208	23.27	RTANK9	BAPC1	1	3
209	23.44	RTANK9	BAPC1	1	3
210	23.52	RTANK9	BAPC1	1	3
211	24.22	RTANK9	BAPC1	1	3
212	24.45	RTANK9	BAPC1	1	3
213	24.58	RTANK9	BAPC1	1	3
214	25.03	RTANK9	BAPC1	1	3
215	25.06	RTANK9	BAPC1	1	3
216	25.07	RTANK9	BAPC1	1	3
217	25.13	RTANK9	BAPC1	1	3
218	25.22	RTANK9	BAPC1	1	3
219	25.25	RTANK9	BAPC1	1	3
220	25.33	RTANK9	BAPC1	1	3
221	25.59	RTANK9	BAPC1	1	3
222	26.02	RTANK9	BAPC1	1	3
223	26.15	RTANK9	BAPC1	1	3
224	26.41	RTANK9	BAPC1	1	3
225	26.45	RTANK9	BAPC1	1	3
226	26.58	RTANK9	BAPC1	1	3
227	26.58	RTANK9	BAPC1	1	3
228	27.27	RTANK9	BAPC1	1	3
229	17.06	RTANK9	BSLDR9	1	4
230	17.13	RTANK9	BSLDR9	1	4
231	19.40	RTANK9	BSLDR9	1	4
232	23.18	RTANK9	BSLDR9	1	4
233	23.22	RTANK9	BSLDR9	1	4
234	5.03	RAPC5	BTANK1	3	1
235	5.12	RAPC5	BTANK1	3	1
236	5.12	RAPC5	BTANK1	3	1
237	5.16	RAPC5	BTANK1	3	1
238	5.32	RAPC5	BTANK1	3	1
239	5.46	RAPC5	BTANK1	3	1
240	5.57	RAPC5	BTANK1	3	1
241	6.08	RAPC5	BTANK1	3	1

242	6.16	RAPC5	BTANK1	3	1
243	7.08	RAPC5	BTANK1	3	1
244	7.55	RAPC5	BTANK1	3	1
245	8.15	RAPC5	BTANK1	3	1
246	8.41	RAPC5	BTANK1	3	1
247	9.13	RAPC5	BTANK1	3	1
248	9.15	RAPC5	BTANK1	3	1
249	9.15	RAPC5	BTANK1	3	1
250	9.19	RAPC5	BTANK1	3	1
251	9.38	RAPC5	BTANK1	3	1
252	9.38	RAPC5	BTANK1	3	1
253	9.45	RAPC5	BTANK1	3	1
254	9.51	RAPC5	BTANK1	3	1
255	10.04	RAPC5	BTANK1	3	1
256	10.05	RAPC5	BTANK1	3	1
257	10.05	RAPC5	BTANK1	3	1
258	10.07	RAPC5	BTANK1	3	1
259	10.07	RAPC5	BTANK1	3	1
260	10.09	RAPC5	BTANK1	3	1
261	10.17	RAPC5	BTANK1	3	1
262	10.20	RAPC5	BTANK1	3	1
263	10.47	RAPC5	BTANK1	3	1
264	10.50	RAPC5	BTANK1	3	1
265	10.51	RAPC5	BTANK1	3	1
266	10.51	RAPC5	BTANK1	3	1
267	10.57	RAPC5	BTANK1	3	1
268	11.08	RAPC5	BTANK1	3	1
269	11.19	RAPC5	BTANK1	3	1
270	11.23	RAPC5	BTANK1	3	1
271	11.37	RAPC5	BTANK1	3	1
272	12.03	RAPC5	BTANK1	3	1
273	12.03	RAPC5	BTANK1	3	1
274	12.09	RAPC5	BTANK1	3	1
275	12.23	RAPC5	BTANK1	3	1
276	12.23	RAPC5	BTANK1	3	1
277	12.27	RAPC5	BTANK1	3	1
278	12.44	RAPC5	BTANK1	3	1
279	12.46	RAPC5	BTANK1	3	1
280	12.46	RAPC5	BTANK1	3	1
281	13.24	RAPC5	BTANK1	3	1
282	13.26	RAPC5	BTANK1	3	1
283	13.30	RAPC5	BTANK1	3	1
284	13.34	RAPC5	BTANK1	3	1
285	13.36	RAPC5	BTANK1	3	1
286	13.40	RAPC5	BTANK1	3	1

287	13.50	RAPC5	BTANK1	3	1
288	14.00	RAPC5	BTANK1	3	1
289	14.39	RAPC5	BTANK1	3	1
290	14.44	RAPC5	BTANK1	3	1
291	14.50	RAPC5	BTANK1	3	1
292	14.58	RAPC5	BTANK1	3	1
293	14.58	RAPC5	BTANK1	3	1
294	15.08	RAPC5	BTANK1	3	1
295	15.12	RAPC5	BTANK1	3	1
296	15.14	RAPC5	BTANK1	3	1
297	15.33	RAPC5	BTANK1	3	1
298	16.11	RAPC5	BTANK1	3	1
299	16.14	RAPC5	BTANK1	3	1
300	16.16	RAPC5	BTANK1	3	1
301	16.40	RAPC5	BTANK1	3	1
302	16.56	RAPC5	BTANK1	3	1
303	17.02	RAPC5	BTANK1	3	1
304	17.12	RAPC5	BTANK1	3	1
305	17.20	RAPC5	BTANK1	3	1
306	18.09	RAPC5	BTANK1	3	1
307	18.44	RAPC5	BTANK1	3	1
308	18.50	RAPC5	BTANK1	3	1
309	19.54	RAPC5	BTANK1	3	1
310	21.47	RAPC5	BTANK1	3	1
311	25.44	RAPC5	BTANK1	3	1
312	9.14	RAPC5	BAPC1	3	3
313	9.14	RAPC5	BAPC1	3	3
314	9.16	RAPC5	BAPC1	3	3
315	10.11	RAPC5	BAPC1	3	3
316	10.16	RAPC5	BAPC1	3	3
317	10.26	RAPC5	BAPC1	3	3
318	10.27	RAPC5	BAPC1	3	3
319	10.33	RAPC5	BAPC1	3	3
320	10.37	RAPC5	BAPC1	3	3
321	10.41	RAPC5	BAPC1	3	3
322	10.41	RAPC5	BAPC1	3	3
323	10.43	RAPC5	BAPC1	3	3
324	10.46	RAPC5	BAPC1	3	3
325	10.46	RAPC5	BAPC1	3	3
326	10.47	RAPC5	BAPC1	3	3
327	10.50	RAPC5	BAPC1	3	3
328	10.50	RAPC5	BAPC1	3	3
329	10.50	RAPC5	BAPC1	3	3
330	10.50	RAPC5	BAPC1	3	3
331	10.52	RAPC5	BAPC1	3	3

332	10.52	RAPC5	BAPC1	3	3
333	10.53	RAPC5	BAPC1	3	3
334	10.55	RAPC5	BAPC1	3	3
335	11.01	RAPC5	BAPC1	3	3
336	11.01	RAPC5	BAPC1	3	3
337	11.03	RAPC5	BAPC1	3	3
338	11.08	RAPC5	BAPC1	3	3
339	11.09	RAPC5	BAPC1	3	3
340	11.09	RAPC5	BAPC1	3	3
341	11.10	RAPC5	BAPC1	3	3
342	11.10	RAPC5	BAPC1	3	3
343	11.13	RAPC5	BAPC1	3	3
344	11.14	RAPC5	BAPC1	3	3
345	11.14	RAPC5	BAPC1	3	3
346	11.32	RAPC5	BAPC1	3	3
347	11.34	RAPC5	BAPC1	3	3
348	12.04	RAPC5	BAPC1	3	3
349	12.09	RAPC5	BAPC1	3	3
350	12.12	RAPC5	BAPC1	3	3
351	12.12	RAPC5	BAPC1	3	3
352	12.19	RAPC5	BAPC1	3	3
353	12.19	RAPC5	BAPC1	3	3
354	12.23	RAPC5	BAPC1	3	3
355	12.24	RAPC5	BAPC1	3	3
356	12.36	RAPC5	BAPC1	3	3
357	12.41	RAPC5	BAPC1	3	3
358	12.59	RAPC5	BAPC1	3	3
359	13.15	RAPC5	BAPC1	3	3
360	13.20	RAPC5	BAPC1	3	3
361	13.21	RAPC5	BAPC1	3	3
362	13.22	RAPC5	BAPC1	3	3
363	13.22	RAPC5	BAPC1	3	3
364	13.26	RAPC5	BAPC1	3	3
365	13.28	RAPC5	BAPC1	3	3
366	13.30	RAPC5	BAPC1	3	3
367	13.34	RAPC5	BAPC1	3	3
368	13.37	RAPC5	BAPC1	3	3
369	13.42	RAPC5	BAPC1	3	3
370	13.42	RAPC5	BAPC1	3	3
371	13.52	RAPC5	BAPC1	3	3
372	13.56	RAPC5	BAPC1	3	3
373	13.58	RAPC5	BAPC1	3	3
374	14.02	RAPC5	BAPC1	3	3
375	14.03	RAPC5	BAPC1	3	3
376	14.07	RAPC5	BAPC1	3	3

377	14.08	RAPC5	BAPC1	3	3
378	14.10	RAPC5	BAPC1	3	3
379	14.12	RAPC5	BAPC1	3	3
380	14.14	RAPC5	BAPC1	3	3
381	14.15	RAPC5	BAPC1	3	3
382	14.16	RAPC5	BAPC1	3	3
383	14.16	RAPC5	BAPC1	3	3
384	14.16	RAPC5	BAPC1	3	3
385	14.16	RAPC5	BAPC1	3	3
386	14.18	RAPC5	BAPC1	3	3
387	14.19	RAPC5	BAPC1	3	3
388	14.21	RAPC5	BAPC1	3	3
389	14.25	RAPC5	BAPC1	3	3
390	14.27	RAPC5	BAPC1	3	3
391	14.28	RAPC5	BAPC1	3	3
392	14.29	RAPC5	BAPC1	3	3
393	14.40	RAPC5	BAPC1	3	3
394	14.50	RAPC5	BAPC1	3	3
395	14.51	RAPC5	BAPC1	3	3
396	14.52	RAPC5	BAPC1	3	3
397	14.52	RAPC5	BAPC1	3	3
398	14.56	RAPC5	BAPC1	3	3
399	15.03	RAPC5	BAPC1	3	3
400	15.04	RAPC5	BAPC1	3	3
401	15.07	RAPC5	BAPC1	3	3
402	15.11	RAPC5	BAPC1	3	3
403	15.44	RAPC5	BAPC1	3	3
404	15.55	RAPC5	BAPC1	3	3
405	16.34	RAPC5	BAPC1	3	3
406	16.34	RAPC5	BAPC1	3	3
407	16.47	RAPC5	BAPC1	3	3
408	16.57	RAPC5	BAPC1	3	3
409	17.04	RAPC5	BAPC1	3	3
410	17.26	RAPC5	BAPC1	3	3
411	17.31	RAPC5	BAPC1	3	3
412	17.31	RAPC5	BAPC1	3	3
413	17.36	RAPC5	BAPC1	3	3
414	17.38	RAPC5	BAPC1	3	3
415	17.41	RAPC5	BAPC1	3	3
416	17.42	RAPC5	BAPC1	3	3
417	17.45	RAPC5	BAPC1	3	3
418	17.48	RAPC5	BAPC1	3	3
419	18.02	RAPC5	BAPC1	3	3
420	18.03	RAPC5	BAPC1	3	3
421	18.09	RAPC5	BAPC1	3	3

422	18.14	RAPC5	BAPC1	3	3
423	18.29	RAPC5	BAPC1	3	3
424	18.34	RAPC5	BAPC1	3	3
425	18.36	RAPC5	BAPC1	3	3
426	18.45	RAPC5	BAPC1	3	3
427	18.48	RAPC5	BAPC1	3	3
428	18.51	RAPC5	BAPC1	3	3
429	19.08	RAPC5	BAPC1	3	3
430	19.11	RAPC5	BAPC1	3	3
431	19.23	RAPC5	BAPC1	3	3
432	19.23	RAPC5	BAPC1	3	3
433	19.24	RAPC5	BAPC1	3	3
434	19.29	RAPC5	BAPC1	3	3
435	19.37	RAPC5	BAPC1	3	3
436	19.37	RAPC5	BAPC1	3	3
437	19.46	RAPC5	BAPC1	3	3
438	19.58	RAPC5	BAPC1	3	3
439	19.60	RAPC5	BAPC1	3	3
440	20.02	RAPC5	BAPC1	3	3
441	20.09	RAPC5	BAPC1	3	3
442	20.26	RAPC5	BAPC1	3	3
443	20.41	RAPC5	BAPC1	3	3
444	20.46	RAPC5	BAPC1	3	3
445	20.52	RAPC5	BAPC1	3	3
446	20.54	RAPC5	BAPC1	3	3
447	20.55	RAPC5	BAPC1	3	3
448	20.56	RAPC5	BAPC1	3	3
449	20.58	RAPC5	BAPC1	3	3
450	20.59	RAPC5	BAPC1	3	3
451	21.04	RAPC5	BAPC1	3	3
452	21.05	RAPC5	BAPC1	3	3
453	21.08	RAPC5	BAPC1	3	3
454	21.10	RAPC5	BAPC1	3	3
455	21.12	RAPC5	BAPC1	3	3
456	21.15	RAPC5	BAPC1	3	3
457	21.20	RAPC5	BAPC1	3	3
458	21.20	RAPC5	BAPC1	3	3
459	21.23	RAPC5	BAPC1	3	3
460	21.33	RAPC5	BAPC1	3	3
461	21.45	RAPC5	BAPC1	3	3
462	21.48	RAPC5	BAPC1	3	3
463	21.51	RAPC5	BAPC1	3	3
464	22.07	RAPC5	BAPC1	3	3
465	22.42	RAPC5	BAPC1	3	3
466	22.58	RAPC5	BAPC1	3	3

467	23.08	RAPC5	BAPC1	3	3
468	23.41	RAPC5	BAPC1	3	3
469	23.43	RAPC5	BAPC1	3	3
470	23.55	RAPC5	BAPC1	3	3
471	24.13	RAPC5	BAPC1	3	3
472	24.28	RAPC5	BAPC1	3	3
473	24.35	RAPC5	BAPC1	3	3
474	24.48	RAPC5	BAPC1	3	3
475	24.54	RAPC5	BAPC1	3	3
476	25.02	RAPC5	BAPC1	3	3
477	25.29	RAPC5	BAPC1	3	3
478	25.37	RAPC5	BAPC1	3	3
479	26.18	RAPC5	BAPC1	3	3
480	26.41	RAPC5	BAPC1	3	3
481	27.46	RAPC5	BAPC1	3	3
482	20.37	RAPC5	BSLDR9	3	4
483	29.07	RAPC5	BSLDR9	3	4
484	12.24	RSLD11	BTANK1	4	1
485	13.27	RSLD11	BTANK1	4	1
486	13.45	RSLD11	BTANK1	4	1
487	13.47	RSLD11	BTANK1	4	1
488	14.55	RSLD11	BTANK1	4	1
489	15.31	RSLD11	BTANK1	4	1
490	15.34	RSLD11	BTANK1	4	1
491	15.34	RSLD11	BTANK1	4	1
492	15.40	RSLD11	BTANK1	4	1
493	15.43	RSLD11	BTANK1	4	1
494	16.17	RSLD11	BTANK1	4	1
495	16.45	RSLD11	BTANK1	4	1
496	16.46	RSLD11	BTANK1	4	1
497	17.08	RSLD11	BTANK1	4	1
498	17.09	RSLD11	BTANK1	4	1
499	17.22	RSLD11	BTANK1	4	1
500	17.26	RSLD11	BTANK1	4	1
501	17.32	RSLD11	BTANK1	4	1
502	17.35	RSLD11	BTANK1	4	1
503	17.46	RSLD11	BTANK1	4	1
504	17.50	RSLD11	BTANK1	4	1
505	17.55	RSLD11	BTANK1	4	1
506	18.27	RSLD11	BTANK1	4	1
507	18.33	RSLD11	BTANK1	4	1
508	19.09	RSLD11	BTANK1	4	1
509	19.37	RSLD11	BTANK1	4	1
510	21.38	RSLD11	BTANK1	4	1
511	21.55	RSLD11	BTANK1	4	1

512	21.55	RSLD11	BTANK1	4	1
513	22.11	RSLD11	BTANK1	4	1
514	22.56	RSLD11	BTANK1	4	1
515	13.39	RSLD11	BAPC1	4	3
516	13.46	RSLD11	BAPC1	4	3
517	14.14	RSLD11	BAPC1	4	3
518	14.31	RSLD11	BAPC1	4	3
519	17.22	RSLD11	BAPC1	4	3
520	17.28	RSLD11	BAPC1	4	3
521	18.31	RSLD11	BAPC1	4	3
522	18.37	RSLD11	BAPC1	4	3
523	18.59	RSLD11	BAPC1	4	3
524	20.46	RSLD11	BAPC1	4	3
525	21.01	RSLD11	BAPC1	4	3
526	3.49	RSLD11	BSLDR9	4	4
527	3.59	RSLD11	BSLDR9	4	4
528	4.01	RSLD11	BSLDR9	4	4
529	4.28	RSLD11	BSLDR9	4	4
530	4.44	RSLD11	BSLDR9	4	4
531	4.49	RSLD11	BSLDR9	4	4
532	5.15	RSLD11	BSLDR9	4	4
533	5.17	RSLD11	BSLDR9	4	4
534	5.56	RSLD11	BSLDR9	4	4
535	6.15	RSLD11	BSLDR9	4	4
536	10.42	RSLD11	BSLDR9	4	4
537	11.21	RSLD11	BSLDR9	4	4
538	11.46	RSLD11	BSLDR9	4	4
539	11.54	RSLD11	BSLDR9	4	4
540	12.06	RSLD11	BSLDR9	4	4
541	12.22	RSLD11	BSLDR9	4	4
542	12.40	RSLD11	BSLDR9	4	4
543	12.54	RSLD11	BSLDR9	4	4
544	13.02	RSLD11	BSLDR9	4	4
545	21.31	RSLD11	BSLDR9	4	4
546	21.55	RSLD11	BSLDR9	4	4
547	23.47	RSLD11	BSLDR9	4	4
548	24.07	RSLD11	BSLDR9	4	4
549	28.24	RSLD11	BSLDR9	4	4
550	28.38	RSLD11	BSLDR9	4	4
551	29.15	RSLD11	BSLDR9	4	4

APPENDIX I. THE JANUS SYSTEM DATA

THE JANUS(T) ORIGINAL DATA FOR COA2

BLUE WEAPON CASUALTY								RED WEAPON FIRERS						
9.14	DF	1	BLUE	BTANK1	302.9	201.5	1	131	RED	RAPC5	302.9	201.7	0.18	MISSILE-1
10.10	DF	3	BLUE	BTANK1	302.9	201.5	1	131	RED	RAPC5	302.9	201.7	0.14	MISSILE-1
10.52	DF	58	BLUE	BAPC1	295.1	198.3	1	128	RED	RAPC5	295.6	202.2	3.97	MISSILE-1
10.59	DF	65	BLUE	BAPC1	294.9	198.3	1	154	RED	RAPC5	295.6	202.1	3.80	MISSILE-1
11.20	DF	80	BLUE	BSLDR9	309.4	200.6	1	36	RED	RTANK9	309.9	202.0	1.50	AP RND 1
11.40	DF	71	BLUE	BAPC1	294.8	198.5	1	146	RED	RAPC5	296.1	202.2	3.93	MISSILE-1
12.12	DF	72	BLUE	BAPC1	302.8	201.7	1	22	RED	RTANK9	303.2	202.4	0.79	TANK RND5
12.38	DF	11	BLUE	BTANK1	302.9	201.7	1	37	RED	RTANK9	303.2	202.3	0.67	TANK RND5
12.40	DF	2	BLUE	BTANK1	294.3	199.3	1	143	RED	RAPC5	295.3	202.3	3.18	MISSILE-1
12.42	DF	61	BLUE	BAPC1	294.2	199.4	1	128	RED	RAPC5	295.6	202.1	3.07	MISSILE-1
12.44	DF	52	BLUE	BAPC21	294.6	199.3	1	151	RED	RAPC5	292.3	200.9	2.94	MISSILE-1
12.55	DF	60	BLUE	BAPC1	295.0	198.3	1	154	RED	RAPC5	295.6	202.0	3.78	MISSILE-1
13.16	DF	18	BLUE	BTANK1	295.0	198.7	1	132	RED	RAPC5	295.8	202.1	3.49	MISSILE-1
13.33	DF	57	BLUE	BAPC1	294.2	199.1	1	139	RED	RAPC5	295.8	202.0	3.29	MISSILE-1
13.34	DF	20	BLUE	BTANK1	294.2	199.5	1	150	RED	RAPC5	295.6	202.3	3.14	MISSILE-1
14.09	DF	10	BLUE	BTANK1	294.4	199.5	1	129	RED	RAPC5	295.7	203.1	3.81	MISSILE-1
14.10	DF	70	BLUE	BAPC1	294.2	198.2	1	154	RED	RAPC5	295.6	201.9	3.93	MISSILE-1
14.28	DF	66	BLUE	BAPC1	294.3	198.3	1	139	RED	RAPC5	295.8	201.9	3.93	MISSILE-1
15.05	DF	9	BLUE	BTANK1	294.2	199.3	1	130	RED	RAPC5	295.6	202.8	3.69	MISSILE-1
15.06	DF	4	BLUE	BTANK1	294.8	198.7	1	146	RED	RAPC5	296.1	202.0	3.58	MISSILE-1
15.15	DF	53	BLUE	BAPC21	294.4	198.2	1	137	RED	RAPC5	292.8	203.4	2.72	MISSILE-1
15.18	DF	17	BLUE	BTANK1	303.0	201.6	1	37	RED	RTANK9	303.0	202.0	0.45	TANK RND5
15.60	DF	19	BLUE	BTANK1	294.1	199.6	1	142	RED	RAPC5	293.2	199.7	0.86	MISSILE-1
16.00	DF	15	BLUE	BTANK1	310.0	201.1	1	36	RED	RTANK9	309.8	201.2	0.23	TANK RND5
16.10	DF	13	BLUE	BTANK1	303.0	201.5	1	22	RED	RTANK9	302.9	201.5	0.12	TANK RND5
16.59	DF	63	BLUE	BAPC1	294.4	198.7	1	142	RED	RAPC5	293.3	199.5	1.32	MISSILE-1
17.17	DF	16	BLUE	BTANK1	303.8	200.3	1	22	RED	RTANK9	303.1	201.2	1.17	TANK RND8
18.12	DF	64	BLUE	BAPC1	294.2	198.3	1	146	RED	RAPC5	296.2	201.8	3.98	MISSILE-1
18.21	DF	12	BLUE	BTANK1	296.0	197.9	1	143	RED	RAPC5	295.0	201.3	3.45	MISSILE-1
18.37	DF	78	BLUE	BSLDR9	292.0	199.5	1	16	RED	RTANK9	292.3	200.6	1.16	AP RND 1
19.19	DF	8	BLUE	BTANK1	294.1	199.4	1	151	RED	RAPC5	293.1	199.5	1.05	MISSILE-1
20.12	DF	79	BLUE	BSLDR9	303.3	200.9	1	37	RED	RTANK9	303.1	201.2	0.31	LT ARMOR1
21.10	DF	62	BLUE	BAPC1	296.0	197.6	1	150	RED	RAPC5	295.7	201.6	3.98	MISSILE-1
21.14	DF	68	BLUE	BAPC1	294.0	198.8	1	129	RED	RAPC5	295.7	202.4	3.93	MISSILE-1
22.17	DF	69	BLUE	BAPC1	295.7	197.4	1	132	RED	RAPC5	296.0	199.7	2.39	LT ARMOR2
27.03	DF	77	BLUE	BSLDR9	295.8	199.3	1	3	RED	RTANK9	295.6	200.3	1.04	AP RND 1
27.56	DF	76	BLUE	BSLDR9	295.6	199.8	1	3	RED	RTANK9	295.6	200.2	0.22	LT ARMOR1
6.16	DF	7	BLUE	BTANK1	310.1	200.6	1	145	RED	RAPC5	310.4	202.5	1.95	MISSILE-1
7.56	DF	54	BLUE	BAPC21	309.9	200.1	1	152	RED	RAPC5	310.1	201.1	1.02	LT ARMOR2
8.55	DF	5	BLUE	BTANK1	309.9	200.4	1	21	RED	RTANK9	310.1	201.7	1.34	TANK RND8
8.60	DF	55	BLUE	BAPC1	295.1	198.1	1	141	RED	RAPC5	295.4	202.1	3.95	MISSILE-1
9.16	DF	1	BLUE	BTANK1	302.9	201.5	1	131	RED	RAPC5	302.9	201.7	0.18	MISSILE-1
9.49	DF	58	BLUE	BAPC1	295.1	198.1	1	141	RED	RAPC5	295.4	202.1	3.93	MISSILE-1
9.55	DF	80	BLUE	BSLDR9	309.4	200.6	1	21	RED	RTANK9	310.1	201.4	1.16	AP RND 1
10.11	DF	3	BLUE	BTANK1	302.9	201.5	1	37	RED	RTANK9	303.3	202.9	1.43	TANK RND8
10.24	DF	65	BLUE	BAPC1	295.0	198.1	1	140	RED	RAPC5	295.3	202.0	3.93	MISSILE-1
10.57	DF	71	BLUE	BAPC1	294.9	198.2	1	149	RED	RAPC5	295.5	201.9	3.74	MISSILE-1
11.26	DF	11	BLUE	BTANK1	303.1	201.4	1	127	RED	RAPC5	302.9	201.5	0.20	MISSILE-1
11.60	DF	60	BLUE	BAPC1	295.1	198.0	1	140	RED	RAPC5	295.4	201.7	3.90	MISSILE-1
12.16	DF	61	BLUE	BAPC1	294.2	199.2	1	132	RED	RAPC5	295.8	201.9	3.08	MISSILE-1
12.37	DF	19	BLUE	BTANK1	294.4	198.3	1	144	RED	RAPC5	292.4	201.1	3.46	MISSILE-1
12.38	DF	72	BLUE	BAPC1	303.1	202.0	1	22	RED	RTANK9	303.2	202.3	0.36	TANK RND5
12.46	DF	14	BLUE	BTANK1	310.0	200.6	1	6	RED	RTANK9	310.1	201.5	0.93	TANK RND5
12.60	DF	52	BLUE	BAPC21	294.6	199.4	1	129	RED	RAPC5	295.7	203.1	3.94	MISSILE-1

13.14	DF	20	BLUE	BTANK1	294.3	199.3	1	134	RED	RAPC5	295.6	202.2	3.11	MISSILE-1
13.22	DF	2	BLUE	BTANK1	294.2	199.5	1	136	RED	RAPC5	292.7	200.6	1.81	MISSILE-1
13.25	DF	57	BLUE	BAPC1	294.2	199.1	1	155	RED	RAPC5	292.4	201.0	2.62	MISSILE-1
13.37	DF	10	BLUE	BTANK1	294.4	199.3	1	135	RED	RAPC5	295.7	202.0	3.43	MISSILE-1
14.07	DF	70	BLUE	BAPC1	294.2	198.2	1	149	RED	RAPC5	295.6	201.4	3.44	MISSILE-1
14.10	DF	66	BLUE	BAPC1	294.3	198.3	1	128	RED	RAPC5	295.6	202.0	3.94	MISSILE-1
14.40	DF	68	BLUE	BAPC1	294.1	198.3	1	143	RED	RAPC5	295.2	202.1	3.96	MISSILE-1
14.47	DF	18	BLUE	BTANK1	294.9	199.2	1	149	RED	RAPC5	295.6	201.4	2.32	MISSILE-1
15.04	DF	9	BLUE	BTANK1	294.2	199.3	1	132	RED	RAPC5	295.9	201.3	2.61	MISSILE-1
15.12	DF	63	BLUE	BAPC1	294.5	198.2	1	140	RED	RAPC5	295.5	201.3	3.23	MISSILE-1
15.18	DF	17	BLUE	BTANK1	303.0	201.6	1	22	RED	RTANK9	302.9	201.7	0.14	TANK RNDS
15.31	DF	74	BLUE	BSLDR9	292.4	199.1	1	29	RED	RTANK9	292.1	200.8	1.75	AP RND 1
16.10	DF	13	BLUE	BTANK1	303.0	201.5	1	22	RED	RTANK9	302.9	201.5	0.12	TANK RNDS
16.18	DF	8	BLUE	BTANK1	294.4	198.3	1	149	RED	RAPC5	295.7	201.1	3.08	MISSILE-1
17.12	DF	78	BLUE	BSLDR9	292.1	199.4	1	30	RED	RTANK9	292.7	200.7	1.48	AP RND 1
17.18	DF	4	BLUE	BTANK1	294.6	199.4	1	137	RED	RAPC5	293.0	200.2	1.85	MISSILE-1
17.58	DF	64	BLUE	BAPC1	294.2	198.3	1	134	RED	RAPC5	295.6	201.9	3.86	MISSILE-1
18.39	DF	12	BLUE	BTANK1	295.9	197.9	1	143	RED	RAPC5	295.0	201.1	3.24	MISSILE-1
18.41	DF	53	BLUE	BAPC21	294.1	199.5	1	129	RED	RAPC5	295.7	202.7	3.56	MISSILE-1
21.24	DF	62	BLUE	BAPC1	296.0	197.6	1	149	RED	RAPC5	296.0	199.8	2.13	LT ARMOR2
22.14	DF	16	BLUE	BTANK1	303.1	201.3	1	9	RED	RTANK9	302.9	201.5	0.25	TANK RNDS
23.08	DF	79	BLUE	BSLDR9	303.2	201.1	1	9	RED	RTANK9	303.1	201.3	0.17	LT ARMOR1
25.35	DF	69	BLUE	BAPC1	295.3	197.9	1	129	RED	RAPC5	295.7	201.4	3.57	MISSILE-1
29.14	DF	76	BLUE	BSLDR9	295.7	199.8	1	3	RED	RTANK9	295.6	200.0	0.16	LT ARMOR1
8.48	DF	80	BLUE	BSLDR9	309.3	200.5	1	32	RED	RTANK9	310.2	202.2	1.91	AP RND 1
9.14	DF	1	BLUE	BTANK1	302.9	201.5	1	131	RED	RAPC5	302.9	201.7	0.18	MISSILE-1
9.22	DF	61	BLUE	BAPC1	294.5	198.3	1	141	RED	RAPC5	295.4	202.0	3.87	MISSILE-1
10.06	DF	58	BLUE	BAPC1	295.1	198.2	1	140	RED	RAPC5	295.3	202.1	3.98	MISSILE-1
10.11	DF	3	BLUE	BTANK1	303.4	201.5	1	127	RED	RAPC5	303.1	202.0	0.55	MISSILE-1
10.34	DF	55	BLUE	BAPC1	295.1	198.4	1	132	RED	RAPC5	295.7	202.3	3.94	MISSILE-1
10.43	DF	57	BLUE	BAPC1	294.4	198.3	1	148	RED	RAPC5	293.0	203.4	2.58	MISSILE-1
11.17	DF	65	BLUE	BAPC1	294.9	198.4	1	132	RED	RAPC5	295.7	202.3	3.95	MISSILE-1
12.34	DF	72	BLUE	BAPC1	302.9	201.8	1	22	RED	RTANK9	303.2	202.3	0.56	TANK RNDS
12.42	DF	7	BLUE	BTANK1	310.1	201.4	1	36	RED	RTANK9	309.9	201.7	0.43	TANK RNDS
12.45	DF	60	BLUE	BAPC1	295.0	198.2	1	140	RED	RAPC5	295.4	201.6	3.46	MISSILE-1
12.46	DF	52	BLUE	BAPC21	294.6	199.3	1	138	RED	RAPC5	293.0	200.5	2.00	MISSILE-1
12.54	DF	2	BLUE	BTANK1	294.2	199.4	1	134	RED	RAPC5	295.6	202.1	3.08	MISSILE-1
13.22	DF	11	BLUE	BTANK1	303.0	202.0	1	8	RED	RTANK9	303.3	202.7	0.83	TANK RNDS
13.24	DF	54	BLUE	BAPC21	310.2	202.2	1	1	RED	RTANK9	310.2	202.3	0.18	TANK RNDS
13.33	DF	10	BLUE	BTANK1	294.4	199.3	1	147	RED	RAPC5	292.9	199.5	1.55	MISSILE-1
13.36	DF	20	BLUE	BTANK1	294.2	199.5	1	150	RED	RAPC5	295.6	202.3	3.09	MISSILE-1
13.60	DF	70	BLUE	BAPC1	294.2	198.2	1	137	RED	RAPC5	292.7	200.7	2.88	MISSILE-1
14.12	DF	66	BLUE	BAPC1	294.3	198.3	1	155	RED	RAPC5	292.6	200.6	2.30	MISSILE-1
14.20	DF	71	BLUE	BAPC1	294.6	199.2	1	135	RED	RAPC5	295.7	202.9	3.78	MISSILE-1
14.50	DF	18	BLUE	BTANK1	294.9	199.2	1	140	RED	RAPC5	295.5	201.3	2.21	MISSILE-1
14.58	DF	63	BLUE	BAPC1	294.5	198.2	1	155	RED	RAPC5	292.6	200.5	3.03	MISSILE-1
15.14	DF	9	BLUE	BTANK1	294.2	199.3	1	132	RED	RAPC5	295.9	201.6	2.79	MISSILE-1
15.20	DF	17	BLUE	BTANK1	303.0	201.6	1	117	RED	RSLD11	303.0	201.9	0.28	MISSILE11
15.29	DF	19	BLUE	BTANK1	294.2	199.2	1	150	RED	RAPC5	295.6	202.1	3.25	MISSILE-1
15.46	DF	15	BLUE	BTANK1	310.0	201.1	1	36	RED	RTANK9	309.8	201.3	0.27	TANK RNDS
17.13	DF	13	BLUE	BTANK1	303.0	201.6	1	117	RED	RSLD11	303.0	201.9	0.31	MISSILE11
17.38	DF	4	BLUE	BTANK1	294.6	199.5	1	130	RED	RAPC5	295.6	202.4	3.07	MISSILE-1
17.56	DF	53	BLUE	BAPC21	294.2	199.2	1	151	RED	RAPC5	293.1	199.5	1.16	MISSILE-1
18.07	DF	78	BLUE	BSLDR9	292.0	199.5	1	12	RED	RTANK9	292.6	201.0	1.67	AP RND 1
19.04	DF	8	BLUE	BTANK1	294.2	199.2	1	155	RED	RAPC5	293.2	199.5	0.98	MISSILE-1
22.14	DF	16	BLUE	BTANK1	303.1	201.3	1	9	RED	RTANK9	302.9	201.5	0.35	TANK RNDS
23.24	DF	79	BLUE	BSLDR9	303.2	201.2	1	9	RED	RTANK9	303.2	201.2	0.04	LT ARMOR1
23.42	DF	62	BLUE	BAPC1	295.6	198.2	1	129	RED	RAPC5	295.7	201.9	3.74	MISSILE-1
23.54	DF	12	BLUE	BTANK1	295.3	199.5	1	153	RED	RAPC5	295.9	202.6	3.17	MISSILE-1
24.59	DF	68	BLUE	BAPC1	293.9	199.4	1	153	RED	RAPC5	295.9	202.5	3.74	MISSILE-1
25.00	DF	64	BLUE	BAPC1	294.0	199.6	1	130	RED	RAPC5	295.5	201.9	2.78	LT ARMOR2
25.14	DF	74	BLUE	BSLDR9	292.3	199.5	1	2	RED	RTANK9	292.6	200.7	1.24	AP RND 1
28.26	DF	69	BLUE	BAPC1	295.3	198.3	1	153	RED	RAPC5	296.0	202.2	3.93	MISSILE-1
5.21	DF	7	BLUE	BTANK1	309.9	200.0	1	145	RED	RAPC5	310.4	202.5	2.54	MISSILE-1
7.42	DF	54	BLUE	BAPC21	309.9	200.0	1	145	RED	RAPC5	310.3	202.0	2.04	MISSILE-1
8.56	DF	80	BLUE	BSLDR9	309.3	200.5	1	21	RED	RTANK9	310.1	201.7	1.50	AP RND 1
9.53	DF	55	BLUE	BAPC1	295.1	198.2	1	154	RED	RAPC5	295.5	202.2	3.94	MISSILE-1
10.36	DF	71	BLUE	BAPC1	294.9	198.2	1	149	RED	RAPC5	295.5	201.9	3.82	MISSILE-1

11.02	DF	58	BLUE	BAPC1	295.1	198.3	1	128	RED	RAPC5	295.6	202.2	3.93	MISSILE-1
11.44	DF	65	BLUE	BAPC1	294.9	198.5	1	146	RED	RAPC5	296.1	202.2	3.88	MISSILE-1
12.07	DF	3	BLUE	BTANK1	303.2	202.2	1	20	RED	RTANK9	303.2	203.9	1.69	TANK RND8
12.37	DF	2	BLUE	BTANK1	294.3	199.3	1	139	RED	RAPC5	295.8	202.1	3.22	MISSILE-1
12.53	DF	61	BLUE	BAPC1	294.2	199.5	1	156	RED	RAPC5	293.0	200.0	1.31	MISSILE-1
13.22	DF	52	BLUE	BAPC21	294.5	199.5	1	143	RED	RAPC5	295.3	202.1	2.72	MISSILE-1
13.30	DF	20	BLUE	BTANK1	294.2	199.4	1	150	RED	RAPC5	295.6	202.3	3.12	MISSILE-1
13.33	DF	57	BLUE	BAPC1	294.2	199.1	1	151	RED	RAPC5	292.4	200.7	2.35	MISSILE-1
13.45	DF	72	BLUE	BAPC1	303.4	202.4	1	117	RED	RGLD11	303.2	202.2	0.25	MISSILE11
14.18	DF	10	BLUE	BTANK1	294.4	199.5	1	151	RED	RAPC5	292.4	200.6	2.22	MISSILE-1
14.20	DF	66	BLUE	BAPC1	294.3	198.3	1	144	RED	RAPC5	292.7	200.6	2.38	MISSILE-1
14.33	DF	11	BLUE	BTANK1	303.3	202.6	1	35	RED	RTANK9	303.4	203.1	0.54	TANK RND5
15.28	DF	9	BLUE	BTANK1	294.2	199.4	1	154	RED	RAPC5	295.6	201.8	2.75	MISSILE-1
15.35	DF	18	BLUE	BTANK1	294.8	199.4	1	134	RED	RAPC5	295.6	202.0	2.66	MISSILE-1
15.38	DF	19	BLUE	BTANK1	294.1	199.3	1	136	RED	RAPC5	293.1	199.6	1.05	MISSILE-1
16.02	DF	15	BLUE	BTANK1	310.1	201.2	1	36	RED	RTANK9	309.8	201.2	0.23	TANK RND5
16.45	DF	4	BLUE	BTANK1	294.7	199.2	1	136	RED	RAPC5	293.1	199.5	1.58	MISSILE-1
16.59	DF	60	BLUE	BAPC1	294.8	199.2	1	142	RED	RAPC5	293.4	199.4	1.46	MISSILE-1
17.11	DF	14	BLUE	BTANK1	310.1	201.5	1	123	RED	RGLD11	310.3	201.2	0.38	MISSILE11
17.18	DF	17	BLUE	BTANK1	303.2	202.2	1	9	RED	RTANK9	303.3	202.9	0.68	TANK RND5
17.34	DF	78	BLUE	BGLDR9	292.1	199.4	1	16	RED	RTANK9	292.2	200.7	1.32	AP RND 1
17.50	DF	1	BLUE	BTANK1	303.3	202.8	1	9	RED	RTANK9	303.4	202.8	0.08	TANK RND5
18.04	DF	63	BLUE	BAPC1	294.3	199.1	1	135	RED	RAPC5	295.7	202.6	3.76	MISSILE-1
18.12	DF	53	BLUE	BAPC21	294.2	199.4	1	151	RED	RAPC5	293.0	199.6	1.19	MISSILE-1
18.27	DF	64	BLUE	BAPC1	294.2	198.3	1	150	RED	RAPC5	295.6	202.0	3.97	MISSILE-1
18.36	DF	13	BLUE	BTANK1	303.0	201.9	1	9	RED	RTANK9	303.4	202.5	0.65	TANK RND5
19.02	DF	8	BLUE	BTANK1	294.2	199.2	1	151	RED	RAPC5	293.1	199.6	1.15	MISSILE-1
19.17	DF	12	BLUE	BTANK1	295.7	197.9	1	134	RED	RAPC5	295.5	201.4	3.47	MISSILE-1
21.54	DF	70	BLUE	BAPC1	293.9	199.5	1	153	RED	RAPC5	295.9	202.7	3.78	MISSILE-1
22.14	DF	16	BLUE	BTANK1	303.0	201.5	1	9	RED	RTANK9	302.9	201.5	0.25	TANK RND5
24.20	DF	62	BLUE	BAPC1	295.7	198.1	1	135	RED	RAPC5	295.6	202.1	3.95	MISSILE-1
24.32	DF	79	BLUE	BGLDR9	303.1	201.3	1	20	RED	RTANK9	303.1	201.2	0.05	LT ARMOR1
25.11	DF	68	BLUE	BAPC1	293.9	199.4	1	133	RED	RAPC5	295.9	202.3	3.54	MISSILE-1
27.46	DF	69	BLUE	BAPC1	295.3	198.3	1	123	RED	RAPC5	295.9	202.1	3.89	MISSILE-1
4.52	DF	54	BLUE	BAPC21	309.2	198.2	1	152	RED	RAPC5	310.2	201.8	3.75	MISSILE-1
5.31	DF	7	BLUE	BTANK1	309.9	200.1	1	152	RED	RAPC5	310.2	201.8	1.67	MISSILE-1
9.16	DF	1	BLUE	BTANK1	302.9	201.5	1	131	RED	RAPC5	302.9	201.7	0.18	MISSILE-1
9.24	DF	61	BLUE	BAPC1	294.5	198.3	1	148	RED	RAPC5	292.9	200.7	2.89	MISSILE-1
9.24	DF	5	BLUE	BTANK1	309.9	200.4	1	145	RED	RAPC5	310.1	201.2	0.85	MISSILE-1
9.40	DF	55	BLUE	BAPC1	295.1	198.2	1	140	RED	RAPC5	295.3	202.2	3.99	MISSILE-1
9.50	DF	58	BLUE	BAPC1	295.1	198.1	1	149	RED	RAPC5	295.5	202.0	3.89	MISSILE-1
10.51	DF	57	BLUE	BAPC1	294.4	198.3	1	148	RED	RAPC5	292.9	200.5	2.67	MISSILE-1
10.52	DF	71	BLUE	BAPC1	294.9	198.2	1	149	RED	RAPC5	295.5	202.0	3.80	MISSILE-1
11.11	DF	65	BLUE	BAPC1	294.9	198.3	1	154	RED	RAPC5	295.6	202.0	3.70	MISSILE-1
11.34	DF	3	BLUE	BTANK1	303.0	202.0	1	22	RED	RTANK9	303.3	202.4	0.55	TANK RND5
12.39	DF	72	BLUE	BAPC1	303.0	201.9	1	39	RED	RTANK9	303.3	203.1	1.30	TANK RND8
12.50	DF	60	BLUE	BAPC1	295.0	198.2	1	139	RED	RAPC5	295.8	202.1	3.93	MISSILE-1
13.[illegible]	DF	2	BLUE	BTANK1	294.2	199.4	1	150	RED	RAPC5	295.6	202.3	3.21	MISSILE-1
13.32	DF	52	BLUE	BAPC21	294.5	199.5	1	129	RED	RAPC5	295.7	203.1	3.74	MISSILE-1
13.32	DF	20	BLUE	BTANK1	294.2	199.4	1	134	RED	RAPC5	295.6	202.1	2.98	MISSILE-1
14.02	DF	10	BLUE	BTANK1	294.4	199.4	1	137	RED	RAPC5	292.7	200.7	2.09	MISSILE-1
14.04	DF	70	BLUE	BAPC1	294.2	198.2	1	139	RED	RAPC5	295.9	201.9	3.98	MISSILE-1
14.10	DF	11	BLUE	BTANK1	303.2	202.2	1	39	RED	RTANK9	303.3	202.6	0.40	TANK RND5
14.14	DF	66	BLUE	BAPC1	294.3	198.3	1	144	RED	RAPC5	292.7	200.6	2.88	MISSILE-1
14.32	DF	68	BLUE	BAPC1	294.1	198.3	1	143	RED	RAPC5	295.2	201.9	3.81	MISSILE-1
14.56	DF	18	BLUE	BTANK1	294.9	199.2	1	134	RED	RAPC5	295.6	202.0	2.90	MISSILE-1
15.12	DF	63	BLUE	BAPC1	294.5	198.2	1	139	RED	RAPC5	295.9	201.8	3.80	MISSILE-1
15.16	DF	9	BLUE	BTANK1	294.2	199.4	1	129	RED	RAPC5	295.7	203.0	3.91	MISSILE-1
15.22	DF	19	BLUE	BTANK1	294.2	199.2	1	143	RED	RAPC5	295.2	201.9	2.89	MISSILE-1
16.51	DF	17	BLUE	BTANK1	303.1	202.0	1	9	RED	RTANK9	303.3	203.1	1.11	TANK RND8
17.09	DF	78	BLUE	BGLDR9	292.1	199.4	1	30	RED	RTANK9	292.7	200.8	1.53	AP RND 1
17.21	DF	4	BLUE	BTANK1	294.6	199.4	1	128	RED	RAPC5	295.7	201.6	2.28	MISSILE-1
17.29	DF	64	BLUE	BAPC1	294.2	198.3	1	147	RED	RAPC5	293.0	199.2	1.54	MISSILE-1
17.51	DF	53	BLUE	BAPC21	294.2	199.2	1	151	RED	RAPC5	293.1	199.6	1.23	MISSILE-1
18.04	DF	13	BLUE	BTANK1	302.9	201.7	1	35	RED	RTANK9	303.1	202.0	0.37	TANK RND5
19.10	DF	8	BLUE	BTANK1	294.2	199.3	1	151	RED	RAPC5	293.2	199.3	0.96	MISSILE-1
20.03	DF	12	BLUE	BTANK1	295.6	198.2	1	143	RED	RAPC5	295.0	200.7	2.59	MISSILE-1
22.17	DF	74	BLUE	BGLDR9	292.3	199.4	1	19	RED	RTANK9	292.8	200.8	1.47	AP RND 1

22.32	DF	16	BLUE	BTANK1	302.9	201.7	1	20	RED	RTANK9	303.0	201.7	0.11	TANK RND5
24.22	DF	79	BLUE	BOLDR9	303.1	201.2	1	20	RED	RTANK9	303.1	201.3	0.03	LT ARMOR1
25.20	DF	62	BLUE	BAPC1	295.6	198.4	1	133	RED	RAPC5	295.9	202.3	3.95	MISSILE-1
26.00	DF	77	BLUE	BOLDR9	295.8	199.3	1	3	RED	RTANK9	295.6	200.5	1.22	AP RND 1
26.37	DF	69	BLUE	BAPC1	295.3	198.0	1	129	RED	RAPC5	295.7	201.5	3.57	MISSILE-1
28.08	DF	76	BLUE	BOLDR9	295.6	199.8	1	3	RED	RTANK9	295.6	200.1	0.27	LT ARMOR1
5.25	DF	7	BLUE	BTANK1	309.9	200.0	1	145	RED	RAPC5	310.4	202.5	2.54	MISSILE-1
8.25	DF	54	BLUE	BAPC21	310.0	200.2	1	145	RED	RAPC5	310.3	202.0	1.79	MISSILE-1
9.10	DF	55	BLUE	BAPC1	295.1	198.2	1	141	RED	RAPC5	295.4	202.1	3.85	MISSILE-1
9.20	DF	61	BLUE	BAPC1	294.5	198.3	1	149	RED	RAPC5	295.5	202.1	3.94	MISSILE-1
9.35	DF	1	BLUE	BTANK1	302.8	201.7	1	127	RED	RAPC5	303.2	202.2	0.70	MISSILE-1
10.35	DF	58	BLUE	BAPC1	295.1	198.2	1	149	RED	RAPC5	295.5	202.1	3.94	MISSILE-1
10.60	DF	65	BLUE	BAPC1	294.9	198.3	1	149	RED	RAPC5	295.5	202.0	3.81	MISSILE-1
11.36	DF	3	BLUE	BTANK1	303.0	202.0	1	22	RED	RTANK9	303.3	202.4	0.53	TANK RND5
12.25	DF	9	BLUE	BTANK1	294.4	198.3	1	155	RED	RAPC5	292.3	201.1	3.49	MISSILE-1
12.26	DF	60	BLUE	BAPC1	295.1	198.1	1	149	RED	RAPC5	295.5	202.0	3.94	MISSILE-1
12.26	DF	72	BLUE	BAPC1	302.9	201.8	1	22	RED	RTANK9	303.2	202.3	0.59	TANK RND5
13.03	DF	52	BLUE	BAPC21	294.5	199.5	1	130	RED	RAPC5	295.6	202.8	3.54	MISSILE-1
13.10	DF	2	BLUE	BTANK1	294.2	199.5	1	134	RED	RAPC5	295.6	202.2	3.07	MISSILE-1
13.25	DF	57	BLUE	BAPC1	294.2	199.1	1	146	RED	RAPC5	296.1	202.0	3.52	MISSILE-1
13.26	DF	20	BLUE	BTANK1	294.2	199.4	1	132	RED	RAPC5	295.9	201.5	2.59	MISSILE-1
13.40	DF	71	BLUE	BAPC1	294.6	199.1	1	139	RED	RAPC5	295.9	201.8	2.94	MISSILE-1
13.51	DF	4	BLUE	BTANK1	294.9	198.3	1	128	RED	RAPC5	295.6	202.0	3.80	MISSILE-1
14.22	DF	68	BLUE	BAPC1	294.1	198.3	1	137	RED	RAPC5	292.6	200.9	3.12	MISSILE-1
14.29	DF	10	BLUE	BTANK1	294.4	199.5	1	130	RED	RAPC5	295.6	202.8	3.48	MISSILE-1
14.37	DF	11	BLUE	BTANK1	303.3	202.7	1	20	RED	RTANK9	303.3	203.6	0.93	TANK RND5
15.22	DF	19	BLUE	BTANK1	294.2	199.2	1	130	RED	RAPC5	295.6	202.8	3.59	MISSILE-1
15.29	DF	18	BLUE	BTANK1	294.8	199.4	1	128	RED	RAPC5	295.6	201.9	2.69	MISSILE-1
15.46	DF	15	BLUE	BTANK1	310.0	201.1	1	36	RED	RTANK9	309.8	201.3	0.27	TANK RND5
16.19	DF	8	BLUE	BTANK1	294.4	198.3	1	136	RED	RAPC5	292.2	199.4	1.59	MISSILE-1
17.29	DF	74	BLUE	BOLDR9	292.4	199.1	1	16	RED	RTANK9	292.2	200.8	1.70	AP RND 1
17.50	DF	17	BLUE	BTANK1	303.1	201.9	1	35	RED	RTANK9	303.1	202.1	0.13	TANK RND5
17.54	DF	78	BLUE	BOLDR9	292.1	199.4	1	29	RED	RTANK9	292.2	200.4	1.01	AP RND 1
18.21	DF	53	BLUE	BAPC21	294.2	199.4	1	129	RED	RAPC5	295.7	202.7	3.59	MISSILE-
18.47	DF	13	BLUE	BTANK1	303.1	202.1	1	116	RED	RGLD11	303.1	202.3	0.23	MISSILE11
19.20	DF	63	BLUE	BAPC1	294.2	199.4	1	150	RED	RAPC5	295.7	201.7	2.79	MISSILE-1
20.39	DF	66	BLUE	BAPC1	294.0	199.5	1	129	RED	RAPC5	295.7	202.4	3.39	MISSILE-1
21.01	DF	70	BLUE	BAPC1	293.9	199.5	1	135	RED	RAPC5	295.6	202.4	3.42	MISSILE-1
22.14	DF	16	BLUE	BTANK1	303.0	201.5	1	20	RED	RTANK9	303.0	201.7	0.16	TANK RND5
23.46	DF	79	BLUE	BOLDR9	303.1	201.2	1	20	RED	RTANK9	303.0	201.4	0.23	LT ARMOR1
24.26	DF	62	BLUE	BAPC1	295.6	198.5	1	153	RED	RAPC5	296.0	202.4	3.96	MISSILE-1
24.43	DF	64	BLUE	BAPC1	294.0	199.2	1	7	RED	RTANK9	292.8	200.6	1.89	TANK RND8
25.49	DF	12	BLUE	BTANK1	295.2	200.1	1	11	RED	RTANK9	295.7	201.8	1.75	TANK RND8
27.49	DF	69	BLUE	BAPC1	295.2	198.5	1	129	RED	RAPC5	295.7	201.1	2.54	LT ARMOR2
6.23	DF	7	BLUE	BTANK1	310.1	200.6	1	33	RED	RTANK9	310.1	201.5	0.93	TANK RND5
9.20	DF	61	BLUE	BAPC1	294.5	198.3	1	142	RED	RAPC5	292.2	201.4	3.31	MISSILE-1
9.32	DF	55	BLUE	BAPC1	295.1	198.2	1	154	RED	RAPC5	295.5	202.2	3.97	MISSILE-1
10.04	DF	58	BLUE	BAPC1	295.1	198.2	1	140	RED	RAPC5	295.3	202.1	3.98	MISSILE-1
10.52	DF	71	BLUE	BAPC1	294.9	198.2	1	149	RED	RAPC5	295.5	202.0	3.80	MISSILE-1
10.58	DF	57	BLUE	BAPC1	294.4	198.3	1	137	RED	RAPC5	292.1	201.5	3.93	MISSILE-1
11.10	DF	65	BLUE	BAPC1	294.9	198.3	1	128	RED	RAPC5	295.6	202.2	3.94	MISSILE-1
12.07	DF	54	BLUE	BAPC21	310.2	201.3	1	123	RED	RGLD11	310.4	201.4	0.26	MISSILE11
12.27	DF	9	BLUE	BTANK1	294.4	198.3	1	144	RED	RAPC5	292.4	201.2	3.53	MISSILE-1
12.28	DF	3	BLUE	BTANK1	303.3	202.4	1	8	RED	RTANK9	303.3	203.0	0.65	TANK RND5
12.40	DF	60	BLUE	BAPC1	295.0	198.1	1	132	RED	RAPC5	295.8	201.9	3.88	MISSILE-1
13.21	DF	72	BLUE	BAPC1	303.3	202.2	1	9	RED	RTANK9	303.3	203.7	1.48	TANK RND8
13.26	DF	20	BLUE	BTANK1	294.2	199.4	1	154	RED	RAPC5	295.6	202.0	2.88	MISSILE-1
13.31	DF	10	BLUE	BTANK1	294.4	199.3	1	146	RED	RAPC5	296.1	202.0	3.23	MISSILE-1
13.31	DF	2	BLUE	BTANK1	294.2	199.6	1	136	RED	RAPC5	292.8	200.3	1.53	MISSILE-1
14.24	DF	68	BLUE	BAPC1	294.1	198.3	1	132	RED	RAPC5	295.8	201.8	3.95	MISSILE-1
14.26	DF	11	BLUE	BTANK1	303.3	202.5	1	9	RED	RTANK9	303.3	203.6	1.14	TANK RND8
14.27	DF	52	BLUE	BAPC21	294.4	199.8	1	156	RED	RAPC5	293.1	199.7	1.30	MISSILE-1
15.22	DF	63	BLUE	BAPC1	294.5	198.3	1	128	RED	RAPC5	295.6	201.9	3.78	MISSILE-1
15.27	DF	18	BLUE	BTANK1	294.8	199.4	1	132	RED	RAPC5	295.8	201.7	2.50	MISSILE-1
15.32	DF	19	BLUE	BTANK1	294.2	199.3	1	135	RED	RAPC5	295.7	202.8	3.89	MISSILE-1
16.37	DF	4	BLUE	BTANK1	294.7	199.2	1	136	RED	RAPC5	293.1	199.6	1.63	MISSILE-1
16.54	DF	1	BLUE	BTANK1	303.3	202.6	1	20	RED	RTANK9	303.4	203.1	0.71	TANK RND5
17.35	DF	53	BLUE	BAPC21	294.3	199.0	1	142	RED	RAPC5	293.4	199.4	0.98	LT ARMOR5

17.48	DF	17	BLUE	BTANK1	303.3	202.5	1	121	RED	RGLD11	303.4	202.7	0.16	MISSILE11
17.59	DF	64	BLUE	BAPC1	294.2	198.3	1	136	RED	RAPC5	293.2	199.4	1.50	MISSILE-1
18.06	DF	66	BLUE	BAPC1	294.1	199.3	1	132	RED	RAPC5	295.9	201.0	2.51	LT ARMOR2
18.51	DF	8	BLUE	BTANK1	294.2	199.1	1	130	RED	RAPC5	295.6	202.4	3.52	MISSILE-1
18.53	DF	13	BLUE	BTANK1	303.2	202.2	1	15	RED	RTANK9	303.2	204.0	1.86	TANK RND8
19.02	DF	12	BLUE	BTANK1	295.8	197.9	1	143	RED	RAPC5	295.0	200.8	2.91	MISSILE-1
20.08	DF	70	BLUE	BAPC1	294.0	199.2	1	146	RED	RAPC5	296.2	201.4	3.15	MISSILE-1
21.08	DF	62	BLUE	BAPC1	296.2	197.6	1	154	RED	RAPC5	295.9	200.2	2.60	LT ARMOR2
21.38	DF	78	BLUE	BGLDR9	292.0	199.6	1	19	RED	RTANK9	292.7	200.9	1.45	AP RND 1
22.23	DF	69	BLUE	BAPC1	296.0	197.3	1	132	RED	RAPC5	296.0	199.7	2.38	LT ARMOR2
22.41	DF	74	BLUE	BGLDR9	292.3	199.4	1	19	RED	RTANK9	292.8	200.7	1.38	AP RND 1
26.05	DF	16	BLUE	BTANK1	303.0	202.0	1	15	RED	RTANK9	303.3	202.8	0.92	TANK RND5
26.53	DF	77	BLUE	BGLDR9	295.8	199.3	1	3	RED	RTANK9	295.6	200.3	1.07	AP RND 1
28.52	DF	76	BLUE	BGLDR9	295.6	199.8	1	3	RED	RTANK9	295.6	200.0	0.17	LT ARMOR1
6.24	DF	7	BLUE	BTANK1	310.1	200.6	1	33	RED	RTANK9	310.1	201.5	0.90	TANK RND5
8.37	DF	54	BLUE	BAPC21	310.1	200.5	1	145	RED	RAPC5	310.3	201.9	1.35	MISSILE-1
9.35	DF	1	BLUE	BTANK1	302.8	201.7	1	127	RED	RAPC5	303.2	202.2	0.70	MISSILE-1
9.42	DF	55	BLUE	BAPC1	295.1	198.2	1	141	RED	RAPC5	295.4	202.1	3.89	MISSILE-1
10.21	DF	58	BLUE	BAPC1	295.1	198.2	1	149	RED	RAPC5	295.5	202.0	3.83	MISSILE-1
10.51	DF	57	BLUE	BAPC1	294.4	198.3	1	136	RED	RAPC5	292.4	201.1	3.48	MISSILE-1
11.15	DF	61	BLUE	BAPC1	294.4	198.8	1	144	RED	RAPC5	292.1	201.5	3.53	MISSILE-1
11.16	DF	65	BLUE	BAPC1	294.9	198.3	1	132	RED	RAPC5	295.7	202.2	3.96	MISSILE-1
11.34	DF	3	BLUE	BTANK1	303.0	202.0	1	22	RED	RTANK9	303.3	202.4	0.55	TANK RND5
12.12	DF	72	BLUE	BAPC1	302.8	201.6	1	37	RED	RTANK9	303.2	202.3	0.79	TANK RND5
12.42	DF	2	BLUE	BTANK1	294.3	199.3	1	143	RED	RAPC5	295.3	202.3	3.18	MISSILE-1
12.46	DF	11	BLUE	BTANK1	302.9	201.8	1	37	RED	RTANK9	303.2	202.3	0.61	TANK RND5
12.55	DF	20	BLUE	BTANK1	294.3	199.3	1	146	RED	RAPC5	296.1	202.0	3.33	MISSILE-1
13.03	DF	60	BLUE	BAPC1	295.0	198.3	1	132	RED	RAPC5	295.9	201.9	3.69	MISSILE-1
13.10	DF	52	BLUE	BAPC21	294.5	199.4	1	135	RED	RAPC5	295.7	203.0	3.79	MISSILE-1
13.49	DF	10	BLUE	BTANK1	294.4	199.3	1	130	RED	RAPC5	295.6	202.8	3.65	MISSILE-1
14.10	DF	70	BLUE	BAPC1	294.2	198.2	1	143	RED	RAPC5	295.2	202.1	3.97	MISSILE-1
14.18	DF	71	BLUE	BAPC1	294.6	199.3	1	146	RED	RAPC5	296.1	202.0	3.05	MISSILE-1
14.60	DF	66	BLUE	BAPC1	294.3	198.3	1	144	RED	RAPC5	292.7	200.6	2.84	MISSILE-1
15.08	DF	18	BLUE	BTANK1	294.9	199.3	1	149	RED	RAPC5	295.6	200.8	1.71	MISSILE-1
15.18	DF	17	BLUE	BTANK1	303.0	201.6	1	22	RED	RTANK9	302.9	201.7	0.14	TANK RND5
15.24	DF	15	BLUE	BTANK1	310.0	201.0	1	36	RED	RTANK9	309.8	201.3	0.34	TANK RND5
15.30	DF	19	BLUE	BTANK1	294.2	199.3	1	143	RED	RAPC5	295.2	202.1	3.01	MISSILE-1
15.48	DF	9	BLUE	BTANK1	294.2	199.5	1	144	RED	RAPC5	292.7	200.6	1.81	MISSILE-1
16.30	DF	4	BLUE	BTANK1	294.7	199.2	1	146	RED	RAPC5	296.2	201.9	3.07	MISSILE-1
16.46	DF	14	BLUE	BTANK1	310.1	201.2	1	36	RED	RTANK9	309.8	201.1	0.31	TANK RND5
16.50	DF	13	BLUE	BTANK1	303.0	201.5	1	37	RED	RTANK9	302.9	201.8	0.29	TANK RND5
17.49	DF	64	BLUE	BAPC1	294.2	198.3	1	143	RED	RAPC5	295.1	201.5	3.40	MISSILE-1
18.10	DF	78	BLUE	BGLDR9	292.1	199.4	1	16	RED	RTANK9	292.3	200.7	1.23	AP RND 1
18.25	DF	53	BLUE	BAPC21	294.2	199.4	1	144	RED	RAPC5	293.1	200.0	1.28	MISSILE-1
18.32	DF	63	BLUE	BAPC1	294.3	199.1	1	135	RED	RAPC5	295.7	202.6	3.72	MISSILE-1
18.35	DF	12	BLUE	BTANK1	295.9	197.9	1	128	RED	RAPC5	295.7	201.4	3.47	MISSILE-1
19.21	DF	8	BLUE	BTANK1	294.1	199.4	1	134	RED	RAPC5	295.5	201.3	2.39	MISSILE-1
20.34	DF	69	BLUE	BAPC1	296.1	197.3	1	134	RED	RAPC5	295.5	201.2	3.88	MISSILE-1
20.43	DF	62	BLUE	BAPC1	296.1	197.6	1	140	RED	RAPC5	295.3	199.6	1.93	LT ARMOR2
21.18	DF	68	BLUE	BAPC1	294.0	198.8	1	129	RED	RAPC5	295.7	202.4	3.98	MISSILE-1
22.14	DF	16	BLUE	BTANK1	303.2	201.2	1	9	RED	RTANK9	302.9	201.5	0.45	TANK RND5
22.33	DF	74	BLUE	BGLDR9	292.3	199.4	1	19	RED	RTANK9	292.8	200.7	1.43	AP RND 1
24.44	DF	79	BLUE	BGLDR9	303.1	201.2	1	20	RED	RTANK9	303.2	201.2	0.07	LT ARMOR1
25.29	DF	77	BLUE	BGLDR9	295.9	199.2	1	13	RED	RTANK9	295.9	200.3	1.10	AP RND 1
28.42	DF	76	BLUE	BGLDR9	295.6	199.9	1	3	RED	RTANK9	295.6	200.0	0.08	LT ARMOR1
9.14	DF	1	BLUE	BTANK1	302.9	201.5	1	131	RED	RAPC5	302.9	201.7	0.19	MISSILE-1
9.41	DF	55	BLUE	BAPC1	295.1	198.2	1	149	RED	RAPC5	295.5	202.1	3.85	MISSILE-1
10.11	DF	3	BLUE	BTANK1	302.9	201.5	1	127	RED	RAPC5	303.1	202.0	0.55	MISSILE-1
10.44	DF	58	BLUE	BAPC1	295.1	198.2	1	154	RED	RAPC5	295.6	202.0	3.81	MISSILE-1
12.06	DF	72	BLUE	BAPC1	302.8	201.6	1	37	RED	RTANK9	303.2	202.4	0.34	TANK RND5
12.12	DF	61	BLUE	BAPC1	294.3	199.2	1	130	RED	RAPC5	295.6	202.9	3.97	MISSILE-1
12.14	DF	54	BLUE	BAPC21	310.2	201.4	1	40	RED	RTANK9	310.0	202.2	0.84	TANK RND8
12.31	DF	9	BLUE	BTANK1	294.4	198.3	1	137	RED	RAPC5	292.4	201.1	3.44	MISSILE-1
12.34	DF	11	BLUE	BTANK1	302.9	201.7	1	22	RED	RTANK9	303.2	202.3	0.67	TANK RND5
12.48	DF	60	BLUE	BAPC1	295.0	198.2	1	139	RED	RAPC5	295.8	202.1	3.93	MISSILE-1
12.49	DF	7	BLUE	BTANK1	310.2	201.8	1	126	RED	RGLD11	309.9	201.7	0.28	MISSILE11
13.05	DF	20	BLUE	BTANK1	294.3	199.3	1	150	RED	RAPC5	295.5	202.4	3.32	MISSILE-1
13.08	DF	2	BLUE	BTANK1	294.2	199.5	1	134	RED	RAPC5	295.6	202.1	2.98	MISSILE-1

13.24	DF	52	BLUE	BAPC21	294.5	199.5	1	142	RED	RAPC5	292.8	200.5	1.98	MISSILE-1
13.35	DF	57	BLUE	BAPC1	294.2	199.1	1	146	RED	RAPC5	296.1	202.1	3.57	MISSILE-1
14.12	DF	10	BLUE	BTANK1	294.4	199.5	1	142	RED	RAPC5	292.8	200.4	1.84	MISSILE-1
14.17	DF	65	BLUE	BAPC1	294.7	199.2	1	155	RED	RAPC5	292.6	200.5	2.46	MISSILE-1
14.24	DF	68	BLUE	BAPC1	294.1	198.3	1	128	RED	RAPC5	295.6	201.9	3.99	MISSILE-1
14.26	DF	66	BLUE	BAPC1	294.3	198.3	1	139	RED	RAPC5	295.8	201.9	3.97	MISSILE-1
14.29	DF	71	BLUE	BAPC1	294.6	199.3	1	135	RED	RAPC5	295.7	202.8	3.67	MISSILE-1
14.45	DF	18	BLUE	BTANK1	294.9	199.2	1	154	RED	RAPC5	295.7	201.4	2.40	MISSILE-1
14.58	DF	63	BLUE	BAPC1	294.5	198.2	1	142	RED	RAPC5	292.8	200.4	2.82	MISSILE-1
15.18	DF	17	BLUE	BTANK1	303.0	201.6	1	22	RED	RTANK9	302.9	201.7	0.18	TANK RND5
15.24	DF	19	BLUE	BTANK1	294.2	199.2	1	156	RED	RAPC5	293.2	199.5	0.98	MISSILE-1
16.10	DF	13	BLUE	BTANK1	303.0	201.5	1	22	RED	RTANK9	302.9	201.5	0.12	TANK RND5
16.25	DF	4	BLUE	BTANK1	294.7	199.1	1	156	RED	RAPC5	293.3	199.4	1.46	MISSILE-1
18.03	DF	78	BLUE	BGLDR9	292.0	199.5	1	12	RED	RTANK9	292.6	201.0	1.67	AP RND 1
18.11	DF	53	BLUE	BAPC21	294.2	199.4	1	142	RED	RAPC5	293.3	199.5	0.90	LT ARMOR5
18.19	DF	74	BLUE	BGLDR9	292.4	199.1	1	16	RED	RTANK9	292.3	202.7	1.59	AP RND 1
19.29	DF	8	BLUE	BTANK1	294.1	199.5	1	134	RED	RAPC5	295.5	201.2	2.21	MISSILE-1
20.19	DF	12	BLUE	BTANK1	295.6	198.3	1	134	RED	RAPC5	295.5	201.1	2.83	MISSILE-1
20.38	DF	79	BLUE	BGLDR9	303.3	200.9	1	37	RED	RTANK9	303.2	201.1	0.16	LT ARMOR1
20.56	DF	16	BLUE	BTANK1	303.4	200.9	1	35	RED	RTANK9	303.1	201.2	0.35	TANK RND5
21.03	DF	62	BLUE	BAPC1	296.0	197.6	1	134	RED	RAPC5	295.5	201.1	3.52	MISSILE-1
22.12	DF	70	BLUE	BAPC1	293.9	199.5	1	130	RED	RAPC5	295.5	202.0	3.02	MISSILE-1
24.03	DF	64	BLUE	BAPC1	294.0	199.4	1	150	RED	RAPC5	295.9	202.8	2.56	LT ARMOR2
25.23	DF	69	BLUE	BAPC1	295.3	198.0	1	130	RED	RAPC5	295.5	201.9	3.96	MISSILE-1
5.49	DF	80	BLUE	BGLDR9	309.2	200.4	1	33	RED	RTANK9	310.2	201.7	1.60	AP RND 1
6.38	DF	7	BLUE	BTANK1	310.1	200.6	1	145	RED	RAPC5	310.4	202.4	1.81	MISSILE-1
8.43	DF	54	BLUE	BAPC21	310.1	200.6	1	145	RED	RAPC5	310.3	201.9	1.31	MISSILE-1
9.18	DF	1	BLUE	BTANK1	302.9	201.5	1	131	RED	RAPC5	302.9	201.7	0.18	MISSILE-1
10.11	DF	3	BLUE	BTANK1	302.9	201.5	1	37	RED	RTANK9	303.3	202.9	1.43	TANK RND8
10.12	DF	65	BLUE	BAPC1	295.0	198.1	1	149	RED	RAPC5	295.5	202.0	3.94	MISSILE-1
10.56	DF	58	BLUE	BAPC1	295.1	198.3	1	132	RED	RAPC5	295.7	202.2	3.95	MISSILE-1
10.57	DF	55	BLUE	BAPC1	295.1	198.3	1	140	RED	RAPC5	295.3	202.0	3.66	MISSILE-1
11.41	DF	72	BLUE	BAPC1	302.9	201.5	1	39	RED	RTANK9	303.3	203.4	1.96	TANK RND8
12.17	DF	61	BLUE	BAPC1	294.2	199.2	1	143	RED	RAPC5	295.4	202.5	3.43	MISSILE-1
12.32	DF	11	BLUE	BTANK1	302.9	201.7	1	37	RED	RTANK9	303.2	202.3	0.67	TANK RND5
12.34	DF	60	BLUE	BAPC1	295.0	198.1	1	154	RED	RAPC5	295.6	202.0	3.92	MISSILE-1
12.52	DF	2	BLUE	BTANK1	294.2	199.4	1	128	RED	RAPC5	295.6	202.0	3.00	MISSILE-1
12.55	DF	20	BLUE	BTANK1	294.3	199.3	1	139	RED	RAPC5	295.8	202.2	3.29	MISSILE-1
13.21	DF	52	BLUE	BAPC21	294.5	199.5	1	135	RED	RAPC5	295.7	203.0	3.67	MISSILE-1
13.42	DF	57	BLUE	BAPC1	294.2	199.1	1	132	RED	RAPC5	295.8	201.8	3.16	MISSILE-1
13.55	DF	10	BLUE	BTANK1	294.4	199.4	1	130	RED	RAPC5	295.6	202.8	3.61	MISSILE-1
14.02	DF	70	BLUE	BAPC1	294.2	198.2	1	154	RED	RAPC5	295.6	201.9	3.93	MISSILE-1
14.44	DF	18	BLUE	BTANK1	294.9	199.1	1	128	RED	RAPC5	295.6	201.9	2.90	MISSILE-1
15.05	DF	63	BLUE	BAPC1	294.5	198.2	1	132	RED	RAPC5	295.9	201.6	3.64	MISSILE-1
15.26	DF	9	BLUE	BTANK1	294.2	199.3	1	129	RED	RAPC5	295.7	202.9	3.89	MISSILE-1
15.30	DF	17	BLUE	BTANK1	303.0	201.6	1	37	RED	RTANK9	303.0	202.0	0.45	TANK RND5
15.30	DF	19	BLUE	BTANK1	294.2	199.3	1	135	RED	RAPC5	295.7	202.8	3.89	MISSILE-1
16.13	DF	13	BLUE	BTANK1	303.1	201.4	1	22	RED	RTANK9	302.9	201.5	0.15	TANK RND5
16.24	DF	71	BLUE	BAPC1	294.5	199.5	1	150	RED	RAPC5	295.6	202.1	2.81	MISSILE-1
18.07	DF	4	BLUE	BTANK1	294.6	199.7	1	133	RED	RAPC5	295.9	203.1	3.70	MISSILE-1
19.23	DF	8	BLUE	BTANK1	294.1	199.4	1	129	RED	RAPC5	295.7	202.5	3.49	MISSILE-1
20.24	DF	66	BLUE	BAPC1	294.0	199.6	1	133	RED	RAPC5	295.9	203.0	3.91	MISSILE-1
21.23	DF	53	BLUE	BAPC21	293.9	200.5	1	133	RED	RAPC5	295.9	203.0	3.20	MISSILE-1
22.34	DF	16	BLUE	BTANK1	303.0	201.5	1	8	RED	RTANK9	302.8	201.6	0.16	TANK RND5
23.38	DF	12	BLUE	BTANK1	295.3	199.4	1	129	RED	RAPC5	295.7	202.2	2.89	MISSILE-1
23.40	DF	79	BLUE	BGLDR9	303.1	201.2	1	8	RED	RTANK9	302.9	201.5	0.35	LT ARMOR1
24.48	DF	62	BLUE	BAPC1	295.6	198.6	1	153	RED	RAPC5	295.9	202.5	3.96	MISSILE-1
25.10	DF	78	BLUE	BGLDR9	292.0	199.8	1	2	RED	RTANK9	292.6	200.7	1.14	AP RND 1
25.41	DF	44	BLUE	BAPC1	294.0	199.4	1	153	RED	RAPC5	295.9	202.4	3.60	MISSILE-1
25.42	DF	74	BLUE	BGLDR9	292.3	199.6	1	17	RED	RTANK9	292.6	200.7	1.13	AP RND 1
25.53	DF	68	BLUE	BAPC1	293.8	199.7	1	17	RED	RTANK9	292.6	200.6	1.49	TANK RND8
27.18	DF	69	BLUE	BAPC1	295.3	198.4	1	153	RED	RAPC5	296.0	202.3	3.94	MISSILE-1

RED WEAPON CASUALTY								BLUE WEAPON FIRERS						
4.28	DF	108	RED	RGLD11	296.2	199.1	1	76	BLUE	BGLDR9	296.1	198.8	0.34	AP ROUND4
5.12	DF	152	RED	RAPC5	310.2	201.6	1	7	BLUE	BTANK1	309.8	199.9	1.71	TANK RND1
6.46	DF	33	RED	RTANK9	310.1	201.4	1	5	BLUE	BTANK1	309.7	199.8	1.64	TANK RND1
9.06	DF	32	RED	RTANK9	310.2	202.1	1	5	BLUE	BTANK1	309.9	200.4	1.73	TANK RND1
9.44	DF	21	RED	RTANK9	310.1	201.5	1	15	BLUE	BTANK1	309.8	199.9	1.62	TANK RND1
9.44	DF	10	RED	RTANK9	310.2	202.3	1	5	BLUE	BTANK1	309.9	200.4	1.88	TANK RND1
10.24	DF	4	RED	RTANK9	310.1	202.0	1	15	BLUE	BTANK1	309.9	200.2	1.79	TANK RND1
10.34	DF	6	RED	RTANK9	310.2	202.1	1	5	BLUE	BTANK1	309.9	200.4	1.74	TANK RND1
10.41	DF	140	RED	RAPC5	295.3	202.0	1	58	BLUE	BAPC1	295.1	198.3	3.74	MISSILE-8
10.50	DF	138	RED	RAPC5	292.8	200.9	1	57	BLUE	BAPC1	294.4	198.3	3.98	MISSILE-8
10.52	DF	141	RED	RAPC5	295.5	202.0	1	58	BLUE	BAPC1	295.1	198.3	3.68	MISSILE-8
11.08	DF	145	RED	RAPC5	310.1	201.3	1	5	BLUE	BTANK1	309.9	200.5	0.85	TANK RND1
11.09	DF	144	RED	RAPC5	292.1	201.5	1	61	BLUE	BAPC1	294.4	198.8	3.53	MISSILE-8
11.23	DF	127	RED	RAPC5	302.9	201.5	1	11	BLUE	BTANK1	303.1	201.3	0.32	TANK RND1
11.46	DF	122	RED	RGLD11	296.2	199.4	1	76	BLUE	BGLDR9	296.0	199.1	0.32	AP ROUND4
12.09	DF	131	RED	RAPC5	303.0	201.6	1	11	BLUE	BTANK1	303.0	201.5	0.05	TANK RND1
12.16	DF	40	RED	RTANK9	310.0	202.2	1	15	BLUE	BTANK1	310.0	200.6	1.64	TANK RND1
12.41	DF	149	RED	RAPC5	295.5	201.9	1	61	BLUE	BAPC1	294.2	199.4	2.82	MISSILE-8
12.54	DF	148	RED	RAPC5	293.3	199.5	1	57	BLUE	BAPC1	294.2	199.1	1.04	MISSILE-8
13.46	DF	109	RED	RGLD11	293.4	198.1	1	64	BLUE	BAPC1	294.2	197.9	0.89	APER PNTL
13.49	DF	1	RED	RTANK9	310.2	202.3	1	5	BLUE	BTANK1	310.0	201.4	0.90	TANK RND1
14.00	DF	155	RED	RAPC5	292.6	200.6	1	10	BLUE	BTANK1	294.4	199.4	2.18	TANK RND1
14.03	DF	29	RED	RTANK9	292.1	201.0	1	70	BLUE	BAPC1	294.2	198.2	3.51	MISSILE-8
14.14	DF	112	RED	RGLD11	293.4	198.3	1	68	BLUE	BAPC1	294.1	198.3	0.70	APER PNTL
14.21	DF	14	RED	RTANK9	310.2	202.3	1	5	BLUE	BTANK1	310.0	201.6	0.69	TANK RND1
14.58	DF	156	RED	RAPC5	293.3	199.4	1	9	BLUE	BTANK1	294.2	199.3	0.91	TANK RND1
15.40	DF	115	RED	RGLD11	310.0	202.1	1	5	BLUE	BTANK1	310.1	201.8	0.29	LT ARMOR1
15.44	DF	139	RED	RAPC5	295.9	201.8	1	63	BLUE	BAPC1	294.4	198.4	3.68	MISSILE-8
16.45	DF	120	RED	RGLD11	309.9	202.3	1	5	BLUE	BTANK1	310.1	202.2	0.20	LT ARMOR1
16.47	DF	36	RED	RTANK9	309.8	201.1	1	14	BLUE	BTANK1	310.1	201.2	0.31	TANK RND1
16.52	DF	30	RED	RTANK9	292.7	200.8	1	63	BLUE	BAPC1	294.4	198.7	2.45	MISSILE-8
17.18	DF	22	RED	RTANK9	303.1	201.2	1	16	BLUE	BTANK1	303.8	200.3	1.17	TANK RND1
17.20	DF	142	RED	RAPC5	293.3	199.5	1	8	BLUE	BTANK1	294.3	198.6	1.33	TANK RND1
17.38	DF	136	RED	RAPC5	293.2	199.4	1	64	BLUE	BAPC1	294.2	198.3	1.60	MISSILE-8
17.55	DF	28	RED	RTANK9	292.7	200.9	1	8	BLUE	BTANK1	294.3	198.8	2.62	TANK RND1
18.02	DF	147	RED	RAPC5	293.0	199.2	1	68	BLUE	BAPC1	294.0	198.6	1.18	MISSILE-8
18.05	DF	13	RED	RTANK9	295.8	201.5	1	64	BLUE	BAPC1	294.2	198.3	3.61	MISSILE-8
18.37	DF	125	RED	RGLD11	293.3	198.7	1	68	BLUE	BAPC1	294.0	198.6	0.74	APER PNTL
18.44	DF	137	RED	RAPC5	293.3	199.6	1	8	BLUE	BTANK1	294.2	199.1	1.03	TANK RND1
19.33	DF	12	RED	RTANK9	292.8	200.9	1	68	BLUE	BAPC1	294.0	198.7	2.49	MISSILE-8
19.37	DF	123	RED	RGLD11	310.3	201.1	1	6	BLUE	BTANK1	310.0	200.8	0.37	LT ARMOR1
20.52	DF	108	RED	RAPC5	295.9	200.5	1	69	BLUE	BAPC1	296.1	197.3	3.19	MISSILE-8
20.58	DF	143	RED	RAPC5	295.0	200.6	1	62	BLUE	BAPC1	296.0	197.6	3.14	MISSILE-8
21.05	DF	151	RED	RAPC5	293.3	199.2	1	68	BLUE	BAPC1	294.0	198.8	0.76	MISSILE-8
21.15	DF	154	RED	RAPC5	295.9	200.2	1	69	BLUE	BAPC1	296.0	197.3	2.83	MISSILE-8
6.15	DF	108	RED	RGLD11	296.2	199.1	1	76	BLUE	BGLDR9	296.1	198.9	0.24	AP ROUND4
7.45	DF	33	RED	RTANK9	310.1	201.1	1	5	BLUE	BTANK1	309.8	200.1	1.00	TANK RND1
8.41	DF	152	RED	RAPC5	310.1	200.7	1	5	BLUE	BTANK1	309.9	200.4	0.36	TANK RND1
10.05	DF	131	RED	RAPC5	302.9	201.7	1	3	BLUE	BTANK1	302.9	201.5	0.18	TANK RND1
10.17	DF	148	RED	RAPC5	293.0	200.4	1	20	BLUE	BTANK1	294.4	198.3	2.61	TANK RND1
10.20	DF	21	RED	RTANK9	310.1	201.3	1	14	BLUE	BTANK1	309.9	200.2	1.11	TANK RND1
10.46	DF	32	RED	RTANK9	310.1	201.6	1	15	BLUE	BTANK1	310.0	200.4	1.18	TANK RND1
10.50	DF	138	RED	RAPC5	292.8	200.9	1	61	BLUE	BAPC1	294.4	198.6	2.77	MISSILE-8
11.19	DF	145	RED	RAPC5	310.1	201.1	1	15	BLUE	BTANK1	310.0	200.5	0.61	TANK RND1
12.01	DF	10	RED	RTANK9	310.2	201.6	1	6	BLUE	BTANK1	309.3	199.0	2.70	TANK RND1
12.12	DF	139	RED	RAPC5	295.7	202.2	1	61	BLUE	BAPC1	294.2	199.2	3.59	MISSILE-8
12.20	DF	4	RED	RTANK9	310.1	201.4	1	14	BLUE	BTANK1	310.0	200.5	0.86	TANK RND1
12.23	DF	142	RED	RAPC5	292.7	200.6	1	19	BLUE	BTANK1	294.4	198.2	2.87	TANK RND1
12.27	DF	127	RED	RAPC5	303.1	201.3	1	13	BLUE	BTANK1	303.4	201.0	0.41	TANK RND1
12.52	DF	6	RED	RTANK9	310.1	201.4	1	15	BLUE	BTANK1	310.0	200.7	0.79	TANK RND1
12.54	DF	122	RED	RGLD11	296.2	199.3	1	76	BLUE	BGLDR9	296.0	199.1	0.30	AP ROUND4
13.22	DF	151	RED	RAPC5	292.3	200.9	1	57	BLUE	BAPC1	294.2	199.1	2.92	MISSILE-8
13.23	DF	40	RED	RTANK9	309.9	202.0	1	15	BLUE	BTANK1	310.0	200.7	1.34	TANK RND1
13.30	DF	147	RED	RAPC5	292.9	199.5	1	10	BLUE	BTANK1	294.4	199.3	1.57	TANK RND1
14.03	DF	154	RED	RAPC5	295.6	201.6	1	66	BLUE	BAPC1	294.3	198.3	3.64	MISSILE-8

14.19	DF	136	RED	RAPC5	292.7	200.6	1	68	BLUE	BAPC1	294.1	198.3	2.68	MISSILE-8
14.34	DF	14	RED	RTANK9	310.2	202.2	1	15	BLUE	BTANK1	310.0	200.9	1.29	TANK RND1
14.58	DF	156	RED	RAPC5	293.3	199.4	1	9	BLUE	BTANK1	294.2	199.3	2.91	TANK RND1
15.11	DF	132	RED	RAPC5	295.9	201.3	1	63	BLUE	BAPC1	294.5	198.2	3.42	MISSILE-8
15.45	DF	36	RED	RTANK9	309.8	201.3	1	15	BLUE	BTANK1	310.0	201.1	0.27	TANK RND1
16.01	DF	1	RED	RTANK9	310.1	201.5	1	15	BLUE	BTANK1	310.1	201.3	0.26	TANK RND1
17.14	DF	22	RED	RTANK9	303.1	201.2	1	16	BLUE	BTANK1	303.9	200.2	1.20	TANK RND1
17.35	DF	115	RED	RSLD11	309.9	201.9	1	15	BLUE	BTANK1	310.1	201.6	0.34	LT ARMOR1
18.01	DF	13	RED	RTANK9	295.8	201.5	1	64	BLUE	BAPC1	294.2	198.3	3.64	MISSILE-8
18.45	DF	144	RED	RAPC5	293.4	199.5	1	69	BLUE	BAPC1	296.4	197.3	3.67	MISSILE-8
19.23	DF	143	RED	RAPC5	295.0	201.0	1	62	BLUE	BAPC1	296.3	197.6	3.61	MISSILE-8
19.40	DF	39	RED	RTANK9	303.1	201.2	1	79	BLUE	BSLDR9	303.3	200.9	0.37	MISSILE-4
20.02	DF	141	RED	RAPC5	295.8	200.2	1	62	BLUE	BAPC1	295.2	197.6	3.63	MISSILE-8
20.05	DF	37	RED	RTANK9	303.1	201.2	1	16	BLUE	BTANK1	303.6	200.6	0.77	TANK RND1
20.37	DF	140	RED	RAPC5	295.9	199.7	1	76	BLUE	BSLDR9	295.8	199.5	0.19	MISSILE-4
20.46	DF	128	RED	RAPC5	295.9	200.4	1	62	BLUE	BAPC1	296.1	197.6	3.75	MISSILE-8
20.57	DF	35	RED	RTANK9	303.1	201.2	1	16	BLUE	BTANK1	303.4	200.9	0.35	TANK RND1
21.20	DF	137	RED	RAPC5	293.5	199.3	1	62	BLUE	BAPC1	296.0	197.6	3.06	MISSILE-8
21.23	DF	149	RED	RAPC5	296.0	199.8	1	69	BLUE	BAPC1	296.0	197.3	2.62	MISSILE-8
21.33	DF	134	RED	RAPC5	295.5	201.0	1	69	BLUE	BAPC1	296.0	197.3	3.70	MISSILE-8
21.55	DF	117	RED	RSLD11	303.0	201.4	1	16	BLUE	BTANK1	303.1	201.3	0.21	LT ARMOR1
25.29	DF	150	RED	RAPC5	296.0	200.0	1	69	BLUE	BAPC1	295.3	197.9	2.29	MISSILE-8
5.16	DF	152	RED	RAPC5	310.2	201.8	1	7	BLUE	BTANK1	309.8	199.9	1.96	TANK RND1
5.56	DF	128	RED	RSLD11	296.2	199.2	1	76	BLUE	BSLDR9	296.1	198.8	2.59	AP RPLND4
6.38	DF	145	RED	RAPC5	310.4	200.5	1	7	BLUE	BTANK1	310.1	200.5	2.04	TANK RND1
6.38	DF	33	RED	RTANK9	310.1	201.4	1	7	BLUE	BTANK1	310.1	200.6	2.80	TANK RND1
9.16	DF	156	RED	RAPC5	292.2	200.9	1	61	BLUE	BAPC1	294.5	198.3	3.48	MISSILE-8
9.44	DF	32	RED	RTANK9	310.1	201.9	1	15	BLUE	BTANK1	309.8	199.9	2.36	TANK RND1
9.63	DF	21	RED	RTANK9	310.1	201.4	1	14	BLUE	BTANK1	309.8	200.1	1.20	TANK RND1
10.09	DF	131	RED	RAPC5	302.9	201.7	1	3	BLUE	BTANK1	302.9	201.5	0.14	TANK RND1
10.11	DF	141	RED	RAPC5	295.4	202.0	1	55	BLUE	BAPC1	295.1	198.3	3.75	MISSILE-8
10.32	DF	6	RED	RTANK9	310.2	202.2	1	14	BLUE	BTANK1	309.9	200.3	1.90	TANK RND1
10.37	DF	154	RED	RAPC5	295.6	202.1	1	55	BLUE	BAPC1	295.1	198.4	3.70	MISSILE-8
10.50	DF	142	RED	RAPC5	292.3	201.2	1	57	BLUE	BAPC1	294.4	198.3	3.64	MISSILE-8
10.57	DF	148	RED	RAPC5	293.0	200.4	1	10	BLUE	BTANK1	294.6	198.2	2.75	TANK RND1
11.08	DF	4	RED	RTANK9	310.1	201.8	1	14	BLUE	BTANK1	309.9	201.4	1.47	TANK RND1
11.20	DF	10	RED	RTANK9	310.2	201.8	1	7	BLUE	BTANK1	310.1	200.8	1.00	TANK RND1
12.03	DF	127	RED	RAPC5	302.9	201.5	1	11	BLUE	BTANK1	303.0	201.5	0.37	TANK RND1
12.04	DF	37	RED	RTANK9	303.2	202.4	1	72	BLUE	BAPC1	302.8	201.6	0.84	MISSILE-8
12.14	DF	40	RED	RTANK9	310.0	202.2	1	15	BLUE	BTANK1	310.0	200.6	1.64	TANK RND1
12.24	DF	123	RED	RSLD11	310.4	201.4	1	7	BLUE	BTANK1	310.1	201.3	0.28	LT ARMOR1
12.45	DF	22	RED	RTANK9	303.2	202.3	1	11	BLUE	BTANK1	302.9	201.8	1.61	TANK RND1
13.02	DF	122	RED	RSLD11	296.2	199.3	1	76	BLUE	BSLDR9	296.0	199.1	0.28	AP RPLND4
13.15	DF	146	RED	RAPC5	296.1	202.0	1	71	BLUE	BAPC1	294.7	199.0	3.36	MISSILE-8
13.26	DF	128	RED	RAPC5	293.1	200.5	1	20	BLUE	BTANK1	294.2	199.4	1.57	TANK RND1
13.34	DF	147	RED	RAPC5	292.9	199.5	1	10	BLUE	BTANK1	294.4	199.3	1.55	TANK RND1
13.52	DF	1	RED	RTANK9	310.2	202.2	1	5	BLUE	BTANK1	310.0	201.5	0.82	TANK RND1
13.52	DF	136	RED	RAPC5	292.7	200.7	1	70	BLUE	BAPC1	294.2	198.2	2.92	MISSILE-8
13.58	DF	143	RED	RAPC5	295.2	201.9	1	71	BLUE	BAPC1	294.6	199.2	2.79	MISSILE-8
14.02	DF	137	RED	RAPC5	292.7	200.7	1	66	BLUE	BAPC1	294.3	198.3	2.40	MISSILE-8
14.20	DF	29	RED	RTANK9	292.1	201.0	1	71	BLUE	BAPC1	294.6	199.2	3.02	MISSILE-8
14.25	DF	14	RED	RTANK9	310.2	202.2	1	5	BLUE	BTANK1	310.0	201.6	0.64	TANK RND1
14.52	DF	140	RED	RAPC5	295.5	201.3	1	63	BLUE	BAPC1	294.5	198.2	3.28	MISSILE-8
15.34	DF	115	RED	RSLD11	310.0	202.1	1	5	BLUE	BTANK1	310.1	201.8	0.33	LT ARMOR1
16.11	DF	144	RED	RAPC5	292.8	200.5	1	8	BLUE	BTANK1	294.4	198.2	2.75	TANK RND1
16.41	DF	39	RED	RTANK9	303.1	201.9	1	13	BLUE	BTANK1	303.0	201.5	0.39	TANK RND1
16.56	DF	132	RED	RAPC5	295.9	201.3	1	4	BLUE	BTANK1	294.7	199.3	2.34	TANK RND1
17.22	DF	125	RED	RSLD11	293.3	198.8	1	68	BLUE	BAPC1	294.0	198.6	0.81	APER PNTL
17.30	DF	30	RED	RTANK9	292.8	200.7	1	4	BLUE	BTANK1	294.6	199.5	2.25	TANK RND1
17.55	DF	118	RED	RSLD11	310.4	201.8	1	14	BLUE	BTANK1	310.1	201.5	0.35	LT ARMOR1
18.07	DF	19	RED	RTANK9	292.3	201.3	1	64	BLUE	BAPC1	294.2	198.3	3.62	MISSILE-8
18.24	DF	12	RED	RTANK9	292.6	201.0	1	64	BLUE	BAPC1	294.2	198.3	3.17	MISSILE-8
18.32	DF	28	RED	RTANK9	292.8	200.8	1	64	BLUE	BAPC1	294.2	198.3	2.90	MISSILE-8
19.09	DF	120	RED	RSLD11	309.9	202.3	1	14	BLUE	BTANK1	310.2	202.1	0.32	LT ARMOR1
19.23	DF	151	RED	RAPC5	295.2	199.3	1	69	BLUE	BAPC1	296.3	197.3	3.60	MISSILE-8
19.37	DF	155	RED	RAPC5	293.2	199.5	1	69	BLUE	BAPC1	296.3	197.3	3.73	MISSILE-8
19.54	DF	149	RED	RAPC5	295.9	200.3	1	12	BLUE	BTANK1	295.6	198.1	2.17	TANK RND1
20.39	DF	36	RED	RTANK9	309.7	200.4	1	6	BLUE	BTANK1	310.1	201.0	0.67	TANK RND1

20.53	DF	3	RED	RTANK9	295.7	201.4	1	62	BLUE	BAPC1	296.1	197.6	3.75	MISSILE-8
20.57	DF	35	RED	RTANK9	303.1	201.2	1	16	BLUE	BTANK1	303.4	200.9	0.35	TANK RND1
21.08	DF	139	RED	RAPC5	296.1	200.7	1	64	BLUE	BAPC1	294.2	198.6	2.85	MISSILE-8
21.10	DF	134	RED	RAPC5	295.5	200.6	1	62	BLUE	BAPC1	296.0	197.6	3.02	MISSILE-8
21.47	DF	150	RED	RAPC5	295.7	201.5	1	12	BLUE	BTANK1	295.5	198.8	2.69	TANK RND1
22.11	DF	117	RED	RGLD11	302.9	201.5	1	16	BLUE	BTANK1	303.1	201.3	0.34	LT ARMOR1
22.24	DF	27	RED	RTANK9	292.1	201.7	1	68	BLUE	BAPC1	293.9	199.2	3.11	MISSILE-8
22.32	DF	13	RED	RTANK9	295.9	200.8	1	69	BLUE	BAPC1	295.6	197.4	3.46	MISSILE-8
22.42	DF	128	RED	RAPC5	295.9	200.2	1	69	BLUE	BAPC1	295.6	197.4	2.89	MISSILE-8
23.17	DF	7	RED	RTANK9	292.7	200.8	1	68	BLUE	BAPC1	293.9	199.3	1.39	MISSILE-8
23.27	DF	26	RED	RTANK9	292.4	200.7	1	68	BLUE	BAPC1	293.9	199.3	2.03	MISSILE-8
23.43	DF	129	RED	RAPC5	295.7	201.9	1	62	BLUE	BAPC1	295.6	198.2	3.74	MISSILE-8
23.44	DF	31	RED	RTANK9	292.1	201.4	1	68	BLUE	BAPC1	293.9	199.3	2.77	MISSILE-8
24.54	DF	133	RED	RAPC5	295.9	202.3	1	64	BLUE	BAPC1	294.0	199.6	3.31	MISSILE-8
24.58	DF	25	RED	RTANK9	295.6	202.2	1	68	BLUE	BAPC1	293.9	199.4	3.26	MISSILE-8
25.02	DF	135	RED	RAPC5	295.6	202.0	1	64	BLUE	BAPC1	294.0	199.6	2.89	MISSILE-8
26.15	DF	24	RED	RTANK9	295.8	201.7	1	69	BLUE	BAPC1	295.3	198.1	3.65	MISSILE-8
26.45	DF	11	RED	RTANK9	295.7	201.6	1	69	BLUE	BAPC1	295.3	198.1	3.53	MISSILE-8
26.58	DF	34	RED	RTANK9	295.6	201.8	1	69	BLUE	BAPC1	295.3	198.2	3.63	MISSILE-8
27.46	DF	130	RED	RAPC5	295.6	201.2	1	69	BLUE	BAPC1	295.3	198.2	3.04	MISSILE-8
5.17	DF	108	RED	RGLD11	296.2	199.1	1	76	BLUE	BGLDR9	296.1	198.8	0.33	AP ROUND4
7.24	DF	33	RED	RTANK9	310.1	201.2	1	5	BLUE	BTANK1	309.8	200.0	1.20	TANK RND1
7.55	DF	152	RED	RAPC5	310.1	200.7	1	5	BLUE	BTANK1	309.8	200.2	0.56	TANK RND1
9.14	DF	21	RED	RTANK9	310.1	201.6	1	5	BLUE	BTANK1	309.9	200.4	1.24	TANK RND1
9.19	DF	131	RED	RAPC5	302.9	201.7	1	1	BLUE	BTANK1	302.9	201.5	0.18	TANK RND1
9.38	DF	145	RED	RAPC5	310.2	201.4	1	14	BLUE	BTANK1	309.8	200.0	1.51	TANK RND1
9.51	DF	127	RED	RAPC5	303.2	202.2	1	1	BLUE	BTANK1	302.8	201.7	0.70	TANK RND1
9.55	DF	4	RED	RTANK9	310.2	202.1	1	5	BLUE	BTANK1	309.9	200.4	1.76	TANK RND1
10.12	DF	37	RED	RTANK9	303.3	202.9	1	3	BLUE	BTANK1	302.9	201.5	1.43	TANK RND1
10.26	DF	138	RED	RAPC5	292.7	201.0	1	61	BLUE	BAPC1	294.4	198.5	3.01	MISSILE-8
10.27	DF	141	RED	RAPC5	295.5	201.9	1	58	BLUE	BAPC1	295.1	198.2	3.74	MISSILE-8
10.34	DF	32	RED	RTANK9	310.1	201.6	1	14	BLUE	BTANK1	309.9	200.3	1.34	TANK RND1
10.41	DF	149	RED	RAPC5	295.5	201.9	1	58	BLUE	BAPC1	295.1	198.2	3.72	MISSILE-8
10.42	DF	122	RED	RGLD11	296.2	199.4	1	76	BLUE	BGLDR9	296.0	199.1	0.39	AP ROUND4
10.48	DF	6	RED	RTANK9	310.2	202.1	1	15	BLUE	BTANK1	310.0	200.4	1.70	TANK RND1
10.49	DF	22	RED	RTANK9	303.3	202.7	1	1	BLUE	BTANK1	302.8	201.7	1.13	TANK RND1
11.22	DF	40	RED	RTANK9	310.2	202.4	1	14	BLUE	BTANK1	309.9	200.4	1.99	TANK RND1
11.32	DF	132	RED	RAPC5	295.6	202.0	1	65	BLUE	BAPC1	294.9	198.5	3.70	MISSILE-8
11.38	DF	10	RED	RTANK9	310.2	201.7	1	15	BLUE	BTANK1	310.0	200.5	1.21	TANK RND1
12.18	DF	8	RED	RTANK9	303.3	203.1	1	11	BLUE	BTANK1	303.0	201.6	1.60	TANK RND1
12.24	DF	140	RED	RAPC5	295.5	201.4	1	60	BLUE	BAPC1	295.1	198.1	3.32	MISSILE-8
12.38	DF	39	RED	RTANK9	303.3	203.1	1	72	BLUE	BAPC1	302.0	201.9	1.30	MISSILE-8
12.44	DF	148	RED	RAPC5	293.3	199.5	1	10	BLUE	BTANK1	294.5	199.0	1.30	TANK RND1
12.29	DF	29	RED	RTANK9	292.2	201.1	1	57	BLUE	BAPC1	294.2	199.1	2.86	MISSILE-8
13.30	DF	1	RED	RTANK9	310.2	202.3	1	14	BLUE	BTANK1	310.0	200.6	1.67	TANK RND1
13.34	DF	139	RED	RAPC5	295.8	202.0	1	60	BLUE	BAPC1	295.0	198.4	3.69	MISSILE-8
13.45	DF	117	RED	RGLD11	303.2	202.2	1	11	BLUE	BTANK1	303.2	202.2	0.06	LT ARMOR1
13.54	DF	14	RED	RTANK9	310.2	202.3	1	15	BLUE	BTANK1	310.0	200.9	1.46	TANK RND1
14.01	DF	13	RED	RTANK9	295.7	202.2	1	60	BLUE	BAPC1	295.0	198.5	3.74	MISSILE-8
14.16	DF	155	RED	RAPC5	292.6	200.5	1	66	BLUE	BAPC1	294.3	198.3	2.95	MISSILE-8
14.21	DF	144	RED	RAPC5	292.7	200.6	1	70	BLUE	BAPC1	294.2	198.3	2.83	MISSILE-8
14.28	DF	137	RED	RAPC5	292.7	200.6	1	68	BLUE	BAPC1	294.1	198.3	2.69	MISSILE-8
14.40	DF	35	RED	RTANK9	303.4	203.1	1	1	BLUE	BTANK1	303.0	202.0	1.17	TANK RND1
14.50	DF	146	RED	RAPC5	296.1	202.0	1	60	BLUE	BAPC1	295.0	198.5	3.56	MISSILE-8
14.50	DF	156	RED	RAPC5	293.2	199.6	1	9	BLUE	BTANK1	294.3	199.2	1.12	TANK RND1
15.33	DF	154	RED	RAPC5	295.6	201.8	1	19	BLUE	BTANK1	294.2	199.3	2.92	TANK RND1
15.43	DF	115	RED	RGLD11	310.0	202.0	1	5	BLUE	BTANK1	310.0	201.7	0.36	LT ARMOR1
16.47	DF	36	RED	RTANK9	309.8	201.1	1	14	BLUE	BTANK1	310.1	201.2	0.31	TANK RND1
16.53	DF	7	RED	RTANK9	292.1	201.7	1	63	BLUE	BAPC1	294.4	198.8	3.74	MISSILE-8
16.57	DF	136	RED	RAPC5	293.1	199.5	1	60	BLUE	BAPC1	294.8	199.2	1.70	MISSILE-8
17.12	DF	147	RED	RAPC5	293.0	199.2	1	8	BLUE	BTANK1	294.3	198.6	1.44	TANK RND1
17.30	DF	38	RED	RTANK9	303.3	203.6	1	13	BLUE	BTANK1	303.0	201.6	2.02	TANK RND1
17.32	DF	120	RED	RGLD11	309.9	202.3	1	5	BLUE	BTANK1	310.1	202.1	0.22	LT ARMOR1
17.48	DF	142	RED	RAPC5	293.4	199.3	1	64	BLUE	BAPC1	294.2	198.3	1.35	MISSILE-8
17.55	DF	16	RED	RTANK9	292.2	200.7	1	63	BLUE	BAPC1	294.3	199.1	2.59	MISSILE-8
18.09	DF	28	RED	RTANK9	292.7	200.9	1	64	BLUE	BAPC1	294.2	198.3	3.03	MISSILE-8
18.17	DF	30	RED	RTANK9	292.8	200.6	1	64	BLUE	BAPC1	294.2	198.3	2.75	MISSILE-8
18.31	DF	125	RED	RGLD11	293.3	198.7	1	68	BLUE	BAPC1	294.0	198.6	0.74	APER PNTL

19.24	DF	143	RED	RAPC5	295.0	200.8	1	62	BLUE	BAPC1	296.2	197.6	3.35	MISSILE-8
20.07	DF	12	RED	RTANK9	292.8	200.8	1	70	BLUE	BAPC1	294.0	199.3	1.92	MISSILE-8
20.41	DF	151	RED	RAPC5	293.2	199.3	1	68	BLUE	BAPC1	294.0	198.8	0.86	MISSILE-8
20.55	DF	134	RED	RAPC5	295.5	201.2	1	62	BLUE	BAPC1	296.1	197.6	3.57	MISSILE-8
21.01	DF	19	RED	RTANK9	292.6	201.0	1	70	BLUE	BAPC1	294.0	199.3	2.12	MISSILE-8
21.31	DF	26	RED	RTANK9	292.3	201.0	1	70	BLUE	BAPC1	293.9	199.4	2.24	MISSILE-8
21.51	DF	108	RED	RAPC5	295.9	200.5	1	69	BLUE	BAPC1	295.8	197.3	3.17	MISSILE-8
22.41	DF	3	RED	RTANK9	295.6	201.0	1	69	BLUE	BAPC1	295.8	197.3	3.66	MISSILE-8
22.58	DF	150	RED	RAPC5	295.8	201.2	1	62	BLUE	BAPC1	295.7	197.7	3.49	MISSILE-8
23.22	DF	9	RED	RTANK9	303.1	201.3	1	79	BLUE	BOLDR9	303.1	201.2	0.05	MISSILE-4
23.55	DF	129	RED	RAPC5	295.7	201.7	1	62	BLUE	BAPC1	295.7	198.0	3.74	MISSILE-8
25.06	DF	25	RED	RTANK9	295.6	202.2	1	68	BLUE	BAPC1	293.9	199.4	3.29	MISSILE-8
25.59	DF	24	RED	RTANK9	295.8	201.7	1	69	BLUE	BAPC1	295.3	198.0	3.70	MISSILE-8
26.18	DF	130	RED	RAPC5	295.6	201.5	1	69	BLUE	BAPC1	295.3	198.1	3.43	MISSILE-8
26.41	DF	5	RED	RTANK9	295.8	201.9	1	69	BLUE	BAPC1	295.3	198.2	3.73	MISSILE-8
27.27	DF	34	RED	RTANK9	295.6	201.8	1	69	BLUE	BAPC1	295.3	198.2	3.66	MISSILE-8
3.49	DF	108	RED	RSLD11	296.2	199.1	1	76	BLUE	BOLDR9	296.1	198.8	0.38	AP ROUND4
5.14	DF	33	RED	RTANK9	310.2	201.9	1	7	BLUE	BTANK1	309.8	199.9	2.00	TANK RND1
7.08	DF	152	RED	RAPC5	310.1	201.1	1	5	BLUE	BTANK1	309.7	199.9	1.25	TANK RND1
7.46	DF	21	RED	RTANK9	310.2	202.1	1	5	BLUE	BTANK1	309.9	200.2	2.00	TANK RND1
9.58	DF	145	RED	RAPC5	310.1	201.2	1	14	BLUE	BTANK1	309.8	200.0	1.31	TANK RND1
10.05	DF	131	RED	RAPC5	302.9	201.7	1	3	BLUE	BTANK1	302.9	201.5	0.18	TANK RND1
10.14	DF	32	RED	RTANK9	310.1	201.8	1	14	BLUE	BTANK1	309.9	200.2	1.59	TANK RND1
10.46	DF	108	RED	RAPC5	292.7	200.9	1	71	BLUE	BAPC1	294.9	198.2	3.46	MISSILE-8
10.51	DF	122	RED	RAPC5	303.1	202.0	1	3	BLUE	BTANK1	302.8	201.6	0.52	TANK RND1
10.52	DF	148	RED	RAPC5	292.9	200.5	1	57	BLUE	BAPC1	294.4	198.3	2.67	MISSILE-8
10.54	DF	4	RED	RTANK9	310.1	201.9	1	15	BLUE	BTANK1	310.0	200.4	1.52	TANK RND1
10.55	DF	141	RED	RAPC5	295.5	201.9	1	71	BLUE	BAPC1	294.9	198.2	3.74	MISSILE-8
10.58	DF	6	RED	RTANK9	310.0	202.1	1	14	BLUE	BTANK1	309.9	200.4	1.74	TANK RND1
11.03	DF	149	RED	RAPC5	295.5	202.0	1	65	BLUE	BAPC1	294.9	198.3	3.71	MISSILE-8
11.13	DF	154	RED	RAPC5	295.6	202.0	1	65	BLUE	BAPC1	294.9	198.3	3.70	MISSILE-8
11.21	DF	122	RED	RSLD11	296.2	199.4	1	76	BLUE	BOLDR9	296.0	199.1	0.35	AP ROUND4
11.28	DF	10	RED	RTANK9	310.2	201.8	1	15	BLUE	BTANK1	310.0	200.5	1.25	TANK RND1
11.36	DF	40	RED	RTANK9	310.0	202.3	1	14	BLUE	BTANK1	309.9	200.4	1.94	TANK RND1
12.13	DF	36	RED	RTANK9	309.9	201.8	1	6	BLUE	BTANK1	309.4	199.1	2.80	TANK RND1
12.19	DF	140	RED	RAPC5	295.4	201.6	1	60	BLUE	BAPC1	295.1	198.1	3.56	MISSILE-8
12.22	DF	22	RED	RTANK9	303.2	202.3	1	72	BLUE	BAPC1	302.9	201.8	0.59	MISSILE-8
12.33	DF	37	RED	RTANK9	303.2	202.3	1	11	BLUE	BTANK1	302.9	201.7	0.67	TANK RND1
12.10	DF	8	RED	RTANK9	303.3	202.8	1	11	BLUE	BTANK1	302.9	201.8	1.06	TANK RND1
13.47	DF	117	RED	RSLD11	303.2	202.1	1	11	BLUE	BTANK1	303.1	202.1	0.02	LT ARMOR1
13.55	DF	16	RED	RTANK9	292.2	201.4	1	70	BLUE	BAPC1	294.2	198.2	3.72	MISSILE-8
14.00	DF	38	RED	RTANK9	303.2	204.1	1	11	BLUE	BTANK1	303.2	202.2	1.97	TANK RND1
14.08	DF	137	RED	RAPC5	292.7	200.7	1	66	BLUE	BAPC1	294.3	199.3	2.93	MISSILE-8
14.18	DF	1	RED	RTANK9	310.2	202.2	1	14	BLUE	BTANK1	310.0	200.7	1.50	TANK RND1
14.16	DF	144	RED	RAPC5	292.7	200.6	1	68	BLUE	BAPC1	294.1	198.3	2.77	MISSILE-8
14.16	DF	155	RED	RAPC5	292.6	200.6	1	66	BLUE	BAPC1	294.3	198.3	2.95	MISSILE-8
14.38	DF	14	RED	RTANK9	310.2	202.2	1	15	BLUE	BTANK1	310.0	200.9	1.24	TANK RND1
15.07	DF	132	RED	RAPC5	295.9	201.5	1	63	BLUE	BAPC1	294.5	198.2	3.55	MISSILE-8
15.08	DF	156	RED	RAPC5	293.5	199.5	1	9	BLUE	BTANK1	294.2	199.3	0.98	TANK RND1
16.35	DF	39	RED	RTANK9	303.1	202.0	1	17	BLUE	BTANK1	303.0	201.8	0.19	TANK RND1
16.40	DF	142	RED	RAPC5	293.3	199.5	1	4	BLUE	BTANK1	294.7	199.2	1.41	TANK RND1
17.02	DF	136	RED	RAPC5	295.2	199.3	1	8	BLUE	BTANK1	294.3	198.5	1.35	TANK RND1
17.22	DF	30	RED	RTANK9	292.7	200.7	1	64	BLUE	BAPC1	294.2	198.3	2.90	MISSILE-8
17.26	DF	115	RED	RSLD11	309.9	201.9	1	15	BLUE	BTANK1	310.1	201.6	0.34	LT ARMOR1
17.31	DF	128	RED	RAPC5	295.7	201.6	1	64	BLUE	BAPC1	294.2	198.3	3.60	MISSILE-8
17.31	DF	147	RED	RAPC5	292.0	199.2	1	62	BLUE	BAPC1	296.4	197.6	3.74	MISSILE-8
18.27	DF	120	RED	RSLD11	309.9	202.3	1	15	BLUE	BTANK1	310.1	202.0	0.34	LT ARMOR1
20.59	DF	35	RED	RTANK9	303.1	201.2	1	16	BLUE	BTANK1	303.3	201.0	0.32	TANK RND1
21.04	DF	143	RED	RAPC5	295.1	200.6	1	62	BLUE	BAPC1	296.0	197.6	3.09	MISSILE-8
21.31	DF	13	RED	RTANK9	295.9	201.0	1	69	BLUE	BAPC1	295.9	197.3	3.61	MISSILE-8
21.45	DF	134	RED	RAPC5	295.5	201.0	1	69	BLUE	BAPC1	295.9	197.3	3.64	MISSILE-8
22.07	DF	150	RED	RAPC5	295.8	201.1	1	62	BLUE	BAPC1	295.8	197.7	3.44	MISSILE-8
22.13	DF	9	RED	RTANK9	302.9	201.5	1	16	BLUE	BTANK1	303.0	201.5	0.05	TANK RND1
23.08	DF	139	RED	RAPC5	294.1	200.6	1	69	BLUE	BAPC1	295.6	197.4	3.23	MISSILE-8
23.41	DF	151	RED	RAPC5	293.9	198.2	1	69	BLUE	BAPC1	295.5	197.4	1.84	MISSILE-8
24.13	DF	130	RED	RAPC5	295.5	201.8	1	62	BLUE	BAPC1	295.7	198.1	3.71	MISSILE-8
24.35	DF	135	RED	RAPC5	295.6	201.8	1	62	BLUE	BAPC1	295.6	198.2	3.66	MISSILE-8
25.07	DF	34	RED	RTANK9	295.5	202.0	1	62	BLUE	BAPC1	295.6	198.3	3.72	MISSILE-8

29.15	DF	126	RED	RGLD11	309.8	201.3	1	80	BLUE	BGLDR9	309.7	201.3	0.11	AP ROUND4
3.59	DF	108	RED	RGLD11	296.2	199.2	1	76	BLUE	BGLDR9	296.1	198.8	0.38	AP ROUND4
8.12	DF	33	RED	RTANK9	310.1	200.9	1	5	BLUE	BTANK1	309.9	200.3	0.66	TANK RND1
8.15	DF	152	RED	RAPC5	310.1	200.7	1	6	BLUE	BTANK1	309.0	198.1	2.81	TANK RND1
9.14	DF	148	RED	RAPC5	292.9	200.7	1	61	BLUE	BAPC1	294.5	198.3	2.93	MISSILE-8
9.14	DF	32	RED	RTANK9	310.1	202.1	1	5	BLUE	BTANK1	309.9	200.4	1.68	TANK RND1
9.15	DF	131	RED	RAPC5	302.9	201.7	1	1	BLUE	BTANK1	302.9	201.5	0.18	TANK RND1
9.38	DF	21	RED	RTANK9	310.1	201.5	1	14	BLUE	BTANK1	309.8	200.0	1.60	TANK RND1
9.46	DF	10	RED	RTANK9	310.2	202.3	1	5	BLUE	BTANK1	309.9	200.4	1.88	TANK RND1
10.04	DF	145	RED	RAPC5	310.2	201.7	1	15	BLUE	BTANK1	309.9	200.1	1.58	TANK RND1
10.20	DF	37	RED	RTANK9	303.3	202.8	1	3	BLUE	BTANK1	302.8	201.6	1.33	TANK RND1
10.28	DF	4	RED	RTANK9	310.1	202.0	1	14	BLUE	BTANK1	309.9	200.2	1.77	TANK RND1
10.38	DF	6	RED	RTANK9	310.2	202.2	1	15	BLUE	BTANK1	310.0	200.4	1.83	TANK RND1
10.51	DF	127	RED	RAPC5	303.1	202.0	1	3	BLUE	BTANK1	302.8	201.6	0.50	TANK RND1
10.53	DF	141	RED	RAPC5	295.5	202.0	1	65	BLUE	BAPC1	294.9	198.3	3.72	MISSILE-8
11.32	DF	39	RED	RTANK9	303.3	203.5	1	3	BLUE	BTANK1	303.0	201.9	1.61	TANK RND1
11.54	DF	122	RED	RGLD11	296.2	199.3	1	76	BLUE	BGLDR9	296.0	199.1	0.30	AP ROUND4
12.04	DF	140	RED	RAPC5	295.4	201.6	1	60	BLUE	BAPC1	295.1	198.0	3.70	MISSILE-8
12.16	DF	40	RED	RTANK9	310.0	202.2	1	15	BLUE	BTANK1	310.0	200.6	1.64	TANK RND1
12.23	DF	138	RED	RAPC5	293.1	200.5	1	19	BLUE	BTANK1	294.4	199.2	2.54	TANK RND1
12.33	DF	22	RED	RTANK9	303.2	202.3	1	11	BLUE	BTANK1	302.9	201.7	0.67	TANK RND1
13.20	DF	143	RED	RAPC5	295.3	202.1	1	57	BLUE	BAPC1	294.2	199.0	3.25	MISSILE-8
13.24	DF	8	RED	RTANK9	303.3	202.7	1	11	BLUE	BTANK1	303.0	202.0	0.83	TANK RND1
13.30	DF	146	RED	RAPC5	296.1	202.0	1	71	BLUE	BAPC1	294.6	199.1	3.29	MISSILE-8
13.42	DF	139	RED	RAPC5	295.9	201.8	1	71	BLUE	BAPC1	294.6	199.1	2.94	MISSILE-8
13.50	DF	147	RED	RAPC5	292.9	199.5	1	10	BLUE	BTANK1	294.4	199.3	1.55	TANK RND1
13.54	DF	14	RED	RTANK9	310.2	202.3	1	15	BLUE	BTANK1	310.0	200.9	1.46	TANK RND1
14.02	DF	1	RED	RTANK9	310.2	202.2	1	14	BLUE	BTANK1	310.0	200.7	1.55	TANK RND1
14.12	DF	155	RED	RAPC5	292.5	200.8	1	66	BLUE	BAPC1	294.3	198.3	3.10	MISSILE-8
14.16	DF	144	RED	RAPC5	292.7	200.6	1	70	BLUE	BAPC1	294.2	198.3	2.83	MISSILE-8
14.25	DF	132	RED	RAPC5	295.9	201.4	1	68	BLUE	BAPC1	294.1	198.3	3.62	MISSILE-8
15.14	DF	156	RED	RAPC5	293.2	199.5	1	19	BLUE	BTANK1	294.2	199.1	1.04	TANK RND1
15.22	DF	9	RED	RTANK9	303.3	203.5	1	17	BLUE	BTANK1	302.9	201.6	1.94	TANK RND1
16.34	DF	142	RED	RAPC5	293.3	199.5	1	63	BLUE	BAPC1	294.4	198.6	1.40	MISSILE-8
17.00	DF	38	RED	RTANK9	303.3	203.7	1	13	BLUE	BTANK1	303.0	201.5	2.15	TANK RND1
17.04	DF	136	RED	RAPC5	293.2	199.3	1	63	BLUE	BAPC1	294.4	198.8	1.25	MISSILE-8
17.06	DF	36	RED	RTANK9	309.8	201.1	1	80	BLUE	BGLDR9	309.6	200.8	0.35	MISSILE-4
17.08	DF	117	RED	RGLD11	303.0	201.9	1	17	BLUE	BTANK1	303.0	201.7	0.23	LT ARMOR1
17.09	DF	123	RED	RGLD11	310.3	201.2	1	14	BLUE	BTANK1	310.1	201.5	0.34	LT ARMOR1
17.22	DF	118	RED	RGLD11	310.4	201.7	1	14	BLUE	BTANK1	310.1	201.5	0.34	LT ARMOR1
17.28	DF	125	RED	RGLD11	293.3	198.7	1	70	BLUE	BAPC1	294.2	198.6	0.91	APER PNTL
17.56	DF	28	RED	RTANK9	292.7	200.9	1	64	BLUE	BAPC1	294.2	198.3	3.03	MISSILE-8
18.02	DF	30	RED	RTANK9	292.8	200.6	1	66	BLUE	BAPC1	294.1	199.3	1.84	MISSILE-8
18.07	DF	35	RED	RTANK9	303.1	202.0	1	13	BLUE	BTANK1	302.9	201.7	0.32	TANK RND1
18.09	DF	151	RED	RAPC5	293.1	199.5	1	66	BLUE	BAPC1	294.1	199.3	1.00	MISSILE-8
18.14	DF	149	RED	RAPC5	295.8	200.8	1	64	BLUE	BAPC1	294.2	198.3	3.00	MISSILE-8
18.33	DF	120	RED	RGLD11	309.9	202.3	1	5	BLUE	BTANK1	310.1	202.0	0.35	LT ARMOR1
18.38	DF	12	RED	RTANK9	292.6	201.0	1	70	BLUE	BAPC1	294.1	198.8	2.63	MISSILE-8
18.56	DF	29	RED	RTANK9	292.3	200.3	1	66	BLUE	BAPC1	294.1	199.3	2.08	MISSILE-8
19.05	DF	26	RED	RTANK9	292.2	201.3	1	66	BLUE	BAPC1	294.1	199.3	2.80	MISSILE-8
19.06	DF	13	RED	RTANK9	295.8	201.3	1	63	BLUE	BAPC1	294.2	199.3	2.61	MISSILE-8
19.08	DF	128	RED	RAPC5	295.7	201.5	1	64	BLUE	BAPC1	294.2	198.3	3.51	MISSILE-8
19.24	DF	17	RED	RTANK9	292.0	201.5	1	66	BLUE	BAPC1	294.1	199.3	2.99	MISSILE-8
19.29	DF	137	RED	RAPC5	293.4	199.5	1	66	BLUE	BAPC1	294.1	199.3	0.72	MISSILE-8
19.37	DF	154	RED	RAPC5	295.8	200.6	1	64	BLUE	BAPC1	294.2	198.3	2.77	MISSILE-8
20.11	DF	16	RED	RTANK9	292.4	200.4	1	70	BLUE	BAPC1	294.0	199.3	1.94	MISSILE-8
20.56	DF	150	RED	RAPC5	295.7	201.5	1	70	BLUE	BAPC1	293.9	199.5	2.71	MISSILE-8
20.59	DF	134	RED	RAPC5	235.5	201.1	1	62	BLUE	BAPC1	296.0	197.6	3.47	MISSILE-8
21.38	DF	115	RED	RGLD11	309.9	202.0	1	6	BLUE	BTANK1	310.1	201.5	0.54	LT ARMOR1
21.55	DF	126	RED	RGLD11	309.8	201.3	1	80	BLUE	BGLDR9	309.7	201.0	0.32	AP ROUND4
22.35	DF	3	RED	RTANK9	295.6	201.1	1	69	BLUE	BAPC1	295.5	197.4	3.70	MISSILE-8
24.22	DF	5	RED	RTANK9	295.8	202.2	1	62	BLUE	BAPC1	295.6	198.5	3.75	MISSILE-8
25.25	DF	24	RED	RTANK9	295.8	201.8	1	69	BLUE	BAPC1	295.3	198.1	3.70	MISSILE-8
25.44	DF	130	RED	RAPC5	295.5	201.9	1	12	BLUE	BTANK1	295.2	200.0	1.86	TANK RND1
26.41	DF	135	RED	RAPC5	295.6	201.9	1	69	BLUE	BAPC1	295.3	198.3	3.65	MISSILE-8
26.58	DF	25	RED	RTANK9	295.6	202.0	1	69	BLUE	BAPC1	295.3	198.3	3.74	MISSILE-8
4.31	DF	108	RED	RGLD11	296.2	199.2	1	76	BLUE	BGLDR9	296.1	198.8	0.38	AP ROUND4
5.03	DF	152	RED	RAPC5	310.2	201.6	1	5	BLUE	BTANK1	309.5	199.2	2.44	TANK RND1

6.16	DF	145	RED	RAPC5	310.4	202.4	1	7	BLUE	BTANK1	310.1	200.6	1.85	TANK RND1
6.48	DF	33	RED	RTANK9	310.1	201.4	1	5	BLUE	BTANK1	309.7	199.8	1.59	TANK RND1
7.28	DF	21	RED	RTANK9	310.2	202.2	1	5	BLUE	BTANK1	309.8	200.1	2.20	TANK RND1
9.13	DF	131	RED	RAPC5	302.9	201.7	1	1	BLUE	BTANK1	302.9	201.5	0.18	TANK RND1
9.14	DF	148	RED	RAPC5	292.9	200.7	1	61	BLUE	BAPC1	294.5	198.3	2.93	MISSILE-8
9.45	DF	127	RED	RAPC5	303.2	202.2	1	1	BLUE	BTANK1	302.8	201.7	0.70	TANK RND1
9.46	DF	32	RED	RTANK9	310.1	202.0	1	5	BLUE	BTANK1	309.9	200.4	1.61	TANK RND1
10.14	DF	10	RED	RTANK9	310.2	202.2	1	15	BLUE	BTANK1	309.9	200.2	2.01	TANK RND1
10.16	DF	4	RED	RTANK9	310.2	202.1	1	14	BLUE	BTANK1	309.9	200.2	1.87	TANK RND1
10.21	DF	37	RED	RTANK9	303.3	202.8	1	1	BLUE	BTANK1	302.8	201.7	1.27	TANK RND1
10.47	DF	141	RED	RAPC5	295.5	201.9	1	71	BLUE	BAPC1	294.9	198.2	3.74	MISSILE-8
10.50	DF	6	RED	RTANK9	310.2	202.1	1	5	BLUE	BTANK1	309.9	200.4	1.69	TANK RND1
10.50	DF	138	RED	RAPC5	292.8	200.9	1	57	BLUE	BAPC1	294.4	198.3	3.08	MISSILE-8
10.55	DF	22	RED	RTANK9	303.3	202.7	1	1	BLUE	BTANK1	302.8	201.7	1.08	TANK RND1
11.08	DF	149	RED	RAPC5	295.5	202.0	1	65	BLUE	BAPC1	294.9	198.3	3.71	MISSILE-8
11.22	DF	39	RED	RTANK9	303.3	203.5	1	3	BLUE	BTANK1	303.0	201.8	1.75	TANK RND1
12.36	DF	140	RED	RAPC5	295.4	201.7	1	60	BLUE	BAPC1	295.0	198.1	3.60	MISSILE-8
12.40	DF	122	RED	RGLD11	296.2	199.3	1	76	BLUE	BGLDR9	295.9	199.2	0.28	AP ROUND4
12.42	DF	8	RED	RTANK9	303.3	203.0	1	72	BLUE	BAPC1	303.1	202.0	1.06	MISSILE-8
12.48	DF	40	RED	RTANK9	309.9	202.1	1	5	BLUE	BTANK1	310.0	201.1	1.07	TANK RND1
13.36	DF	35	RED	RTANK9	303.4	203.6	1	1	BLUE	BTANK1	302.9	201.9	1.81	TANK RND1
13.24	DF	147	RED	RAPC5	292.9	199.5	1	10	BLUE	BTANK1	294.4	199.2	1.59	TANK RND1
13.27	DF	117	RED	RGLD11	303.2	202.2	1	11	BLUE	BTANK1	303.1	202.0	0.21	LT ARMOR1
13.28	DF	1	RED	RTANK9	310.2	202.3	1	5	BLUE	BTANK1	310.0	201.3	1.00	TANK RND1
14.11	DF	14	RED	RTANK9	310.2	202.3	1	5	BLUE	BTANK1	310.0	201.5	0.74	TANK RND1
14.15	DF	139	RED	RAPC5	295.9	201.6	1	70	BLUE	BAPC1	294.2	198.3	3.73	MISSILE-8
14.16	DF	29	RED	RTANK9	292.1	201.0	1	68	BLUE	BAPC1	294.1	198.3	3.41	MISSILE-8
14.31	DF	109	RED	RGLD11	293.4	198.1	1	64	BLUE	BAPC1	296.2	198.0	0.87	APER PNTL
15.31	DF	115	RED	RGLD11	310.0	202.1	1	5	BLUE	BTANK1	310.1	201.8	0.33	LT ARMOR1
15.45	DF	36	RED	RTANK9	309.8	201.3	1	15	BLUE	BTANK1	310.0	201.1	0.27	TANK RND1
16.14	DF	156	RED	RAPC5	293.3	199.4	1	4	BLUE	BTANK1	294.7	199.1	1.48	TANK RND1
16.14	DF	38	RED	RTANK9	303.3	203.8	1	1	BLUE	BTANK1	303.1	202.1	1.65	TANK RND1
16.58	DF	9	RED	RTANK9	303.3	203.0	1	13	BLUE	BTANK1	30 .0	201.6	1.49	TANK RND1
17.25	DF	20	RED	RTANK9	303.4	202.9	1	17	BLUE	BTANK1	303.3	202.3	0.60	TANK RND1
17.36	DF	142	RED	RAPC5	293.4	199.3	1	66	BLUE	BAPC1	294.1	199.2	0.69	MISSILE-8
17.46	DF	120	RED	RGLD11	309.9	202.3	1	5	BLUE	BTANK1	310.1	202.3	0.17	LT ARMOR1
17.49	DF	28	RED	RTANK9	292.7	200.9	1	64	BLUE	BAPC1	294.2	198.3	3.08	MISSILE-8
18.34	DF	137	RED	RAPC5	293.4	199.5	1	62	BLUE	BAPC1	296.3	197.6	3.49	MISSILE-8
18.48	DF	144	RED	RAPC5	293.4	199.5	1	62	BLUE	BAPC1	296.3	197.6	3.51	MISSILE-8
18.51	DF	136	RED	RAPC5	293.2	199.3	1	70	BLUE	BAPC1	294.1	198.8	0.98	MISSILE-8
19.11	DF	155	RED	RAPC5	293.4	199.3	1	69	BLUE	BAPC1	296.3	197.3	3.52	MISSILE-8
19.46	DF	143	RED	RAPC5	295.0	200.7	1	62	BLUE	BAPC1	296.2	197.6	3.30	MISSILE-8
19.60	DF	151	RED	RAPC5	293.2	199.3	1	70	BLUE	BAPC1	294.0	199.2	0.80	MISSILE-8
21.12	DF	154	RED	RAPC5	295.9	200.2	1	69	BLUE	BAPC1	296.2	197.3	2.85	MISSILE-8
21.20	DF	128	RED	RAPC5	295.9	200.3	1	69	BLUE	BAPC1	296.2	197.3	2.95	MISSILE-8
22.11	DF	13	RED	RTANK9	295.9	200.9	1	69	BLUE	BAPC1	296.1	197.3	3.53	MISSILE-8
22.56	DF	116	RED	RGLD11	303.1	202.2	1	16	BLUE	BTANK1	302.8	201.7	0.52	LT ARMOR1
23.47	DF	126	RED	RGLD11	309.8	201.2	1	80	BLUE	BGLDR9	309.7	201.1	0.15	AP ROUND4
28.24	DF	113	RED	RGLD11	303.1	201.9	1	79	BLUE	BGLDR9	302.9	201.6	0.39	AP ROUND4
4.44	DF	108	RED	RGLD11	296.2	199.1	1	76	BLUE	BGLDR9	296.1	198.8	0.34	AP ROUND4
5.57	DF	152	RED	RAPC5	310.1	201.4	1	7	BLUE	BTANK1	310.0	200.4	0.98	TANK RND1
7.06	DF	33	RED	RTANK9	310.1	201.3	1	5	BLUE	BTANK1	309.7	199.9	1.40	TANK RND1
8.54	DF	21	RED	RTANK9	310.1	201.7	1	5	BLUE	BTANK1	309.9	200.4	1.34	TANK RND1
9.03	DF	32	RED	RTANK9	310.2	202.1	1	14	BLUE	BTANK1	309.7	199.7	2.43	TANK RND1
9.15	DF	131	RED	RAPC5	302.9	201.7	1	1	BLUE	BTANK1	302.9	201.5	0.18	TANK RND1
10.04	DF	10	RED	RTANK9	310.2	202.2	1	5	BLUE	BTANK1	309.9	200.4	1.83	TANK RND1
10.36	DF	4	RED	RTANK9	310.1	202.0	1	5	BLUE	BTANK1	309.9	200.4	1.61	TANK RND1
10.46	DF	142	RED	RAPC5	292.4	201.1	1	57	BLUE	BAPC1	294.4	198.3	3.44	MISSILE-8
10 47	DF	127	RED	RAPC5	303.1	202.0	1	3	BLUE	BTANK1	302.8	201.6	0.50	TANK RND1
10.50	DF	145	RED	RAPC5	310.1	201.3	1	15	BLUE	BTANK1	310.0	200.4	0.95	TANK RND1
11.01	DF	149	RED	RAPC5	295.5	202.0	1	65	BLUE	BAPC1	294.9	198.3	3.74	MISSILE-8
11.09	DF	154	RED	RAPC5	295.6	202.0	1	65	BLUE	BAPC1	294.9	198.3	3.70	MISSILE-8
11.10	DF	138	RED	RAPC5	292.8	200.9	1	61	BLUE	BAPC1	294.4	198.8	2.63	MISSILE-8
11.10	DF	6	RED	RTANK9	310.1	201.9	1	5	BLUE	BTANK1	309.9	200.4	1.54	TANK RND1
11.31	DF	39	RED	RTANK9	303.3	203.5	1	72	BLUE	BAPC1	302.9	201.5	2.04	MISSILE-8
12.12	DF	40	RED	RTANK9	310.0	202.2	1	14	BLUE	BTANK1	310.0	200.5	1.78	TANK RND1
12.46	DF	149	RED	RAPC5	293.3	199.5	1	10	BLUE	BTANK1	294.5	199 3	1.33	TANK RND1
12.59	DF	141	RED	RAPC5	295.5	202.0	1	60	BLUE	BAPC1	295.0	198.3	3.72	MISSILE-8

13.28	DF	1	RED	RTANK9	310.2	202.3	1	15	BLUE	BTANK1	310.0	200.7	1.55	TANK RND1
13.40	DF	147	RED	RAPC5	292.9	199.5	1	10	BLUE	BTANK1	294.4	199.3	1.55	TANK RND1
13.54	DF	14	RED	RTANK9	310.2	202.3	1	5	BLUE	BTANK1	310.0	201.4	0.99	TANK RND1
14.05	DF	29	RED	RTANK9	292.1	201.0	1	70	BLUE	BAPC1	294.2	198.2	3.51	MISSILE-8
14.10	DF	155	RED	RAPC5	292.6	200.6	1	66	BLUE	BAPC1	294.3	198.3	2.90	MISSILE-8
14.14	DF	139	RED	RAPC5	295.9	201.8	1	71	BLUE	BAPC1	294.6	199.3	2.75	MISSILE-8
14.32	DF	28	RED	RTANK9	292.3	201.3	1	66	BLUE	BAPC1	294.3	198.3	3.59	MISSILE-8
14.51	DF	137	RED	RAPC5	292.7	200.7	1	66	BLUE	BAPC1	294.3	198.3	2.86	MISSILE-8
14.55	DF	115	RED	RSLD11	310.0	202.0	1	5	BLUE	BTANK1	310.0	201.7	0.41	LT ARMOR1
15.03	DF	132	RED	RAPC5	295.9	201.4	1	68	BLUE	BAPC1	294.1	198.3	3.57	MISSILE-8
15.12	DF	156	RED	RAPC5	293.3	199.4	1	9	BLUE	BTANK1	294.2	199.3	0.95	TANK RND1
16.11	DF	22	RED	RTANK9	302.9	201.5	1	13	BLUE	BTANK1	303.1	201.4	0.15	TANK RND1
16.47	DF	146	RED	RAPC5	296.2	201.9	1	63	BLUE	BAPC1	294.4	198.6	3.73	MISSILE-8
17.13	DF	36	RED	RTANK9	309.8	201.0	1	80	BLUE	BSLDR9	309.7	200.8	0.24	MISSILE-4
17.42	DF	136	RED	RAPC5	293.2	199.4	1	64	BLUE	BAPC1	294.2	198.3	1.50	MISSILE-8
18.24	DF	16	RED	RTANK9	292.3	200.7	1	63	BLUE	BAPC1	294.3	199.1	2.54	MISSILE-8
18.36	DF	151	RED	RAPC5	293.2	199.3	1	68	BLUE	BAPC1	294.0	198.7	1.03	MISSILE-8
20.03	DF	37	RED	RTANK9	303.1	201.2	1	16	BLUE	BTANK1	303.6	200.6	0.77	TANK RND1
20.09	DF	143	RED	RAPC5	295.0	201.0	1	62	BLUE	BAPC1	296.2	197.6	3.52	MISSILE-8
20.27	DF	12	RED	RTANK9	292.9	200.8	1	68	BLUE	BAPC1	294.0	198.8	2.09	MISSILE-8
20.46	DF	125	RED	RSLD11	293.3	198.5	1	68	BLUE	BAPC1	294.0	198.8	0.73	APER PNTL
20.54	DF	144	RED	RAPC5	293.4	199.4	1	68	BLUE	BAPC1	294.0	198.8	0.85	MISSILE-8
20.57	DF	35	RED	RTANK9	303.1	201.2	1	16	BLUE	BTANK1	303.4	200.9	0.35	TANK RND1
21.31	DF	126	RED	RSLD11	309.8	201.4	1	80	BLUE	BSLDR9	309.7	201.0	0.58	AP ROUND4
23.18	DF	9	RED	RTANK9	303.1	201.3	1	79	BLUE	BSLDR9	303.1	201.2	0.05	MISSILE-4
4.49	DF	108	RED	RSLD11	296.2	199.1	1	76	BLUE	BSLDR9	296.1	198.8	0.34	AP ROUND4
5.12	DF	152	RED	RAPC5	310.2	201.6	1	7	BLUE	BTANK1	309.8	199.9	1.71	TANK RND1
5.46	DF	145	RED	RAPC5	310.4	202.5	1	7	BLUE	BTANK1	310.0	200.3	2.29	TANK RND1
6.16	DF	33	RED	RTANK9	310.1	201.6	1	7	BLUE	BTANK1	310.1	200.5	1.04	TANK RND1
7.56	DF	21	RED	RTANK9	310.2	202.1	1	7	BLUE	BTANK1	310.1	200.6	1.47	TANK RND1
8.50	DF	32	RED	RTANK9	310.2	202.2	1	5	BLUE	BTANK1	309.9	200.4	1.85	TANK RND1
9.26	DF	10	RED	RTANK9	310.2	202.3	1	5	BLUE	BTANK1	309.9	200.4	1.93	TANK RND1
10.07	DF	131	RED	RAPC5	302.9	201.7	1	3	BLUE	BTANK1	302.9	201.5	0.18	TANK RND1
10.18	DF	4	RED	RTANK9	310.1	202.0	1	15	BLUE	BTANK1	309.9	200.2	1.84	TANK RND1
10.33	DF	141	RED	RAPC5	295.5	202.0	1	58	BLUE	BAPC1	295.1	198.2	3.72	MISSILE-8
10.38	DF	6	RED	RTANK9	310.2	202.2	1	5	BLUE	BTANK1	309.9	200.4	1.79	TANK RND1
11.14	DF	149	RED	RAPC5	295.5	202.0	1	65	BLUE	BAPC1	294.9	198.4	3.72	MISSILE-8
11.14	DF	144	RED	RAPC5	292.2	201.5	1	61	BLUE	BAPC1	294.4	198.8	3.48	MISSILE-8
11.34	DF	132	RED	RAPC5	295.8	202.0	1	65	BLUE	BAPC1	294.9	198.4	3.74	MISSILE-8
12.03	DF	127	RED	RAPC5	302.9	201.5	1	11	BLUE	BTANK1	303.0	201.5	0.07	TANK RND1
12.06	DF	122	RED	RSLD11	296.2	199.4	1	76	BLUE	BSLDR9	296.0	199.1	0.36	AP ROUND4
12.09	DF	140	RED	RAPC5	295.3	202.0	1	61	BLUE	BAPC1	294.3	199.2	3.96	MISSILE-8
12.16	DF	40	RED	RTANK9	310.0	202.2	1	7	BLUE	BTANK1	310.1	201.4	0.83	TANK RND1
12.17	DF	36	RED	RTANK9	309.9	201.8	1	6	BLUE	BTANK1	309.3	199.0	2.86	TANK RND1
12.19	DF	138	RED	RAPC5	293.0	200.7	1	57	BLUE	BAPC1	294.3	198.8	2.33	MISSILE-8
13.22	DF	143	RED	RAPC5	295.3	202.2	1	57	BLUE	BAPC1	294.2	199.0	3.35	MISSILE-8
13.28	DF	148	RED	RAPC5	293.3	199.5	1	71	BLUE	BAPC1	294.6	199.1	1.44	MISSILE-8
13.30	DF	1	RED	RTANK9	310.2	202.3	1	14	BLUE	BTANK1	310.0	200.6	1.67	TANK RND1
13.36	DF	147	RED	RAPC5	292.9	199.5	1	10	BLUE	BTANK1	294.4	199.3	1.57	TANK RND1
13.37	DF	146	RED	RAPC5	296.1	202.1	1	57	BLUE	BAPC1	294.2	199.1	3.57	MISSILE-8
13.39	DF	109	RED	RSLD11	293.4	198.1	1	64	BLUE	BAPC1	294.2	197.9	0.88	APER PNTL
13.54	DF	14	RED	RTANK9	310.2	202.3	1	5	BLUE	BTANK1	310.0	201.5	0.89	TANK RND1
13.57	DF	28	RED	RTANK9	292.2	201.3	1	70	BLUE	BAPC1	294.2	198.2	3.70	MISSILE-8
14.07	DF	29	RED	RTANK9	292.1	201.0	1	66	BLUE	BAPC1	294.3	198.3	3.54	MISSILE-8
14.07	DF	136	RED	RAPC5	292.7	200.6	1	65	BLUE	BAPC1	294.7	199.2	2.37	MISSILE-8
14.18	DF	155	RED	RAPC5	292.6	200.5	1	68	BLUE	BAPC1	294.1	199.3	2.73	MISSILE-8
14.27	DF	151	RED	RAPC5	292.4	200.8	1	71	BLUE	BAPC1	294.6	199.3	2.62	MISSILE-8
14.39	DF	139	RED	RAPC5	295.8	201.9	1	18	BLUE	BTANK1	294.9	199.1	2.94	TANK RND1
14.52	DF	154	RED	RAPC5	295.7	201.4	1	63	BLUE	BAPC1	294.5	198.2	3.47	MISSILE-8
15.34	DF	115	RED	RSLD11	310.0	202.1	1	5	BLUE	BTANK1	310.1	201.8	0.35	LT ARMOR1
16.45	DF	120	RED	RSLD11	309.9	202.3	1	5	BLUE	BTANK1	310.1	202.1	0.23	LT ARMOR1
17.14	DF	22	RED	RTANK9	303.1	201.2	1	16	BLUE	BTANK1	303.9	200.2	1.20	TANK RND1
17.26	DF	156	RED	RAPC5	293.4	199.3	1	70	BLUE	BAPC1	294.2	198.6	1.09	MISSILE-8
17.41	DF	128	RED	RAPC5	295.7	201.4	1	64	BLUE	BAPC1	294.2	198.3	3.43	MISSILE-8
18.18	DF	12	RED	RTANK9	292.6	201.0	1	64	BLUE	BAPC1	294.2	198.3	3.17	MISSILE-8
18.29	DF	142	RED	RAPC5	293.3	199.5	1	69	BLUE	BAPC1	296.4	197.3	3.69	MISSILE-8
18.50	DF	137	RED	RAPC5	293.3	199.6	1	8	BLUE	BTANK1	294.2	199.1	0.99	TANK RND1
18.59	DF	125	RED	RSLD11	293.3	198.7	1	70	BLUE	BAPC1	294.1	198.8	0.82	APER PNTL

19.38	DF	39	RED	RTANK9	303.1	201.2	1	16	BLUE	BTANK1	303.6	200.6	0.78	TANK RND1
20.54	DF	13	RED	RTANK9	295.9	201.1	1	62	BLUE	BAPC1	296.0	197.6	3.43	MISSILE-8
21.35	DF	16	RED	RTANK9	292.5	200.2	1	70	BLUE	BAPC1	294.0	199.4	1.65	MISSILE-8
21.48	DF	134	RED	RAPC5	295.5	201.1	1	69	BLUE	BAPC1	295.8	197.3	3.73	MISSILE-8
21.57	DF	30	RED	RTANK9	293.0	200.0	1	70	BLUE	BAPC1	293.9	199.4	1.10	MISSILE-8
23.18	DF	18	RED	RTANK9	291.9	201.7	1	64	BLUE	BAPC1	294.0	199.2	3.32	MISSILE-8
23.52	DF	26	RED	RTANK9	292.5	200.6	1	64	BLUE	BAPC1	294.0	199.3	2.03	MISSILE-8
24.07	DF	126	RED	RGLD11	309.8	201.3	1	80	BLUE	BGLDR9	309.7	201.0	0.38	AP ROUND4
24.48	DF	150	RED	RAPC5	295.9	200.6	1	69	BLUE	BAPC1	295.3	197.9	2.73	MISSILE-8
25.22	DF	3	RED	RTANK9	295.6	200.6	1	69	BLUE	BAPC1	295.3	198.0	2.62	MISSILE-8
29.07	DF	129	RED	RAPC5	295.6	200.1	1	76	BLUE	BGLDR9	295.6	199.9	0.20	MISSILE-4
5.15	DF	108	RED	RGLD11	296.2	199.1	1	76	BLUE	BGLDR9	296.1	198.8	0.31	AP ROUND4
5.32	DF	152	RED	RAPC5	310.2	201.5	1	7	BLUE	BTANK1	309.9	200.1	1.42	TANK RND1
6.22	DF	33	RED	RTANK9	310.1	201.5	1	7	BLUE	BTANK1	310.1	200.6	0.90	TANK RND1
8.18	DF	21	RED	RTANK9	310.2	201.9	1	5	BLUE	BTANK1	309.9	200.3	1.65	TANK RND1
9.10	DF	32	RED	RTANK9	310.2	202.1	1	5	BLUE	BTANK1	309.9	200.4	1.73	TANK RND1
9.44	DF	4	RED	RTANK9	310.2	202.2	1	5	BLUE	BTANK1	309.9	200.4	1.81	TANK RND1
10.07	DF	131	RED	RAPC5	302.9	201.7	1	3	BLUE	BTANK1	302.7	201.5	0.19	TANK RND1
10.16	DF	149	RED	RAPC5	295.5	202.0	1	55	BLUE	BAPC1	295.1	198.3	3.71	MISSILE-8
10.20	DF	145	RED	RAPC5	310.2	201.7	1	14	BLUE	BTANK1	309.9	200.2	1.51	TANK RND1
10.34	DF	10	RED	RTANK9	310.2	202.1	1	5	BLUE	BTANK1	309.9	200.4	1.68	TANK RND1
10.43	DF	141	RED	RAPC5	295.5	202.0	1	58	BLUE	BAPC1	295.1	198.3	3.71	MISSILE-8
11.01	DF	136	RED	RAPC5	292.4	201.2	1	57	BLUE	BAPC1	294.4	198.3	3.63	MISSILE-8
11.10	DF	138	RED	RAPC5	292.8	200.8	1	61	BLUE	BAPC1	294.4	198.8	2.55	MISSILE-8
11.14	DF	6	RED	RTANK9	310.1	201.9	1	14	BLUE	BTANK1	309.9	200.4	1.69	TANK RND1
11.37	DF	127	RED	RAPC5	302.9	201.5	1	11	BLUE	BTANK1	303.1	201.4	0.20	TANK RND1
11.41	DF	39	RED	RTANK9	303.3	203.4	1	72	BLUE	BAPC1	302.9	201.5	1.96	MISSILE-8
11.49	DF	36	RED	RTANK9	309.9	201.9	1	6	BLUE	BTANK1	309.3	199.3	3.00	TANK RND1
12.12	DF	134	RED	RAPC5	295.6	202.2	1	61	BLUE	BAPC1	294.2	199.2	3.28	MISSILE-8
12.19	DF	40	RED	RTANK9	310.0	202.2	1	5	BLUE	BTANK1	309.9	200.8	1.47	TANK RND1
12.22	DF	122	RED	RGLD11	296.2	199.4	1	76	BLUE	BGLDR9	296.0	199.1	0.32	AP ROUND4
12.23	DF	140	RED	RAPC5	295.4	201.8	1	60	BLUE	BAPC1	295.1	198.1	3.75	MISSILE-8
12.46	DF	148	RED	RAPC5	293.3	199.5	1	20	BLUE	BTANK1	294.3	199.2	1.10	TANK RND1
13.21	DF	146	RED	RAPC5	296.1	202.1	1	57	BLUE	BAPC1	294.2	199.0	3.58	MISSILE-8
13.24	DF	1	RED	RTANK9	310.2	202.3	1	5	BLUE	BTANK1	310.0	201.2	1.20	TANK RND1
13.42	DF	139	RED	RAPC5	295.8	202.2	1	57	BLUE	BAPC1	294.2	199.1	3.44	MISSILE-8
13.54	DF	14	RED	RTANK9	310.2	202.3	1	15	BLUE	BTANK1	310.0	200.9	1.46	TANK RND1
13.56	DF	155	RED	RAPC5	292.3	201.0	1	70	BLUE	BAPC1	294.2	198.2	3.40	MISSILE-8
14.29	DF	133	RED	RAPC5	295.6	202.8	1	71	BLUE	BAPC1	294.6	199.4	3.55	MISSILE-8
14.40	DF	143	RED	RAPC5	295.2	202.1	1	71	BLUE	BAPC1	294.6	199.4	2.72	MISSILE-8
14.44	DF	156	RED	RAPC5	293.3	199.4	1	18	BLUE	BTANK1	294.9	199.1	1.61	TANK RND1
14.56	DF	137	RED	RAPC5	292.7	200.7	1	63	BLUE	BAPC1	294.5	198.2	3.87	MISSILE-8
15.04	DF	144	RED	RAPC5	292.7	200.6	1	63	BLUE	BAPC1	294.5	198.2	3.06	MISSILE-8
15.45	DF	30	RED	RTANK9	292.6	201.0	1	71	BLUE	BAPC1	294.6	199.4	2.47	MISSILE-8
15.55	DF	132	RED	RAPC5	295.9	201.5	1	71	BLUE	BAPC1	294.5	199.5	2.41	MISSILE-8
16.12	DF	29	RED	RTANK9	292.1	200.7	1	71	BLUE	BAPC1	294.5	199.5	2.72	MISSILE-8
16.16	DF	142	RED	RAPC5	293.4	199.4	1	4	BLUE	BTANK1	294.7	199.1	1.37	TANK RND1
16.17	DF	115	RED	RGLD11	310.0	202.0	1	5	BLUE	BTANK1	310.0	201.7	0.34	LT ARMOR1
16.23	DF	34	RED	RTANK9	295.7	202.8	1	71	BLUE	BAPC1	294.5	199.5	3.51	MISSILE-8
16.34	DF	147	RED	RAPC5	293.0	199.2	1	66	BLUE	BAPC1	294.2	198.9	1.18	MISSILE-8
17.31	DF	22	RED	RTANK9	303.2	201.1	1	16	BLUE	BTANK1	303.8	200.3	1.07	TANK RND1
17.45	DF	128	RED	RAPC5	295.7	201.5	1	64	BLUE	BAPC1	294.2	198.3	3.56	MISSILE-8
17.50	DF	120	RED	RGLD11	309.9	202.3	1	5	BLUE	BTANK1	310.1	202.2	0.17	LT ARMOR1
17.51	DF	16	RED	RTANK9	292.2	200.7	1	66	BLUE	BAPC1	294.1	199.2	2.42	MISSILE-8
18.03	DF	151	RED	RAPC5	293.1	199.5	1	66	BLUE	BAPC1	294.1	199.2	0.99	MISSILE-8
18.05	DF	13	RED	RTANK9	295.8	201.5	1	64	BLUE	BAPC1	294.2	198.3	3.64	MISSILE-8
18.09	DF	150	RED	RAPC5	295.6	202.0	1	4	BLUE	BTANK1	294.6	199.7	2.53	TANK RND1
18.24	DF	28	RED	RTANK9	292.7	200.8	1	64	BLUE	BAPC1	294.2	198.3	2.95	MISSILE-8
18.34	DF	12	RED	RTANK9	292.6	201.0	1	64	BLUE	BAPC1	294.2	198.3	3.12	MISSILE-8
19.17	DF	3	RED	RTANK9	295.7	201.6	1	8	BLUE	BTANK1	294.1	199.4	2.72	TANK RND1
19.21	DF	7	RED	RTANK9	292.3	201.4	1	64	BLUE	BAPC1	294.2	198.3	3.66	MISSILE-8
19.32	DF	26	RED	RTANK9	292.2	201.3	1	64	BLUE	BAPC1	294.2	198.3	3.62	MISSILE-8
19.58	DF	154	RED	RAPC5	295.8	200.5	1	64	BLUE	BAPC1	294.2	198.3	2.71	MISSILE-8
20.05	DF	37	RED	RTANK9	303.1	201.2	1	16	BLUE	BTANK1	303.6	200.6	0.77	TANK RND1
20.26	DF	135	RED	RAPC5	295.6	202.4	1	66	BLUE	BAPC1	294.0	199.6	3.25	MISSILE-8
20.52	DF	19	RED	RTANK9	292.6	201.0	1	64	BLUE	BAPC1	294.2	198.3	3.08	MISSILE-8
20.57	DF	35	RED	RTANK9	303.1	201.2	1	16	BLUE	BTANK1	303.4	200.9	0.35	TANK RND1
21.01	DF	125	RED	RGLD11	293.3	198.5	1	68	BLUE	BAPC1	294.0	198.8	0.74	APER PNTL

21.55	DF	117	RED	RGLD11	303.0	201.4	1	16	BLUE	BTANK1	303.1	201.3	0.18	LT ARMOR1
22.13	DF	9	RED	RTANK9	302.9	201.5	1	16	BLUE	BTANK1	303.1	201.3	0.25	TANK RND1
24.28	DF	129	RED	RAPC5	295.7	202.1	1	62	BLUE	BAPC1	295.6	198.5	3.62	MISSILE-8
24.45	DF	25	RED	RTANK9	295.6	202.2	1	62	BLUE	BAPC1	295.6	198.6	3.68	MISSILE-8
25.03	DF	31	RED	RTANK9	292.2	201.2	1	68	BLUE	BAPC1	293.9	199.5	2.36	MISSILE-8
25.13	DF	24	RED	RTANK9	295.8	201.8	1	69	BLUE	BAPC1	295.3	198.1	3.75	MISSILE-8
25.33	DF	11	RED	RTANK9	295.7	201.8	1	69	BLUE	BAPC1	295.3	198.2	3.67	MISSILE-8
25.37	DF	133	RED	RAPC5	295.8	202.6	1	68	BLUE	BAPC1	293.8	199.7	3.61	MISSILE-8
26.02	DF	5	RED	RTANK9	295.8	202.0	1	69	BLUE	BAPC1	295.3	198.3	3.73	MISSILE-8
28.38	DF	111	RED	RGLD11	296.3	199.5	1	77	BLUE	BGLDR9	295.8	199.4	0.51	AP ROUND4

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