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TARGET ACQUISITION MODEL

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The Target Acquisition Model (TAM) is a computer simulation model used in the Nonnuclear Ammunition Combat Rates Studies. The model uses basic sensor effectiveness data to simulate acquisition events in a target array. This documentation has been produced as part of the Nonnuclear Ammunition Combat Rates Methodology Improvement Study-Part II. The documentation contains a methodology description, a program listing, and sample inputs and outputs.

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TARGET ACQUISITION MODEL

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SUMMARY

1. Purpose. - This documentation describes the methodology and input requirements for the Target Acquisition Model.

2. Background. - The Nonnuclear Ammunition Combat Rates Methodology uses computerized simulation models to assist in war gaming combat activities affecting theater ammunition requirements. The US Army Concepts Analysis Agency has been tasked by ODCSOPS to perform a Nonnuclear Ammunition Combat Rates Methodology Improvement Study-Part II (AMMIP II).

3. Methodology. - The Target Acquisition Model simulates the acquisition of units in a target force, by the sensors in an acquiring force. The target force is played at small unit resolution. The acquiring force is played at the individual sensor level of resolution. The model produces an a priori history of the acquisition events that will occur over a period of time. The Target Acquisition Model uses basic sensor data and target arrays as input. The outputs of the Target Acquisition Model serve as inputs to the Blue Artillery Model and the Red Artillery Model.

4. Summation. - This document is one of a series which describes the models and associated methodologies used in the Nonnuclear Ammunition Combat Rates Methodology. Figure 1 presents an overview of the methodology and illustrates the flow of interactions between the models and associated methodologies. Additional information can be obtained from:

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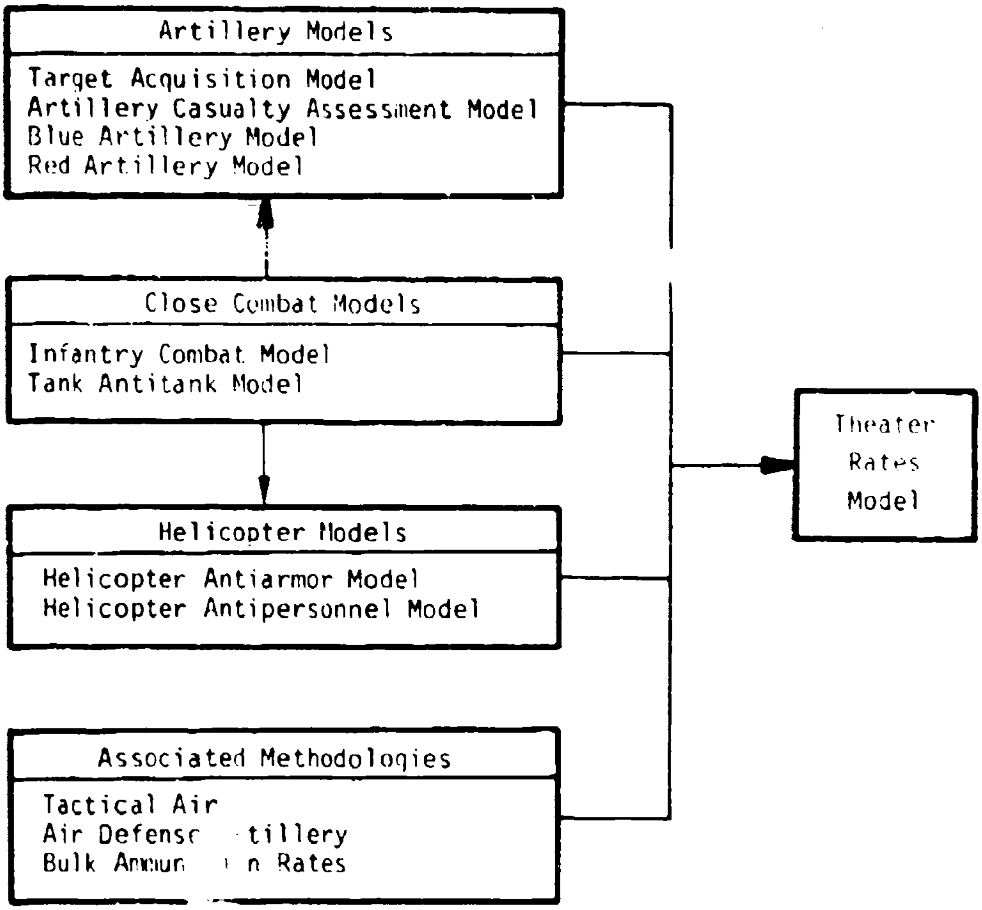

FIGURE 1, Nonnuclear Ammunition Combat Rates Methodology

TARGET ACQUISITION MODEL

CHAPTER I
TECHNICAL DESCRIPTION

1. Introduction. - The Target Acquisition Model (TAM) is a simulation of the acquisition of targets in a target force by the sensors of an acquiring force. The purpose of the simulation is the generation of acquisition events which will ultimately result in requests for fire missions to be delivered by an artillery firing force. The target force, represented to the model by a static target array, is played at the small unit level of resolution. The acquiring force is played at the individual sensor level of resolution. The model addresses input target arrays for a 6-hour game time period and produces an a priori list or history of acquisition events. A time sequenced acquired target list is output in the format necessary for subsequent simulation by the Blue Artillery Model (BAM) and the Red Artillery Model (RAM) used in the Nonnuclear Ammunition Combat Rates Studies.

2. Assumptions. - The Target Acquisition Model converts a static, time independent target array into a dynamic chronicle of acquisition events. The methodology used to accomplish this conversion is based on the following assumptions.

a. Detection events which do not result in a reasonable identification of the elements detected do not result in target acquisition for purpose of engagement by artillery fire.

b. Detection events which do not result in an accurate location of the elements detected do not result in target acquisition for purpose of engagement by artillery fire.

c. Acquisition events against targets known to have short dwell times by sensor systems which have slow report response times do not result in target acquisition for the purpose of engagement by artillery fire.

d. The length of the time period being simulated is sufficiently short that the movement of target units during the time between acquisition events can either be ignored or accounted for outside of the model.

e. The acquiring force and the target force are located on opposite sides of a conventional, continuous forward edge of the battle area (FEBA).

f. The probability that a target is acquired is a function of single element probability of detection, the probability that the target is covered by a sensor, and the probability that line of sight exists from the sensor to some elements of the target.

g. The target array is resolved to those target sizes which are expected to be acquired as individual targets.

h. The decision process of estimating the particulars of a target, given that some, but not all, of the target elements have been detected and identified, can be simulated using a binomial probability formulation.

i. Data exists which will permit an acceptable treatment of multiple acquisition of the same target, given those targets which will be acquired at least once.

j. Data exists which will permit a realistic assignment of clock times to acquisition events.

k. The elements which are likely to be detected in a target can adequately be described as troops and any one particular type of military equipment.

3. Limitations. - The following limitations are inherent in the methodology implemented by TAM, or in the model itself.

a. Only 20 different kinds of sensors can be played. The user is required to provide data for eight specific kinds of sensors, described later in this chapter. The user may suppress one or more of these base case eight sensors through inputs

b. The target force cannot have more than 4,000 individual targets. The acquired target list, including multiple acquisitions, cannot exceed 1,000 target acquisitions.

c. The model is programmed to address a 6-hour game time period. The user can cause the model to address a period shorter than 6 hours by providing multiple acquisition function inputs and clock time distribution inputs for a shorter period. The user cannot cause a time period simulation to exceed 6 hours.

d. The model will address as many as four consecutive 6-hour periods in a continuous game time day. It can be used to address the same target array in each of these periods or a different target array in each period. The model does not have provisions for determining which targets have been destroyed from one acquisition to the next or from one period to the next. The game clock time cannot exceed 2400 hours.

e. The user can describe targets as being one of 16 categories of target. Target categories six through nine must be defined as armored or mechanized targets. The 16 target categories used in the Nonnuclear Ammunition Combat Rates Studies are described in Table I-1.

TABLE 1-1, Sample Target Category Definitions

Category	Description
1	Dismounted troops prior to final assault
2	Dismounted troops in final assualt
3	Dismounted troops in assembly area--hasty positions
4	Dismounted troops in assembly area--prepared positions
5	Infantry in prepared defense
6	Mechanized/armor units in assembly area--hasty positions
7	Mechanized/armor units in assembly area--prepared positions
8	Mechanized/armor units in column
9	Mechanized/armor units in attack
10	Service units in hasty positions
11	Service units in prepared positions
12	Headquarters, command posts, observation posts
13	Truck convoys stopped--troops prone
14	Dismounted troops in approach march
15	Artillery units in hasty positions
16	Artillery units in prepared positions

f. The methodology implemented by the model is designed to treat sensors which are located on, or on the friendly side of, the FEBA. These sensors are simulated as though they search across the FEBA in a continuous zone bounded by the sensor maximum range. Sensor types that do not fit this description can be played in the simulation if suitable adjustments are made in the input data for those sensor types. Methods for making these adjustments are discussed later in this chapter.

g. The model does not provide for the input of different probabilities of detection for daylight conditions and nighttime conditions during a series of consecutive 6-hour period simulations. The user can either modify subroutine ADJUST to accomplish modifications to input probabilities or he can treat daylight activities and nighttime activities with different simulation runs.

h. The model does not provide for false acquisitions. The user can include in the target array, units which are described as targets for acquisition purposes, but which in fact have no troops or elements at risk to artillery.

4. Preparation of Simulation. - Detailed format specifications for the preparation of input data necessary to exercise TAM are described in Chapter III. A sample game situation and the complete set of inputs necessary to use TAM to simulate that situation are contained in Chapter V. The procedures suggested to prepare a situation for simulation with TAM are described below. A combat sample (or combat stylized period) is defined for the purposes of this discussion as a set of target arrays which represent opposing forces at a particular level of activity, for one day. A specific combat sample might be defined as a blue division defending against a red army attack, for one day. The Target Acquisition Model can treat as many as four combat samples in two model runs. One run would treat the red force as the target force. The other run would treat the blue force as the target force. The procedures outlined in the remainder of this paragraph must be implemented twice for each combat sample; once for blue sensors acquiring red targets and once for red sensors acquiring blue targets.

a. Target Array. - The user must develop or obtain a target array for the combat sample target force which does not exceed the model limitations. Each unit in the target array must be coded in the format prescribed for the Target Array Deck (see Chapter III). Target array data consists of:

(1) Necessary Data. - The target array data which is used by TAM includes:

(a) target environment codes

(b) target mobility codes

(c) target category codes

(d) distance from the target to the FEBA

(e) military equipment type code

(f) quantity of troops in the target at risk of acquisition

(g) quantity of military equipment in the target at risk of acquisition

(2) Extraneous Data. - The target array data which is not used by TAM, but which may be included by the user for input to subsequent models, includes:

(a) target identification number

(b) target coordinates

(c) quantity of troops in the target at risk to artillery

(d) quantity of tanks in the target at risk to artillery

(e) quantity of 18 other items of military equipment in the target at risk to artillery

b. Target Characteristics. - The model recognizes six different types of targets with respect to target element composition. The six types of elements are combat troops, service vehicles, tanks and armored vehicles, artillery pieces, noncombat troops, and heavy weapons. The data in the Target Array Deck describes each unit as being one of the above six types (the model assumes that all targets have troops). To provide a basis for estimating the size of acquired targets, the user must analyze the target force and make the following determination for each of the six type targets.

(1) Organizational Size. - The user must select the three most likely organizational sizes of a unit which might be acquired. Generally, these should represent a small, a medium and a large target of that type. For example: platoon, company, and battalion might be selected for units having tanks and armored vehicles. If a type unit (such as artillery) is likely to be acquired in only one organizational size, the user can select that size (battery) to represent all three sizes.

(2) Organizational Inventory. - For each organizational size selected, a determination must be made about the quantity of equipment (of the type which defines the organizational type unit) expected to be in that size unit. For example, it might be determined that in tank and armored vehicle targets, platoons, companies and battalions have 10, 30 and 90 tanks and armored vehicles, respectively.

(3) Target Typical Sizes. - For each organizational size selected, a determination must be made about the radius of the area each such organization size is expected to occupy. For example, it might be determined that, in tank and armored vehicle targets, platoons, companies and battalions are typically contained within a 100 meter, 200 meter and 300 meter radius, respectively.

c. Environmental Characteristics. - The effect of terrain on the capability of the acquiring force to detect target elements is input to the model with line of sight functions. The user defines a set of 16 range bands which are measured in distance from the FEBA. The first range band must extend from the FEBA to some specific distance (for example, FEBA to 200 meters). The last range band must extend to the rear of the target array (for example, 15 kilometers and beyond). The user may select as many as five line of sight functions which express the probability that line of sight exists from a typically located sensor to a randomly located target, as a function of the range band in which the target is located. Different sensor types can be assigned different line of sight functions. Certain types of sensors are not affected by sensor target line of sight. These sensors should be assigned a line of sight function which expresses unlimited line of sight.

d. Sensor Characteristics. - As many as 20 different sensor types can be assigned to the acquiring force. The model reserves the first eight sensor codes for specific sensor types. These base case sensor types are described in Table I-2. For each sensor type played in the simulation, the following technical data must be obtained.

(1) Probability of Detection Functions. - The probabilities of detection used by TAM are single sensor, single element conditional probabilities. Each probability expresses the likelihood that a sensor detects (and identifies) one element in a target, given that:

(a) There is one such element in the target area.

(b) The sensor is trained on the target area.

(c) Line of sight exists from the sensor to the target element.

TABLE I-2, Base Case Sensor Types

Code	Sensor type
1	Forward observor (FO)
2	Movement detection radar
3	Movement detection radar
4	Light observation helicopter (LOH)
5	Photo reconnaissance mission flying over the target force
6	Infrared reconnaissance mission flying over the target force
7	Patrol operating within the target force
8	Countermortar or counterbattery radar

Each probability function must have 16 entries; one entry for each of the 16 range bands defined to cover the target array. A total of 18 probability of detection functions is needed for each sensor type; one function with respect to each of the six type target elements (troops and military equipment) located in each of three environments (open, woods, town). Certain sensor types are only effective when a particular activity occurs in a target. Counter-battery radar, for example, only senses when a battery fires. Probability functions for such sensors should assume that the required activity obtains in the target.

(2) Expected Sensor Coverage. - The model does not consider specific coordinate locations for sensors. The density of a sensor type on the battlefield is treated by the concept of expected sensor coverage. Expected sensor coverage is defined as the number of sensors (of a given type sensor) which are expected to be within range of a target. Since the density of sensors is likely to vary from one combat sample to another, an expected sensor coverage function is required for each sensor type in each acquiring force. An expected sensor coverage function has 16 entries; one entry for each of the 16 range bands defined to cover the target array. Factors affecting the expected sensor coverage calculations are sensor maximum range, sensor density, sensor set-back from the FEBA and the width of the target array. The

formulation used in calculating sensor expected coverage is presented later in this chapter.

5. General Description of Methodology. - The methodology implemented in TAM operates in two distinct phases with respect to the model inputs.

a. Fixed Data Phase. - At the start of a model execution, all of the input data prescribed in the first six input specifications is read and stored. These data include target force characteristics, terrain characteristics and sensor characteristics. Certain of these data are related to specific combat samples. When specific combat samples are addressed during the simulation, the model will select the appropriate data. The remainder of these data are applied to the simulations with respect to all of the combat samples addressed during the model execution.

b. Simulation Phase. - The model, in this phase of execution, performs the simulations of the target acquisition process. The procedures described below are repeated for each set of combat sample data included in the execution runstream.

(1) Combat Sample Situation Definition. - A set of data describing a combat sample target force and the simulations desired, is input and stored. This data includes a target array, a set of multiple acquisition functions, a set of acquisition clock time distributions, and a set of codes which indicate the particular 6-hour time periods to be simulated. The procedures described below are repeated for each 6-hour period of the day that is simulated.

(2) Combat Sample Period Simulation. - All sensor systems in the acquiring force are played against each target in the target array. This process is defined as a simulation replication. A detailed technical description of the methodology employed during one simulation replication is presented in paragraph six of this chapter. A minimum of 25 simulation replications is performed before the model attempts to produce an acquired target list. During each replication, a stochastic determination is made stating which targets are acquired and which targets are not acquired. The purpose of these replications is to extablish a basis for estimating the average size and composition of an acquired target list. The model keeps track of three acquired target list characteristics (having two degrees of freedom) over the replications; number of armor/mechanized targets acquired, number of other targets acquired, and total number of targets acquired. At the completion of each replication (subsequent to the minimum 25), a check is made to see if that replication has produced a near average acquired target list.

Any acquired target list in which the number of armor/mechanized targets acquired and total targets acquired are within plus or minus 10 percent of the running average of these observables, is considered to be near average. If a replication is not acceptable, the estimated averages of the observables are updated and a new replication is begun. Once an acceptable replication has been observed, that replication is repeated for record and used as the basis for generating an acquired target list for the 6-hour period.

(3) Acquired Target List. - The multiple acquisition function and clock time distribution function appropriate to the specific combat sample and time period, are applied against the targets acquired in the record replication. A print record and a punch record of the acquired target list is provided as output. The punch record format is consistent with the input specifications described for the Blue Artillery Model and the Red Artillery Model used in the Nonnuclear Ammunition Combat Rates Methodology.

6. Acquisition Methodology. - This paragraph describes the methodology implemented by TAM to simulate the acquisition process during each simulation replication. The methodology is stochastic and each replication partitions the target array into two sets; those targets which should be acquired one or more times, and those targets which should not be acquired. The targets which are assigned to the acquired set tend to be targets which are at greatest risk of acquisition because of size, type, location, environment and sensor characteristics. The description of the acquisition methodology is presented in terms of a type sensor located at or near the forward edge of the battle area. This type sensor is assumed to search across the FEBA in all directions up to maximum sensor range. Suggested procedures for treating sensor types which do not fit this description are contained in paragraph eight of this chapter.

a. Target Array Processing. - In each simulation replication the model processes each target in the target array, one by one, in the input order. As a target is processed, it is confronted by the entire acquiring force sensor array. This process will make a determination that the target should be, or should not be, acquired. The data available for each target describes the target environment, the target mobility, the range band in which the target is located, the type and quantity of military equipment in the target, and the number of troops in the target.

(1) Let $b \epsilon \{1,2,\ldots,16\}$ be defined as the index of the range band in which a target is located.

(2) Let E_k, $k \epsilon \{OPEN, WOOD, TOWN\}$ be defined as the environment codes for a target, where $E_k \epsilon \{0,1\}$ and $E_k = 1$ implies that a target is entirely or partially located in environment k.

(3) Let $t \geq o$ be the number of troops in a target which are at risk of detection.

(4) Let $m \epsilon$ {service vehicles, tanks and armored vehicles, artillery, heavy weapons} be defined as the type military equipment located in a target and let $e \geq o$ be the quantity of such equipment in a target.

b. Sensor Processing. - Each target addressed during target processing is confronted by each sensor system type. The data available for each sensor type describes the probability that line of sight exists from sensor to target, the expected number of sensors that cover a target, and the single element probabilities of detection for the sensor with respect to the type elements in a target. The process described below is repeated for each sensor type.

(1) Line of Sight Probability. - As many as five line of sight functions can be considered by the model.

(a) Let s be the index which identifies the sensor system type confronting a target.

(b) Let L_{sb} be defined as the probability that line of sight exists from a sensor of type s to a target in range band b, given that the sensor is located on the extension of a perpendicular from the target to the FEBA.

(2) Expected Sensor Coverage. - Expected sensor coverage is defined as the number of sensors that are expected to be closer to a target than the maximum sensor range. Figure I-1 depicts the analytical basis for expected coverage calculations for a type sensor.

(a) Assume that a target located in range band b is at a distance D_b from the FEBA.

(b) Assume that type s sensors are uniformly placed across the target array width.

(c) Let S_s be the distance that type s sensors are set back from the FEBA.

(d) Let R_s be the maximum range of a type s sensor.

(e) Let N_s be the number of type s sensors deployed against the target array.

(f) Let W be the width of the target array.

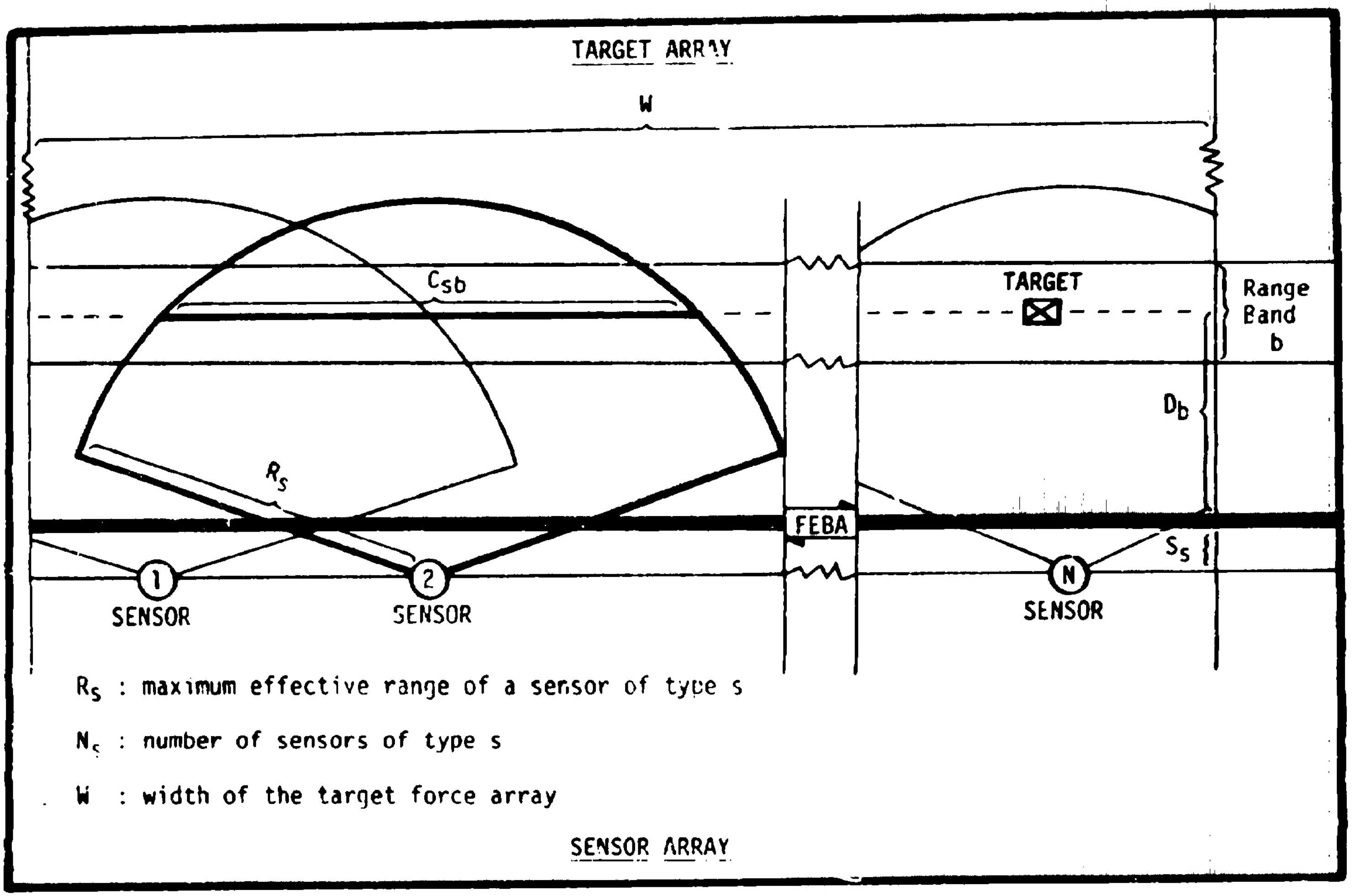

FIGURE I-1, Expected Sensor Coverage in Range Band b by a Sensor with Range R_s

(g) Let C_{sb} be defined as the length of the chord formed by a line parallel to, and a distance D_b from, the FEBA, and contained within a circle of radius R_s centered at a type s sensor location.

Then C_{sb} is the measure of the width of range band b that can be covered by one type s sensor. The magnitude of C_{sb} is given by:

$$C_{sb} = 2\sqrt{R_s^2 - (D_b + S_s)^2} \text{ when } R_s > (D_b + S_s)$$

$$C_{sb} = 0 \text{ ; otherwise.}$$

Let A_{sb} be defined as the expected coverage in range band b for a type s sensor. Then:

$$A_{sb} = N_s\, C_{sb}/W$$

(3) Probability of Detection. - The probability that one type s sensor detects at least one troop, or at least one item of equipment, in a target, given line of sight and coverage, can be calculated from the single element probabilities of detection.

(a) Let P_{sbk} be the single element probability of detection for one type s sensor with respect to one troop in environment k, range band b.

(b) Let P_{smbk} be the single element probability of detection for one type s sensor with respect to one type m item of military equipment in environment k, range band b.

Then we can define P_{sb} and P_{smb} as single element probabilities of detection averaged over the target environments as follows:

$$P_{sb} = \left[\sum_{k=1}^{3}\left(P_{sbk}\ E_k\right)\right] \div \sum_{k=1}^{3} E_k$$

$$P_{smb} = \left[\sum_{k=1}^{3}\left(P_{smbk}\ E_k\right)\right] \div \sum_{k=1}^{3} E_k$$

Define P_s as the probability that at least one troop in a target will be detected by one type s sensor, given line of sight and coverage. Define P_{sm} as the probability that at least one type m item of equipment in a target will be detected by one type s sensor, given line of sight and coverage. Then:

$$P_s = 1 - (1 - P_{sb})^t$$

$$P_{sm} = 1 - (1 - P_{smb})^e$$

where e and t are as defined on page I-11.

c. Simulating Acquisition. - The four factors necessary to treat target acquisition as a stochastic process have been defined for each type sensor (expected sensor coverage, A_{sb}; probability of line of sight, L_{sb}; probability of detecting one or more items of equipment, P_{sm}, or troops, P_s). Note that all of the input characteristics that vary from target to target are considered in the calculation of the four factors, as appropriate. The stochastic process described below is applied for each sensor type against each type in the array.

(1) Let $A_{sb} = x.y$ imply that expected sensor coverage is a real number read as x decimal y. Define $n_s = x + 1$ as the maximum number of type s sensors that cover a target.

(2) Let $G_i(n, z_i, q_i)$ define a stochastic process (or game) which is iterated n times. Each iteration is performed as follows:

(a) Draw a variate z_i from the rectangular distribution; that is, define $z_i \epsilon R(0,1)$.

(b) If $z_i > q_i$, set $G_i = 0$. If $z_i \leq q_i$, set $G_i = 1$.

(3) Define the results of the stochastic process G_i as a vector $(g_1, g_2, \ldots g_n)$ where $g_i \epsilon \{0,1\}$.

Target acquisition in TAM is defined by two stochastic processes, $G_i(n_s, z_i, q_i)$ and $G_i^m(n_s, z_i^m, q_i^m)$, where:

$$q_i = P_s L_{sb}[1 - (i-1)/n_s] \quad \text{when } i < n_s$$

$$q_i^m = P_{sm} L_{sb}[1 - (i-1)/n_s] \quad \text{when } i < n_s$$

$$q_i = yP_s L_{sb}[1 - (i-1)/n_s] \quad \text{when } i = n_s$$

$$q_i^m = yP_{sm} L_{sb}[1 - (i-1)/n_s] \quad \text{when } i = n_s$$

That is, n_s distinct type s sensors are played against the troops and equipment in a target. The first n_s-1 such sensors cover the target with probability 1.0. The first one of these n_s-1 sensors is closest to the target and has the highest probability of line of sight. All other type s sensors that cover the target are successively farther and farther from the target and have successively lower and lower probabilities of line of sight. The n_sth sensor has the lowest probability of line of sight and has a probability of coverage of $y \leq 1$.

d. Acquisition of Targets. - Subsequent to the stochastic process for all sensor types, a determination is made whether acquisition occurs. If the $\Sigma\, g_i > 0$ or the $\Sigma\, g_i^m > 0$ for any sensor type, then one or more sensors have detected one or more troops or items of equipment in a target. If one or more troops or one or more items of equipment have been detected during the stochastic process, acquisition is assumed to occur. When acquisition does not occur, processing transfers to the next target in the array. When acquisition occurs, the record of acquired targets is updated. Processing then transfers to the next target in the array, except during the record simulation replication. The processes described below apply only to targets acquired during the record replication.

e. Acquired Target Definition. - Data concerning the actual target size and composition (type and quantity of troops and military equipment) is available to the model. This paragraph describes the process employed by the model to estimate the size and composition of an acquired target, given the limited information provided by the acquisition.

(1) Type of Elements Detected. - The model identifies each sensor type which has detected one or more troops or items of equipment. For each such sensor, the operating single element probabilities of detection at the time of acquisition (P_{sb} and P_{smb}) are modified to account for the phenomena that the probability of detecting more elements, once one element is detected, is greater than the single element probabilities of detection. The modified probabilities, P_s^* (for troop detection) and P_{sm}^* (for type m equipment detection), are computed as:

$$P_s^* = .75\, P_{sb} + .25$$

$$P_{sm}^* = .75\, P_{smb} + .25$$

For each sensor type that has detected troops or equipment in the target, the model estimates:

(a) the number of items of equipment of type m detected, if equipment or troops and equipment have been detected.

(b) the number of troops detected if troops only have been detected.

(2) <u>Quantity of Elements Detected</u>. - The estimates made for each type acquiring sensor is based on drawing a binomial variate.

(a) Let $z = B(j,p)$ be an integer variate representing the number of successes which occur in a series of j Bernoulli trials, each trial having probability of success p.

(b) Define Q_s and Q_{sm} as the quantity of troops detected and the quantity of type m items of equipment detected, respectively.

Then, either Q_s, or Q_{sm}, is determined stochastically for each type s sensor, as follows:

$$Q_{sm} = \text{Maximum}\left[1; B(q, P_{sm}^*)\right]$$

$$Q_s = \text{Maximum}\left[1; B(t, P_s^*)\right]$$

(3) <u>Estimation of Target Size</u>. - The target force characteristics input data includes descriptions of the type and quantity of military equipment, and the quantity of troops, typically found in targets, for three organizational sizes (small, medium and large). This data also includes typical radii for such targets. The model estimates the radius of acquired targets using the data provided by the sensor type which detects the greatest quantity of elements.

(a) Let Q_m be the largest quantity of type m equipment detected by any of the acquiring sensor types.

(b) Let Q be the largest quantity of troops detected by any of the acquiring sensors.

(c) Let $B(j,p:h)$ be the probability that h successes occur in $B(j,p)$.

(d) Let $M_{om}, o\varepsilon\{1,2,3,\}$ be the expected number of type m elements in a unit with organizational size $o\varepsilon$(small, medium, large; respectively). Let $T_o, o\varepsilon\{1,2,3\}$, be the expected number of troops in such a unit.

(e) Let $F_m(o), o\varepsilon\{1,2,3\}$, be the typical radius of a target with type m equipment, organizational size o. Let $F(o)$, $o\varepsilon\{1,2,3\}$ be the typical radius of a target described as having only troops, organizational size o.

(f) Define $P(o)$ as the probability that an acquired target has organizational size o.

If $Q_m > 0$, a target size estimate will be based on equipment detected, as follows:

$$P(o) = B(M_{om}, P^{\star}_{sm}:Q_m) \quad : o = \{1,2,3\}$$

If $Q_m = 0$, a target size estimate will be based on troops detected, as follows:

$$P(o) = B(T_o, P^{\star}_s:Q) \quad : o = \{1,2,3\}$$

The size of the target is selected to be the most likely size, given the number of elements detected. Let $c\varepsilon\{1,2,3\}$ be the value of o which results in the greatest value for $P(o)$. The target radius is estimated to $F_m(c)$ if type m equipment was detected, and $F(c)$ if only troops were detected.

7. Acquired Target List. - The record replication of the target acquisition simulation process is a list of the specific arrayed targets which will be acquired one or more times during a 6-hour period. All that remains to produce an acquired target list for the 6-hour period is to determine how many times each such target will be acquired and at what clock time each acquisition will occur. The process employed by TAM to perform these tasks is described below.

a. Multiple Acquisitions. - The combat sample input data includes a multiple acquisition function for each 6-hour time period.

(1) Let N be the number of targets acquired during the record replication for the 6-hour time period.

(2) Let F be the multiple acquisition function for the 6-hour time period. $F_i, i \varepsilon \{1,2,\ldots,10\}$ is defined as the fraction of acquired targets which should be acquired i times.

(3) Let $T_i, i \varepsilon \{1,2,\ldots 10\}$, be the number of targets that should be acquired i times. Let T^* be the total number of acquisition events that should occur in the 6-hour time period.

$$T_i = NF_i \quad : \quad i = 1,10$$

$$T^* = \sum_{i=1}^{10} iT_i$$

(4) The frequency of acquisition factors are randomly assigned to the acquired targets, with certain exceptions. These exceptions are intended to cause multiple acquisition to occur only for those targets most likely to be acquired more than once in a 6-hour period.

(a) Targets acquired only by photo or infrared reconnaissance are not considered for multiple acquisition.

(b) Targets acquired only by long range patrols are not considered for multiple acquisition.

(c) Targets in range band 16 are not considered for multiple acquisition.

b. Clock Times. - Once the list of acquired and re-acquired targets has been generated, the list is shuffled to produce a random order list. The shuffled list is taken to be the order in which the acquisitions occur during a 6-hour period. One clock time is drawn out of the appropriate input clock time distribution function for each target on the list. A total of T^* random times are arranged in order of increasing clock time and assigned; one to each target on the list.

8. Treatment of Sensors. - The methodology applied to each sensor type during a simulation replication assumes each sensor is located at or near the FEBA. Methods which are suggested to play other types of sensors are described in this paragraph. Each such sensor requires adjustment of the input data.

a. Moving sensors which penetrate the target array can be played. For sensors such as vertical photo or infrared, probability of detection is not a function of range band (distance from the FEBA). The expected sensor coverage in each range band can be calculated if one knows the number of sorties (S_b^*) in a 6-hour period, the area covered in a range band by one sortie (A_b), and the area contained in the range band (A_b^*). In such a case:

$$A_{sb} = S_b^* A_b / A_b^*$$

Probability of line of sight is not normally a factor for such sensors. Therefore, a line of sight function must be included in the inputs which indicates unlimited line of sight. If such a sensor employs side looking imagery, a line of sight function appropriate to the operational altitude of the sensor must be included in the inputs. Finally, sensors which penetrate the target array at ground level (such as patrols) can be treated in a manner similar to that described above. Probabilities of detection and line of sight for the range bands in which such sensors operate should be based on short ranges. This assumes that such sensors can maneuver within their areas of operation to find targets which would otherwise go undetected.

b. Moving sensors which operate parallel to the FEBA can be played. Probabilities of detection appropriate to the sensor and line of sight functions appropriate to operational altitudes are required. These probabilities should be related to the range bands. Coverage calculations should be based on the number of sorties and the fraction of each range band covered per sortie.

c. Sensors which require that special conditions (not parameters in the inputs) obtain in the targets, can be played, but require model modifications. Subroutine ADJUST is called by the model during that phase of the logic when specific sensor probabilities of detection are being set for play against a specific target. Information containing sensor type, target characteristics and environmental conditions, are available during calls to the subroutine. Modifications to the subroutine which cause the program to sense target, sensor and environmental conditions, can be used to cause zero probabilities to be returned to the main program. Conditional senses included in the documented version of TAM are described in Table 1-3. Sensors which do not depend on line of sight, but which do require probability functions not otherwise covered in the inputs, can use the input specifications for line of sight functions as a vehicle to input these other functions. One of the "line of sight" functions might describe the probability that artillery units are firing. This function can be used by counterbattery radar sensors, in place of a line of sight function.

TABLE I-3, Base Case Sensor Limitations

Code	Sensor type	Conditions required for play
2	Movement radar	Moving targets only
3	Movement radar	Moving targets only
4	Light observation helicopter	Daytime only Stationary targets only
5	Photo reconnaissance	Daytime only
6	Infrared reconnaissance	Nighttime only
7	Patrols	Stationary targets only
8	Counterbattery	Artillery targets only

d. Factors such as operational maintainability and readiness limitations should be considered for all sensor types. Percent availability factors which are applied to the expected sensor coverage functions directly impact the acquisitions of targets.

9. Outputs. - After a 6-hour period has been simulated, the model produces two records. The first is a card punch file of the acquired target list. This file is consistent with the input specifications for the Target/Event Deck described for the Blue Artillery Model and the Red Artillery Model. The second record is a printer listing of the acquired target list and a summary which presents an analysis of the input array and the acquired target list, by target category and size. Sample outputs are presented in Chapter VI.

TARGET ACQUISITION MODEL

CHAPTER II
GENERAL FLOW CHART

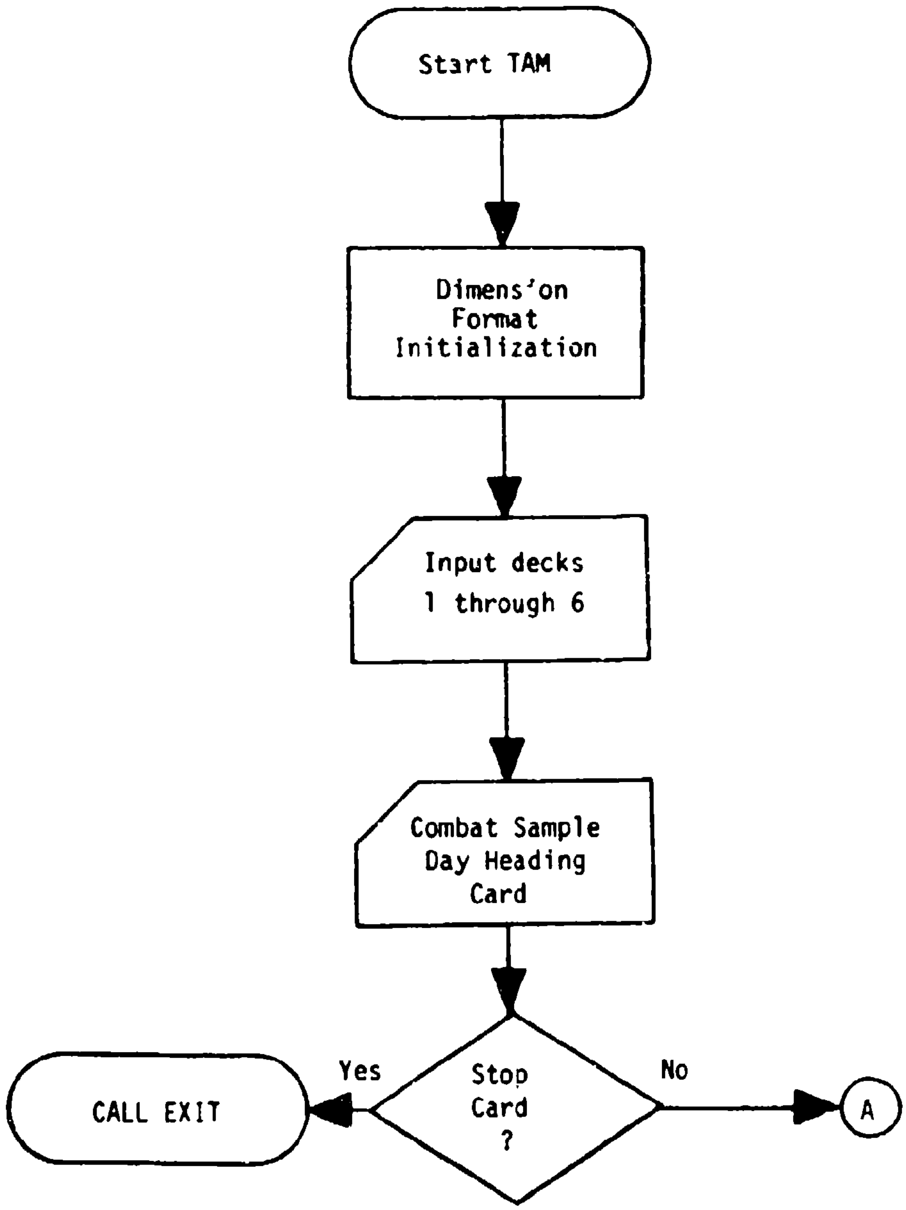

FIGURE II-1, Target Acquisition Model, General Flow Chart
(continued on next page)

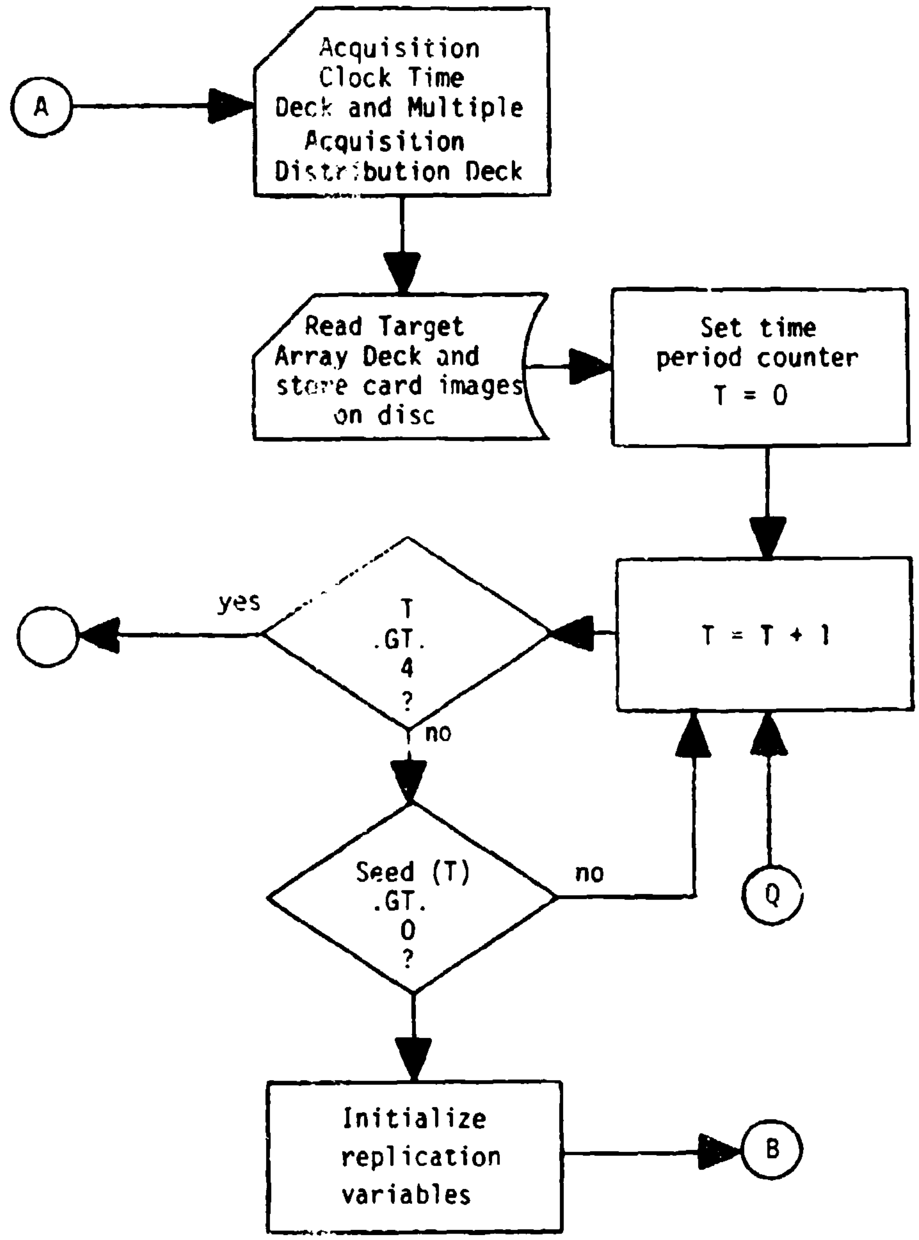

FIGURE II-1, Target Acquisition Model, General Flow Chart
(continued on next page)

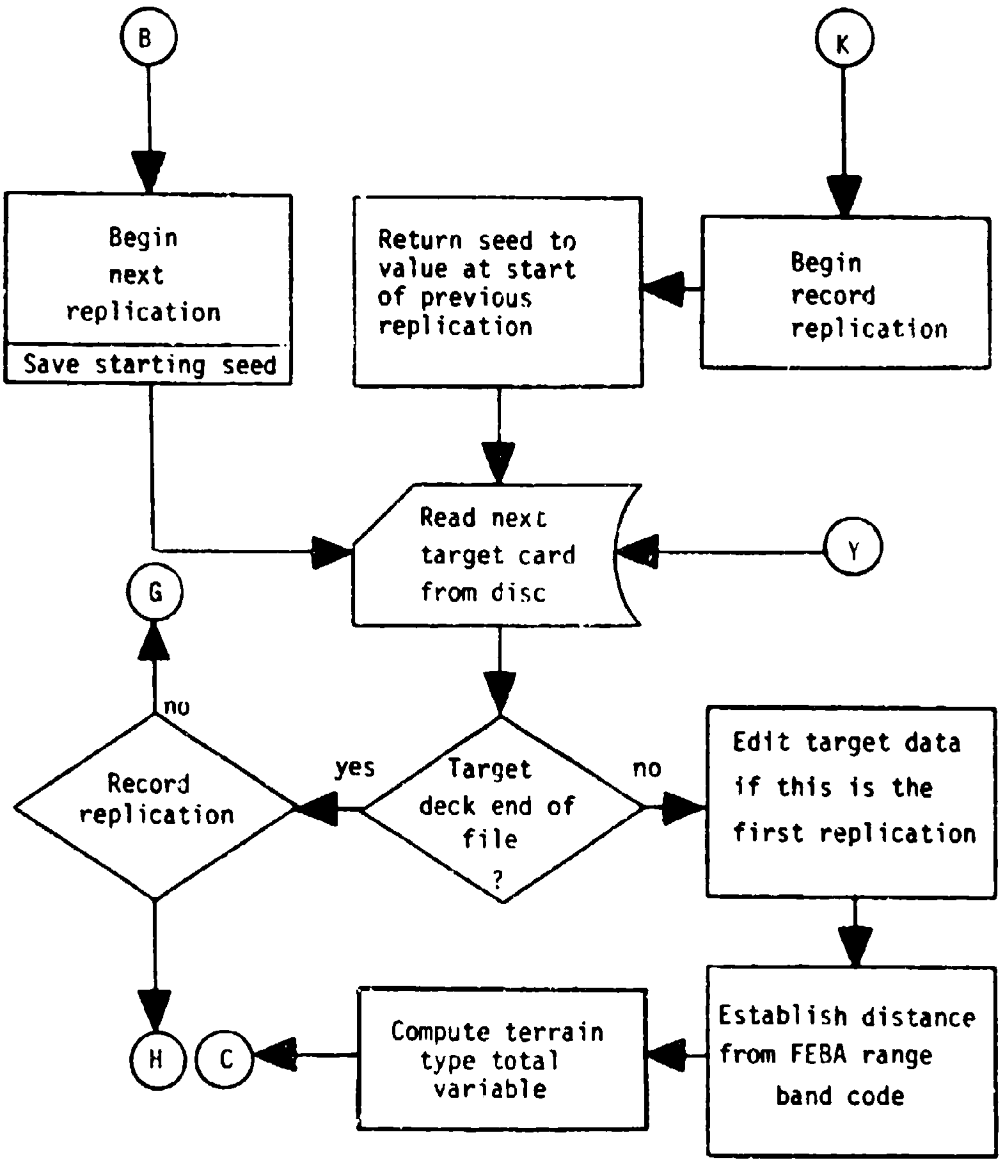

FIGURE II-1, Target Acquisition Model, General Flow Chart
(continued on next page)

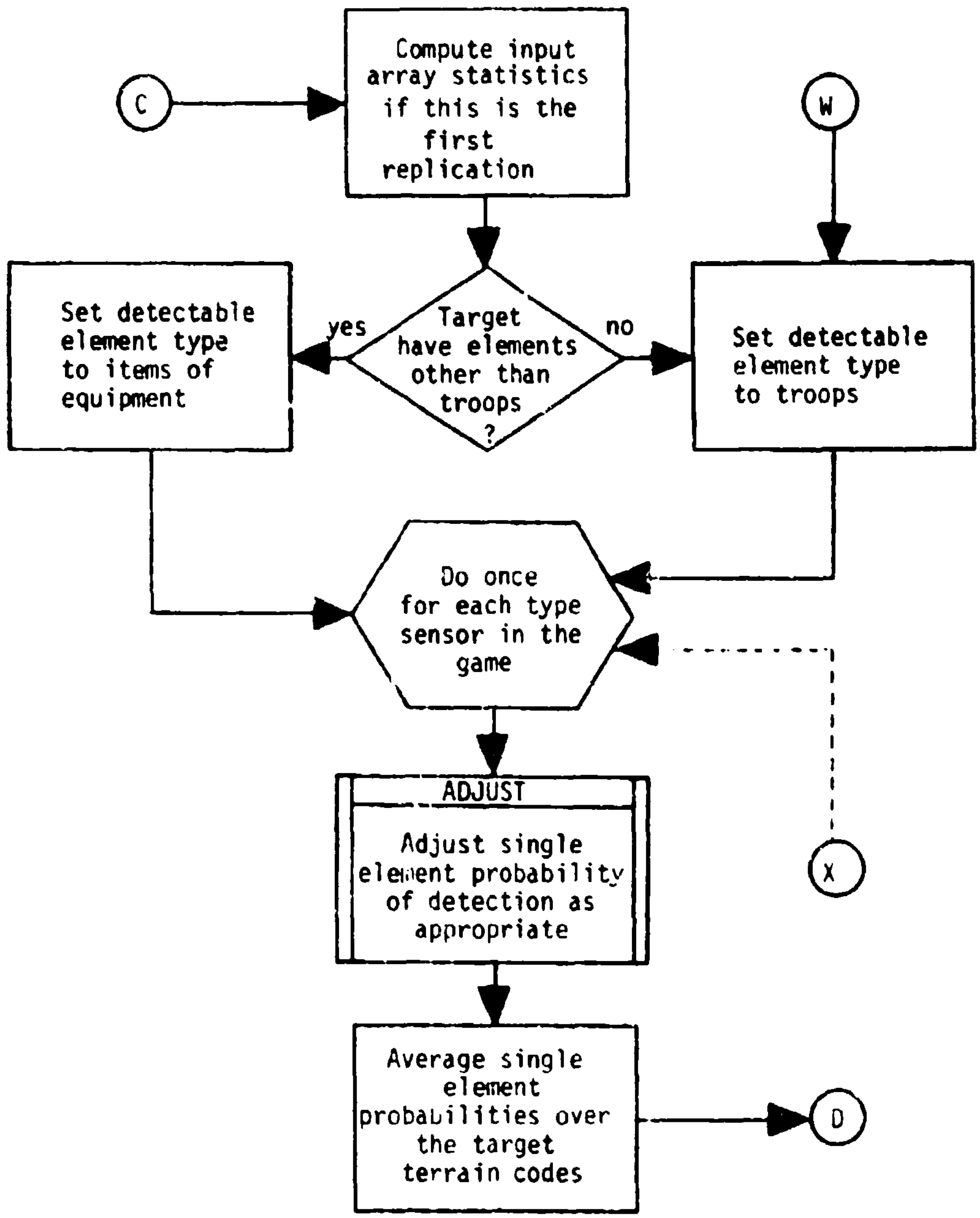

FIGURE II-1, Target Acquisition Model, General Flow Chart
(continued on next page)

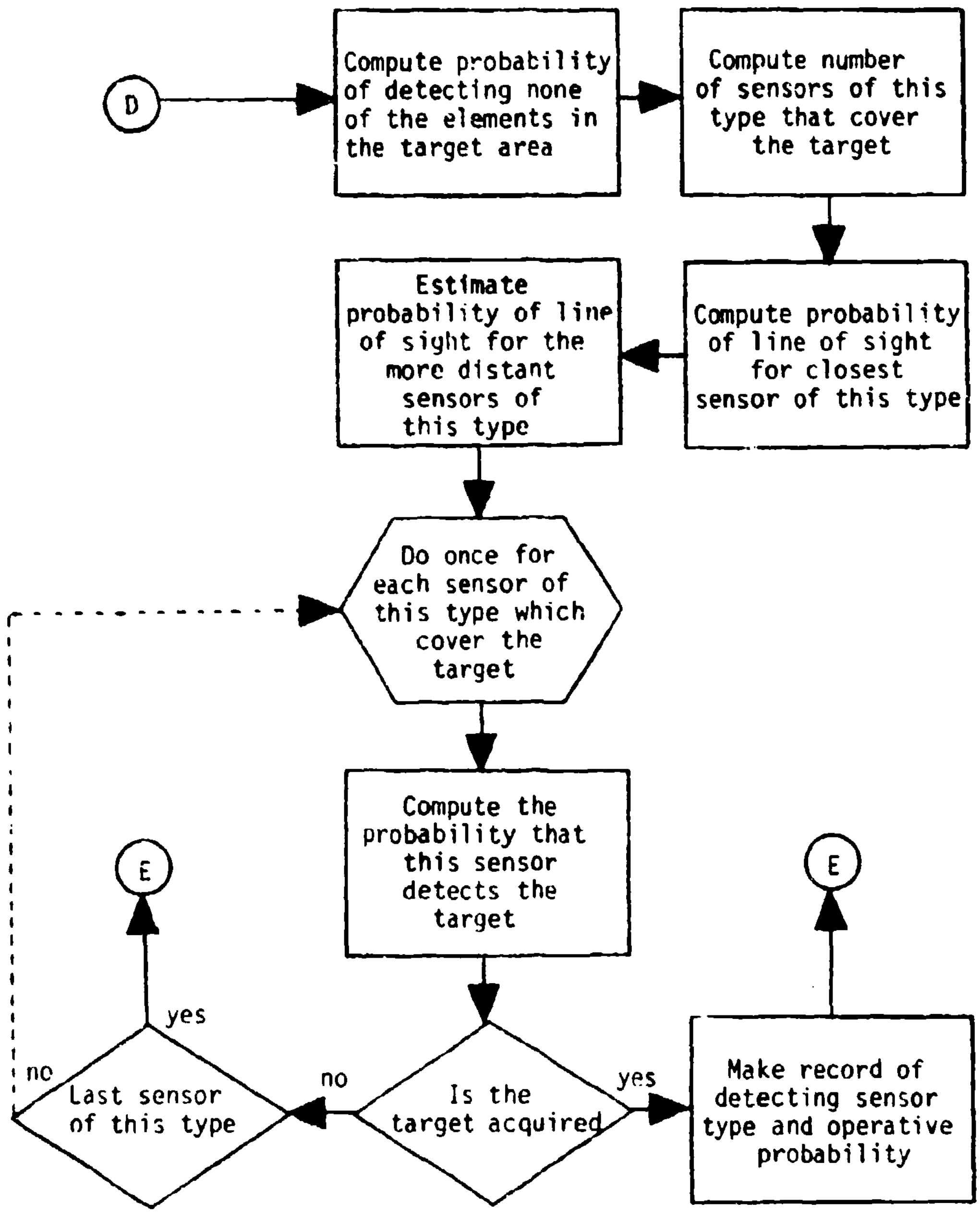

FIGURE II-1, Target Acquisition Model, General Flow Chart
(continued on next page)

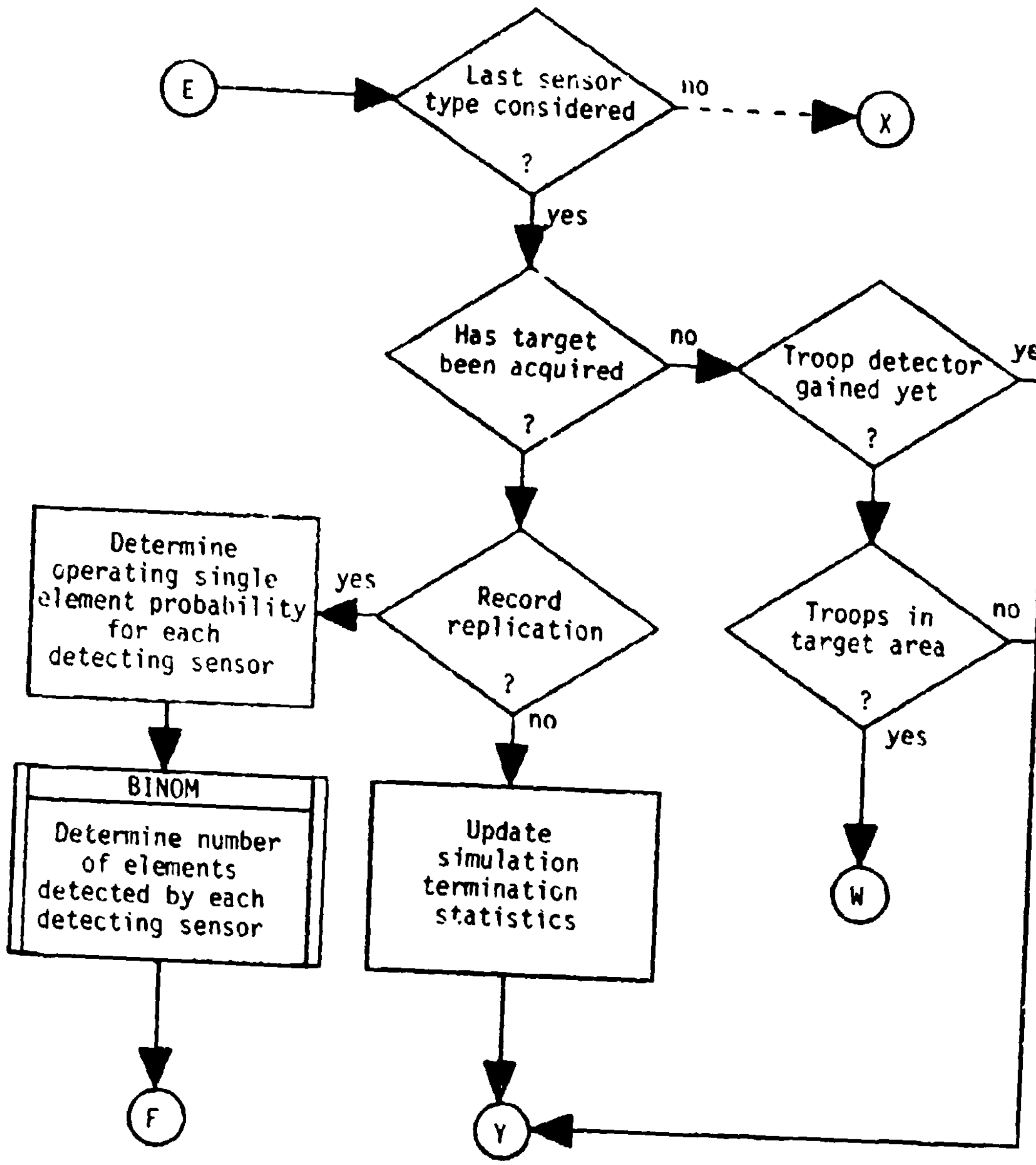

FIGURE II-1, Target Acquisition Model, General Flow Chart
(continued on next page)

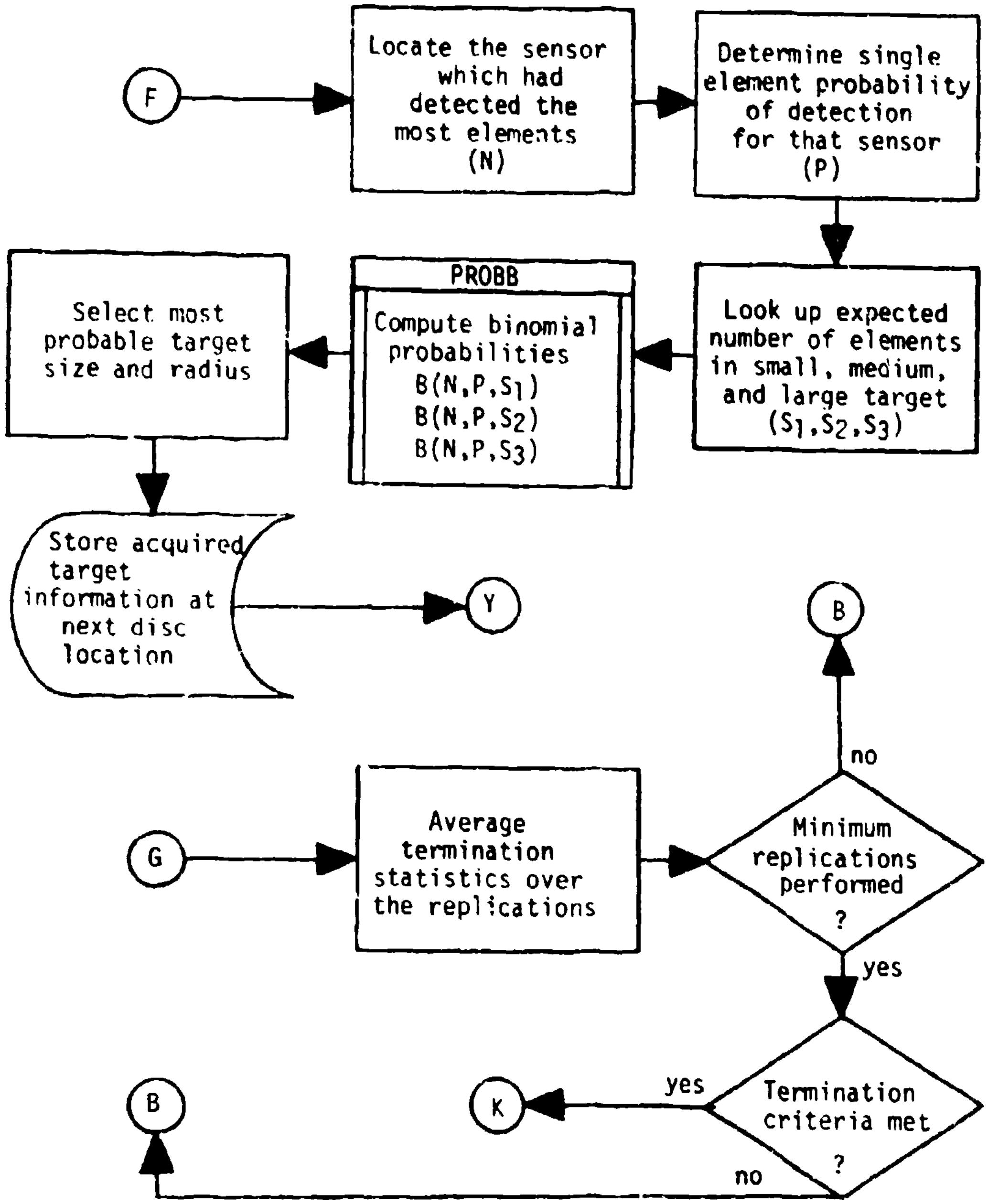

FIGURE II-1, Target Acquisition Model, General Flow Chart
(continued on next page)

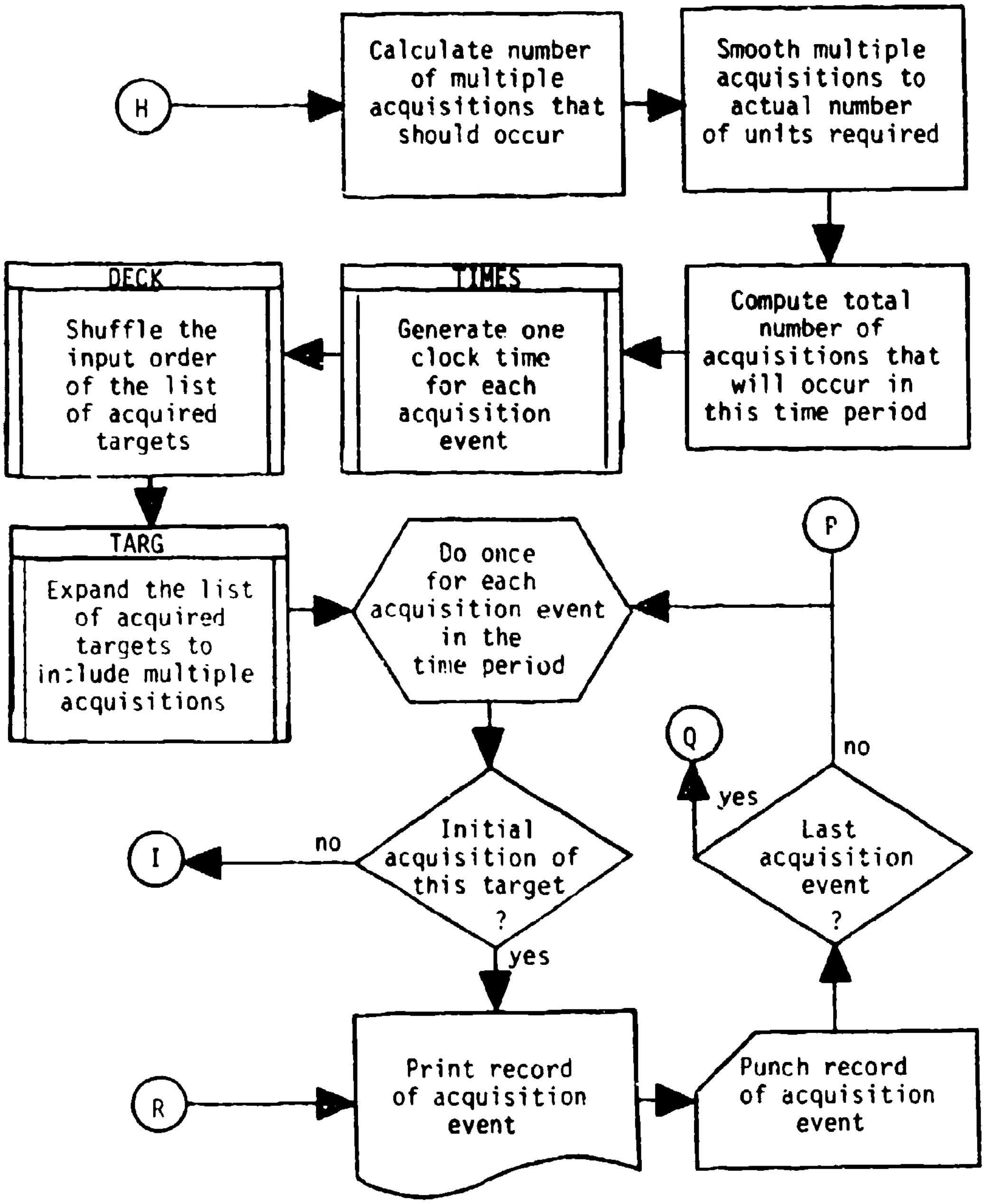

FIGURE II-1, Target Acquisition Model, General Flow Chart
(continued on next page)

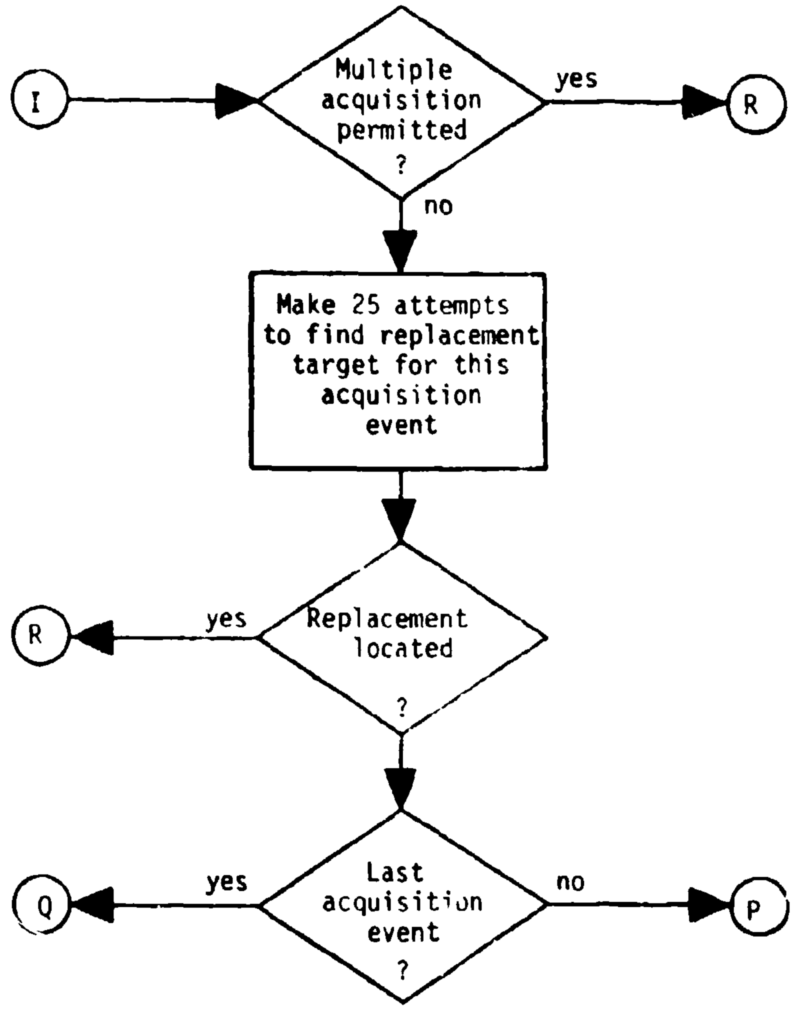

FIGURE II-1, Target Acquisition Model, General Flow Chart
(continued on next page)

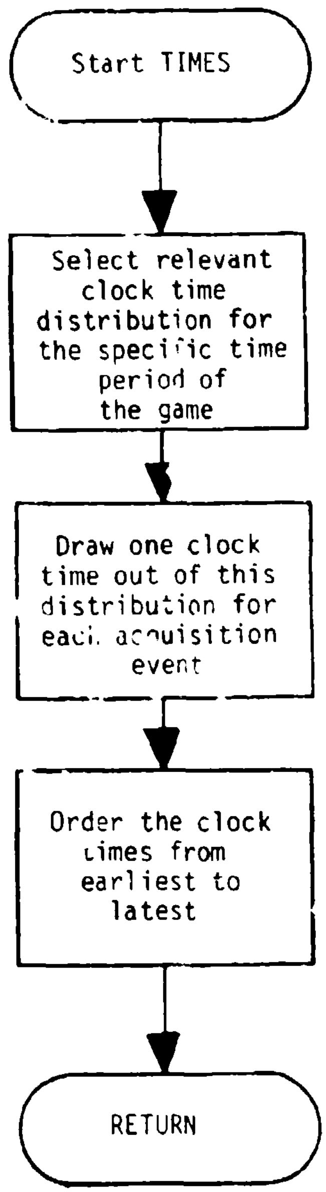

FIGURE II-1, Target Acquisition Model, General Flow Chart
(continued on next page)

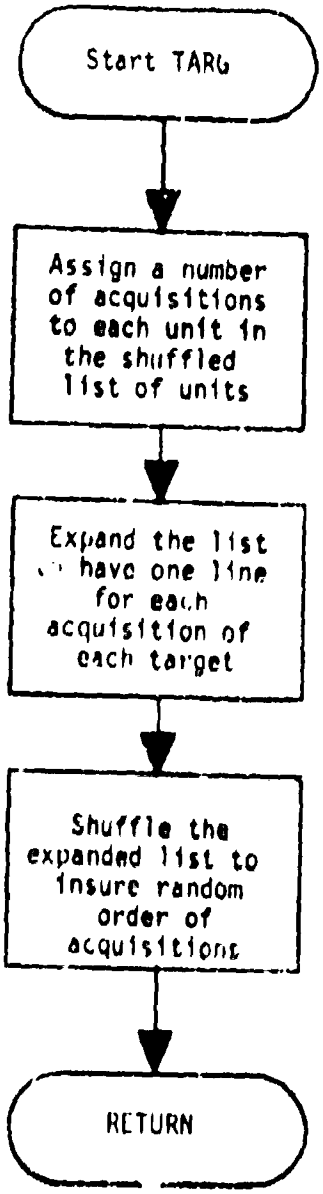

FIGURE II-1, Target Acquisition Model, General Flow Chart
(continued on next page)

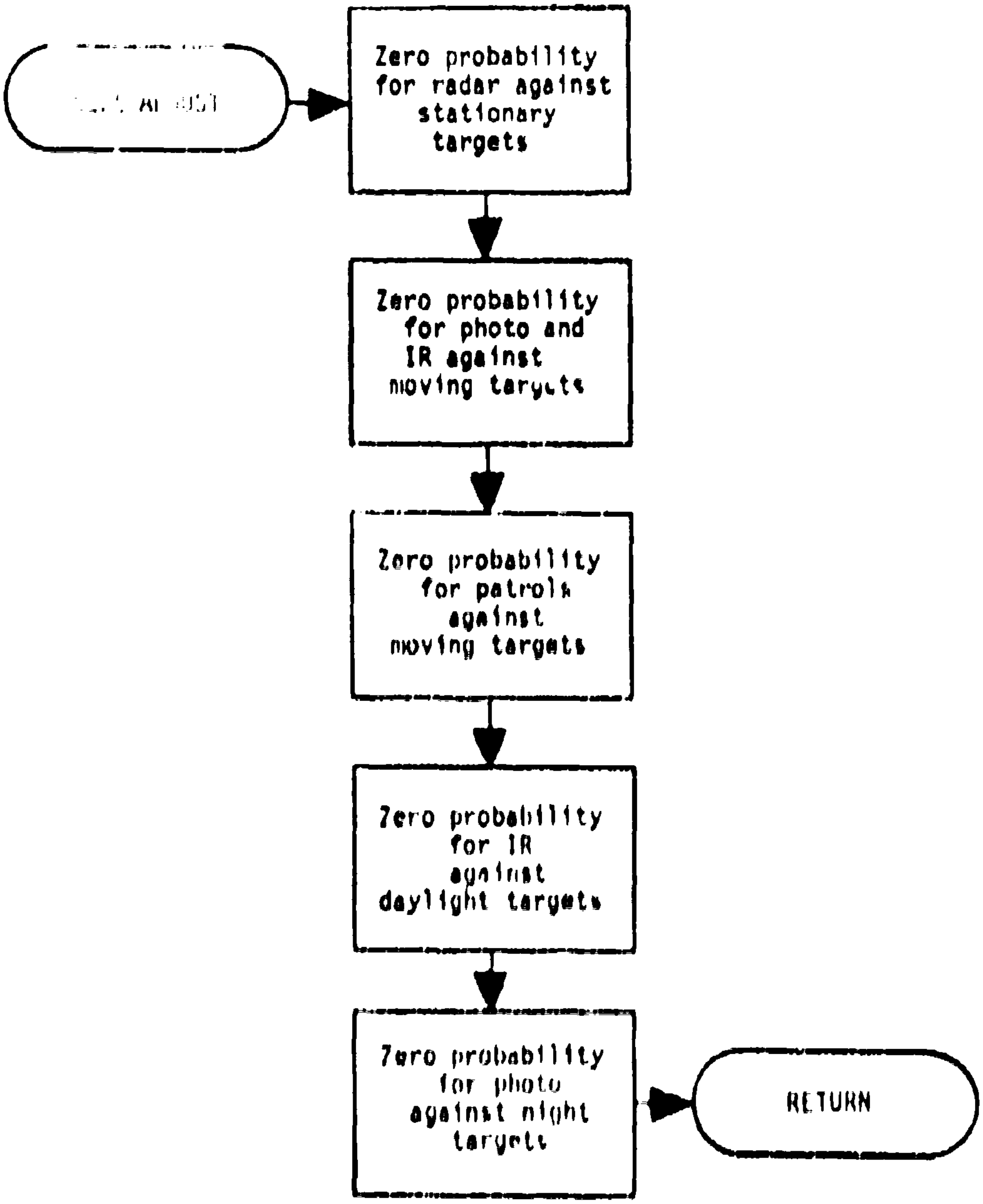

FIGURE II-1, Target Acquisition Model, General Flow Chart
(continued on next page)

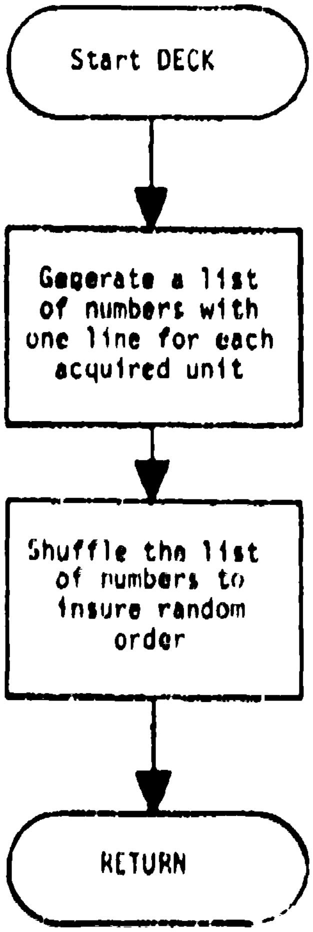

FIGURE II-1, Target Acquisition Model, General Flow Chart (concluded)

TARGET ACQUISITION MODEL

CHAPTER III
INPUT DATA SPECIFICATIONS

1. Standard Size and Radius Deck[a/]

Columns	Variable	Data Description	Format
1	J	Combat sample activity level to which this card applies ($1 \leq J \leq 4$)	I1
2	K	Size of unit to which the data on this card applies[b/]	I1
3-6	JTSZ(J,K,1)[c/]	Average number of elements type one in a size K target at activity level J	I4
7-10	JTSZ(J,K,2)	Average number of elements type two in a size K target at activity level J	I4
---	---------	-------------------------	--
23-26	JTSZ(J,K,6)	Average number of elements type six in a size K target at activity level J	I4
27-30	na	Not used	4X
31-36	ATRGR(J,K,1)[d/]	Average radius code of a size K target, activity level J, described as having element type one	I6
---	---------	-------------------------	--
61-66	ATRGR(J,K,6)	Average radius code of a size K target, activity level J, described as having element type six	I6

a/ This deck must have 12 cards. These 12 cards are divided into four subdecks having three cards. Each subdeck carries data for one of four combat sample activity levels (for example; delay, defense, inactive, attack). Subdecks can have zero entries if the run does not address all four activity levels. Each subdeck has one card for data for each of three target sizes (see b/ below).

b/ The model will estimate one of three sizes for acquired targets (these three sizes might be specified as platoon, company, battalion, for example). The user specifies K on each card to indicate which of the three sizes applies to the data on the card.

c/ See note d/ in the Target Array Deck input specifications for an explanation of element types one through six.

d/ Radius codes for target sizes are integers I = 1,2,...N which map radii 50 meters, 100 meters, ..., 50N meters.

2. Indicator Card[a]

Columns	Variable	Data Description	Format
1-4	INDER(1)	Line of sight function code applicable to sensor type one	I4
5-8	INDER(2)	Line of sight function code applicable to sensor type two	I4
---	-------	----------------------------	--
29-32	INDER(8)	Line of sight function code applicable to sensor type eight	I4
---	-------	----------------------------	--

a/ This card carries a code for each of the $N \geq 8$ sensors played in the simulation. The code, C = 1,5; for a sensor states which one of the five line of sight functions in the Line of Sight Probability Deck is applicable to that sensor.

3. Range Parameter Card[a/]

Columns	Variable	Data Description	Format
1-5	RANGE(1)	Cut off distance of range band one (kilometers)	F5.0
6-10	RANGE(2)	Cut off distance of range band two (kilometers)	F5.0
----	--------	------------------------	----
71-75	RANGE(15)	Cut off distance of range band 15 (kilometers)	F5.0

a/ This card specifies information which defines range bands measuring distance from the forward edge of the battle area (FEBA). Subsequent input decks (probability of line of sight, coverage, and detection) are parameterized as a function of distance from the FEBA. This input card defines the 16 range bands to which the subsequent inputs are related. The model assumes that range band one extends from the FEBA to RANGE(1) kilometers from the FEBA. In general, range band I extends from RANGE(I-1) kilometers to RANGE(I) kilometers from the FEBA. Range band 16 extends from RANGE(15) kilometers to the rear of the target array.

4. Line of Sight Probability Deck[a/]

Columns	Variable	Data Description	Format
1-2	PSIGHT(I,1)	Probability of line of sight in range band one	F2.2
3-4	PSIGHT(I,2)	Probability of line of sight in range band two	F2.2
---	----------	-------------------------	----
31-32	PSIGHT(I,16)	Probability of line of sight in range band 16	F2.2

a/ This deck contains five cards. Each card carries 16 point entries of a probability function. The user might specify five different line of sight functions to be used by various sensors. For example, functions one through five might be specified as probability of line of sight for:

Function	Description
1	Observer (or sensor) at optimal vantage point
2	Observer (or sensor) at typical weapon position
3	Airborne sensor at 1,000 meter altitude
4	Line of sight infinite
5	Other function

Functions not mentioned on the indicator card can have all entries zero. The function described as "line of sight infinite" can be used by sensors (such as counter battery radar) where line of sight is irrelevant. Other function implies that a probability function other than line of sight can be entered in the deck. Counterbattery radar, for example, is independent of line of sight, but is a function of the probability that a target is firing.

5. Expected Coverage Deck[a/]

Columns	Variable	Data Description	Format
1-4	PCOVER(I,1,K)[b/]	Expected number of sensors of type I, in range of targets in range band one, given combat sample type K	F4.0
5-8	PCOVER(I,2,K)	Expected number of sensors of type I, in range of targets in range band two, given combat sample type K	F4.0
---	------------	-------------------------	----
61-64	PCOVER(I,16,K)	Expected number of sensors of type I, in range of targets in range band 16, given combat sample type K	F4.0

a/ This deck consists of at least eight subdecks, one for each sensor type played in the simulation (see note a/ of the Probability of Detection deck for discussion of the base case eight sensor types). Each subdeck contains four cards. The data on each card in the subdeck presents expected coverage by a sensor type at one of four combat sample activity levels. For example, activity level one (K = 1) may be defined as delay. If a particular sensor of the base case eight sensors is not being employed, its four card subdeck should have all zero entries. If a simulation run will address less than four combat sample activity levels (entered in variable JACT on each Combat Sample Day Heading Card in the runstream) those cards in each sensor type subdeck that are not needed should have all zero entries.

b/ Each entry expresses the expected number of sensors in range of a target as a function of range, sensor type and combat sample. See Chapter I for discussion of computation of expected sensor coverage (formula for A_{sb} in paragraph 6.b.(2)).

6. Probability of Detection Decks[a/][b/]

Columns	Variable	Data Description	Format
1-2	SREL(I,J,1)	Single element probability of detection for sensor type I detecting element type J located in range band one, given coverage, line of sight and terrain type (open, woods, town)	F2.2
---	----------	-----------------------------	----
31-32	SREL(I,J,16)	Single element probability of detection for sensor type I detecting element type J located in range band 16, given coverage, line of sight and terrain type (open, woods, town)	F2.2

a/ There must be one deck for each of the $N \geq 8$ sensor types played in the simulation. The user must assign data decks for the base case eight sensors, consistent with the following instructions:

Sensor type one must be the forward observer. Probabilities should be for daylight conditions. The model reduces the input probabilities by one-half for night periods.

Sensor type two must be a movement detection radar. Probabilities should assume the element is moving. The model does not play this sensor against stationary targets.

Sensor type three must be a movement detection radar. Sensor type two instructions also apply to sensor type three.

Sensor type four must be an observation aircraft operating from the friendly side of the FEBA. Probabilities should be for daylight conditions. The model does not play this sensor in night periods.

Sensor type five must be a photo reconnaissance sensor. Probabilities should be for daylight conditions. The model does not play this sensor in night periods.

Sensor type six must be an infrared photo reconnaissance sensor. Probabilities should be for night conditions. The model does not play this sensor in day periods.

Sensor type seven must be patrols (short range or long range). Probabilities should be for daylight conditions and should not vary with range. Probabilities for range bands in which patrols are not played should be zero. The model reduces the input probabilities by one-half for night periods.

Sensor type eight must be a counterbattery or countermortar sensor. Probabilities should assume the target is firing.

If the user does not wish to play one or more of the base case eight sensors, the probability entries in the appropriate decks should be zero.

b/ Each Probability of Detection Deck has six subdecks. Each subdeck has three cards which contain probability data for the sensor with respect to the six target element types (described in note d/ of the Target Array Deck input specifications). The three cards in the subdecks contain probabilities for the element in each of three environments: open, woods, town.

7. Combat Sample Day Heading Card[a/]

Columns	Variable	Data Description	Format
1-40	WORDS(I)	Heading desired to identify output	10A4
41-45	IPERD(1)[b/]	Enter seed if simulation of 0000-0600 hours is desired	I5
46-50	IPERD(2)	Enter seed if simulation of 0600-1200 hours is desired	I5
51-55	IPERD(3)	Enter seed if simulation of 1200-1800 hours is desired	I5
56-60	IPERD(4)	Enter seed if simulation of 1800-2400 hours is desired	I5
61-65	JACT	Enter activity level code 1, 2, 3, or 4	I5

a/ Runs may be stacked by successive sets of Combat Sample Day Heading Cards, Acquisition Clock Time Distribution Decks, Multiple Acquisition Distribution Decks and Target Array Decks.

b/ A seed is a five digit odd integer not divisible by five. It is used to begin a sequence of pseudorandom rectangular numbers. If simulation of a particular period of the day is not desired, enter bbbbØ in lieu of a seed.

8. Acqui ·ıtion Clock Time Distribution Deck[a/]

Columns	Variable	Data Description	Format
1-3	TIME(I,1)	Fraction of total acquisitions in period I which occur during the first 15 minutes	F3.3
4-6	TIME(I,2)	Fraction of total acuisitions in period I which occur during the first 30 minutes	F3.3
---	--------	----------------------------	----
67-69	TIME(I,23)	Fraction of total acquisitions in period I which occur during the first 5 hours 45 minutes	F3.3

a/ This deck must have four cards; one card for each of the four six hour periods of a combat sample day. Each card contains the ordinate of the cumulative distribution of frequency of acquisition events during a particular six hour period. These ordinates should be taken at points 15 minutes, 30 minutes, ..., 5 hours 45 minutes, into the six hour period. This yields a total of 23 entries. The model sets the value of TIME(I,24) equal to 1.00 for all I. The user should override the F3.3 format and enter 1.0 if he wishes to close the distribution short of the last (24th) 15 minute interval.

9. Multiple Acquisition Distribution Deck[a/]

Columns	Variable	Data Description	Format
1-5	FREQ(I,1)	Fraction of acquired units which will be acquired once in a six hour period	F5.0
6-10	FREQ(I,2)	Fraction of acquired units which will be acquired twice in a six hour period	F5.0
46-50	FREQ(I,10)	Fraction of acquired units which will be acquired ten times in a six hour period	F5.0

a/ This deck must have two cards The first card contains data for night six hour periods. The second contains data for daytime six hour periods. Each card specifies the fraction of acquired units which will be engaged N times, N = 1,10. The sum of the entries on a card must obviously be 1.00.

10. Target Array Deck[a]

Columns	Variable	Data Description	Format
1-4	JTNBR[b]	Four digit target identification number greater than 0 and less than 4,000	I4
6-10	ICOOR[b]	Six digit coordinates of target location without quadrant or grid square designator	I6
11	JENVO	Enter "1" if target is all or partially in the open. Enter "Ø" otherwise	I1
12	JENVW	Enter "1" if target is all or partially in the woods. Enter "Ø" otherwise	I1
13	JENVT	Enter "1" if target is all or partially in a town. Enter "Ø" otherwise	I1
14	JMOP	Enter "1" if target is persistent. Enter "2" if target is fleeting	I1
15-16	ICATY	Target category code	I2
17-20	JFLDA	Distance from the target to the leading edge of the opposing force expressed in hectometers	I4
21	JTYPE	Type elements at risk to acquisition other than troops.[d]	I1
22-24	JPER	Number of troops at risk to acquisition	I3
25-26	ENEL	Number elements of type JTYPE at risk to acquisition	I2
27-29	IOOB(1)[b/c]	Number of troops at risk to artillery fire	I3
30-31	IOOB(2)[b/c]	Number of tanks at risk to artillery fire	I2

Columns	Variable	Data Description	Format
32-33	IRAD[b/]	Target radius code where IRAD = 1,10 maps target radii of 50 meters, 100 meters, ..., 500 meters	I2
34-35	IOOB(3)[b/c/]	Number of elements of type A_3 at risk to artillery	I2
36-37	IOOB(4)[b/c/]	Number of elements of type A_4 at risk to artillery	I2
-----	------	----------------------------	--
68-69	IOOB(20)[b/c/]	Number of elements of type A_{20} at risk to artillery	I2

a/ This deck contains one card for each target at risk to acquisition. Since the model is designed to address a static array, the targets should be described in that condition in which it is most likely to be acquired. The last card in the deck must have a "9" punched in columns 1 through 80.

b/ This data is not used by TAM. It is passed through the model for subsequent use by models which use the output acquired target list as input.

c/ This data array permits transmission through the model of target inventories of troops, tanks and 18 other items of equipment (A_3, A_4, ..., A_{20}) for each target.

d/ The model recognizes [illegible] of elements (equipment). The description and code number of these six types are:

Element	Code
Troops in combat units	1
Trucks, vans, service vehicles	2
Tanks, armored vehicles	3
Artillery, missiles, mortars: subject to counterbattery or countermortar devices	4
Troops in noncombat units	5
Heavy weapons not included above	6

The user must specify one of the above codes for each target. The code selected should be for the type element which best describes the element most likely to be detected, other than troops. The model always attempts to acquire troops in addition to the specified type element. Codes "1" and "5" should not be specified for a target unless troops is the only detectable element type.

11. Run Stop Card

Columns	Variable	Data Description	Format
1-80	JACT	Enter a "9" in each column	16I5

TARGET ACQUISITION MODEL

CHAPTER IV
DICTIONARY OF PRINCIPAL VARIABLES

Variable	Type	Definition
ATRAD	INTEGER	Variable computed as 100 times the target radius code plus the estimated target
ATRGR(4,3,6)	INTEGER	Typical radius (code) of a target described as having elements type K, unit size J, at combat sample activity level I
BAND	ALPHA	DATA to 6HbRANGE
CUMA	REAL	Sum of JENVO and JENVT
CUMB	REAL	Sum of JENVO, JENVW and JENVT
CUMTOT	REAL	Same as CUMB
D	REAL	Constant set to 1.00
DPROB(20)	REAL	Probability of acquisition for the Ith sensor that detected at least one element
FMI	REAL	Average number of nonarmor targets acquired over the replications
FMT	REAL	Average number of armor targets acquired over the replications
FREQ(2,10)	REAL	Array containing multiple acquisitions distributions: see input specifications
IAD	INTEGER	Disc address of target array data
ICATY	INTEGER	Target category code
ICOOR	INTEGER	Target coordinates (not used by TAM)
IFREQ(10)	INTEGER	Array containing the number of acquired targets which will be acquired I times
IN	INTEGER	Device code of the card reader

Variable	Type	Definition
INDER(20)	INTEGER	Array containing line of sight function code for sensor type I (see input specifications)
IO	INTEGER	Device code of the line printer
IOOB(20)	INTEGER	Array used to transmit input inventory of element type I (not used by TAM)
IP	INTEGER	Device code of card punch
IPERD(4)	INTEGER	Array containing input random seeds (see input specifications)
IRAD	INTEGER	Target true radius code
ITARG(1000)	INTEGER	Array containing an ordered list of the identification numbers of the target acquired on the Ith line of the acquired target list
ITIME(1000)	INTEGER	Array containing the clock time of occurrence of the Ith acquisition
JACT	INTEGER	Code number of the combat sample array being addressed in the current simulation
JENVO	INTEGER	Open environment code
JENVT	INTEGER	Town environment code
JENVW	INTEGER	Woods environment code
JFEBA	INTEGER	Distance from the target to the FEBA in hectometers
JMOB	INTEGER	Target dwell time or mobility code
JMOST	INTEGER	Index of the sensor which has detected the most elements in an acquired target
JNEL	INTEGER	Number of detectable elements in a target

Variable	Type	Definition
JPER	INTEGER	Number of detectable troops in a target
JSEED	INTEGER	Updated random seed
JSEN(20)	INTEGER	Array containing a list of the sensors which have detected a specific target
JTARG	INTEGER	Estimated number of elements in an acquired target
JTIME	INTEGER	Six hour period of the day for the current simulation
JT[illegible]R	INTEGER	Target identification number (not used by TAM)
JTSZ(4,3,6)	INTEGER	Number of target elements K typically found in a unit of size J at activity level I
JTYPE	INTEGER	Type element likely to be detected in current target
K	INTEGER	Time of day code for current simulation
KAD	INTEGER	Disc address of information about the acquired targets
KIX	INTEGER	Code used to indicate that non-troop elements have not been detected and that troop detection should be simulated next
KKKK	INTEGER	Minimum replications permitted (set to [illegible]5 in the model)
KLGP	INTEGER	Number of observed tanks and armored vehicles in an acquired target
KNEL	INTEGER	Number of tanks and armored vehicles in acquired targets in which at least one tank or armored vehicle has been observed

Variable	Type	Definition
KOFF	INTEGER	Cutoff code to indicate that the previous replication is acceptable and should be re-run for record
KOUNT	INTEGER	Total number of acquisitions occurring in a six hour period (including multiple acquisitions)
KSEED	INTEGER	Random seed used only in the record replication
KSEN(20)	INTEGER	Number of elements of a type detected by the Ith detecting sensor
LIST(1000)	INTEGER	Array containing the identification number of the array units which have actually been acquired
LSEED	INTEGER	Value of JSEED at the start of the current iteration
MSEN	INTEGER	Code indicating whether an observing or a remote sensor has acquired a target
N	INTEGER	Current target range band index
NACQ	INTEGER	Number of distinct targets acquired during the current iteration
NBRDET	INTEGER	Number of elements of a type actually detected in an acquired target
NINF	INTEGER	Number of nonarmor units detected during the current iteration
NOSEN	INTEGER	Number of sensor types played in the simulation (set to eight in the model)
NSEN	INTEGER	Number of sensor types that have acquired a target

Variable	Type	Definition
NTHREP	INTEGER	Counter index of the current iteration or replication
NTNK	INTEGER	Number of armor units detected during the current iteration
NUFX	INTEGER	Index which causes read of Target Array Deck to occur only once per Combat Sample Activity Level Deck
NUMNUT(16)	INTEGER	Array where the Ith element is equal to I
P	REAL	Probability of detecting one element, given line of sight, coverage and acquisition
PCAV	REAL	Attrited expected coverage across the front
PCOV	REAL	Expected coverage for the particular sensor being simulated
PCOVER(20,16,4)	REAL	Expected coverage by sensor I of a target in range band J from combat sample array K (see input specifications)
PF	REAL	Probability that a target will be detected by a given sensor
PINK	REAL	Variable used to estimate the range from the covering sensors to a target
PROB	REAL	Average probability of detecting one element, averaged over the target environment
PSHIP	REAL	Variable whose value is the attrited probability of line of sight for a particular covering sensor
PSIGHT(5,16)	REAL	Probability of line of sight, function I, at range band J

Variable	Type	Definition
PT1	REAL	Probability of detecting one element in the open
PT2	REAL	Probability of detecting one element in the woods
PT3	REAL	Probability of detecting one element in a town
PX1	REAL	Probability that a target is size one (small)
PX2	REAL	Probability that a target is size two (medium)
PX3	REAL	Probability that a target is size three (large)
R	REAL	Pseudorandom rectangular variate
RANGE(15)	REAL	Maximum distance from FEBA for range band I, in kilometers
RFEBA	REAL	Distance from a target to the FEBA in kilometers
RREL(3,16)	REAL	Array containing the probabilities of detecting one element by a given sensor for elements in environment I, range band J
SREL(20,6,48)	REAL	Array containing input probabilities of detection for sensor I against element type J (see input specifications)
TIME(4,24)	REAL	Array containing clock time distribution in six hour period I, 15 minute period J (see input specifications)
TOTAL	ALPHA	DATA to 6HbTOTAL
TOTI	REAL	Total nonarmor targets acquired over the replications

Variable	Type	Definition
TOTT	REAL	Total armor targets acquired over the replications
WORDS(10)	ALPHA	Array containing input heading data
X	REAL	Pseudorandom rectangular variate
XXX	REAL	Pseudorandom rectangular variate

TARGET ACQUISITION MODEL

CHAPTER V
SAMPLE INPUTS LISTING

1. General. - This chapter contains a complete set of sample inputs which may be used as a program run test deck. Note that the listing contains comments which begin with asterisks in card columns one through five. These comments are not part of the actual sample inputs. The user should refer to Chapter III for detailed input specifications. The following explanations are provided to assist the user in interpreting the situation simulated in the sample data.

2. Explanation of Sample Inputs

a. Standard Size and Radius Deck. - The target force has been analyzed and it has been decided to describe target sizes as either platoon, company or battalion. The first card in the deck states that for combat sample array one (acquiring force delays), small targets (platoons) described as having element type three (tanks, armor), typically have four such elements. These targets are normally in a 50 meter radius area. The last card in the deck carries similar information for large targets (battalions) in combat sample array four (acquiring force attacks).

b. Indicator Card. - Sensor one is subject to line of sight function one (the entry in column four is "1").

c. Range Parameter Card. - The range bands to which subsequent data applies are: band one from FEBA to 100 meters, band two from 100 meters to 200 meters, ..., band 16 from 15 kilometers to rear or total array.

d. Line of Sight Probability Deck. - Five line of sight functions are presented. The probability of line of sight from an observer (or sensor) at ground level to a target element at ground level within range band one (100 meter) is .66 (the entry in columns 1-2 of card one is 66).

e. Expected Coverage Deck. - The deck has eight subdecks of four cards each. The last three cards in each subdeck are zero because the run only calls for activity level one (delay). The first card in subdeck one carries expected coverages for sensor one (forward observers). The expected coverage for this sensor type in range band four is 2.2 (the fourth entry on the card is 2.2). This means that the range and density of this type sensor implies that on the average, a target located in range band four will be at risk of detection by 2.2 sensors of this type.

f. Probability of Detection Decks - There are eight 18 card such decks in the sample. The first three cards in the first deck carry 16 range dependent probabilities of detection for forward observers detecting elements type one (troops) in the open, woods, or town, respectively.

g. Combat Sample Day Heading Card. - The heading includes the asterisks. Only one seed is provided (97137). The seed is entered in the second five digit field, indicating that only the second time period (0600-1200 hours) is to be simulated. The Target Array Deck input should be simulated using the data relevant to combat sample activity level one (delay).

h. Acquisition Clock Time Distribution Deck. - The entries for time periods one, three and four are zero (the run will not address these time periods). The first three digit entry on card two directs that 3.7 percent of the acquisitions that occur will occur during the first 15 minutes. The second entry implies that 7.9 percent will occur in the first 30 minutes.

i. Multiple Acquisition Distribution Deck. - The entries for hours of darkness (card one) are zero because the run will only address the morning (daylight) period. The second entry on card two implies that 25.1 percent of the units acquired, will be acquired twice.

j. Target Array Deck. - There are 772 individual targets in the array. The tenth target has identification number 10 (it need not be 10). Target 10 is located at coordinates 886276. Target 10 is in the open, is fleeting, and has a category code of "1". Target 10 is 16 hectometers from the FEBA and has principle elements of type three (tanks and armored vehicles). Target 10 has 120 troops at risk of detection and 13 tanks and armored vehicles. The same number of troops and vehicles are at risk to artillery. The target is in a 250 meter radius circle.

3. Results. - The listing which results from executing the sample input deck is contained in Chapter VI. The user cannot expect to duplicate the run because of the stochastic nature of the process.

```
***** THOSE LINES IN THE BELOW LISTING OF SAMPLE INPUTS WHICH BEGIN
***** WITH ASTERISKS ARE COMMENTS ONLY AND ARE NOT PART OF THE ACTUAL
***** INPUT DATA. THE MODEL RUN OUTPUT WHICH RESULTS FROM THESE
***** INPUT DATA IS SHOWN IN SECTION VI OF THIS REPORT.
*****
*****
***** STANDARD SIZE AND RADIUS
11007000070004000600260000300000   1   2   1   1   1   1
12005000017000130001200094000090000   1   4   3   2   3   1
13019000070000400018003740002700000   2   6   8   3   8   2
21002000070000400060026000030000   1   2   1   1   1   1
22005000017000130001200094000090000   1   4   3   2   3   1
23019000070000400018003740002700000   2   10   8   3   8   2
31000000070000400060026000030000   1   2   2   1   2   1
32005000017000130001200094000090000   1   4   10   2   10   1
33019000070000400018003740002700000   2   10   20   3   20   2
41002000070000400060026000030000   1   2   2   1   2   1
42005000017000130001200094000090000   1   4   10   2   10   1
43019000070000400018003740002700000   2   10   20   3   20   2
***** INDICATOR CARD FOR 8 SENSORS
  1   1   1   1   4   4   4   5
***** RANGE PARAMETER CARD
  .1   .2   .3   .4   .5   .6   .7   .8   .9   1.0   3.0   5.0   7.0   10.0   15.0
***** LINE OF SIGHT PROBABILITY DECK
56484647454742454647393020 4 2 1 0        0000 METERS ABOVE GROUND
99999999989797979695948783777065          0500 METERS ABOVE GROUND
99999999999999989898989656539186 84       1000 METERS ABOVE GROUND
99999999999999999999999999999999          LINE OF SIGHT UNLIMITED
00000000000000000000000030 3 3 0000       PROBABILITY OF FIRING
***** EXPECTED COVERAGE DECK FOR 8 SENSORS
 2.2 2.2 2.2 2.2 2.2 2.2 2.1 2.1 2.1 2.1 2.0 1.6  .0  .0  .0  .0
  .0  .0  .0  .0  .0  .0  .0  .0  .0  .0  .0  .0  .0  .0  .0  .0
  .0  .0  .0  .0  .0  .0  .0  .0  .0  .0  .0  .0  .0  .0  .0  .0
  .0  .0  .0  .0  .0  .0  .0  .0  .0  .0  .0  .0  .0  .0  .0  .0
```

4.7	4.7	4.7	4.7	4.7	4.6	4.6	4.6	4.6	4.6	4.4	3.8	2.9	.0	.0	.0
.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.2	.2	.0	.0
.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.1	.1	[illegible]	.1	.1	.1	.1	.1	.1	.1	.1	.0	.0	.0	.0	.0
.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.1
.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.0	.0	.0	.0	.0	.0	.0	[illegible]	.0	.0	.0	.0	.0	.0	.0	.1
.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.1	.1	.0
.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.6	.6	.6	.6	.6	.5	.6	.6	.6	.6	.6	.5	.4	.2	.0	.0
.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.0	.0	.0	.0	.0	.0	.0		.0	.0	.0	.0	.0	.0	.0	.0
[illegible]	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0

***** PROBABILITY OF DETECTION DECKS

```
978670598484238363027120300000000
937455433631282522190900000000000
978670584842383430271203000000000
999999999999999999998340270000000
999997898074696357542610000000000
999999999999999999998340270000000
999999999999999999993463210000000
999999888777716662321200000000000
999999999999999999993463210000000
999999999999999999998340270000000
999997898074696357542610000000000
999999999999999999998340270000000
378670584842387430271203000000000
937455433631282522190900000000000
978670584842383430271203000000000
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999999580746963575426100000000000
999999999999999999998340270000000
999999999999989698974400000000000
000000000000000000000000000000000
000000000000000000000000000000000
999999999999999999999999999950000
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000000000000000000000000000000000
000000000000000000000000000000000
999999999999989898989744000000000
000000000000000000000000000000000
000000000000000000000000000000000
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999998989796959493928300000000000
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000000000000000000000000000000000
000000000000000000000000000000000
999999999999999999999999590826000
000000000000000000000000000000000
000000000000000000000000000000000
110907050302010101010000000000000
030702010101010101010000000000000
110907050302010101010000000000000
342721151109060303030201000000000
342720141007050202020101000000000
342721151109060303030201000000000
342721151109060303030201000000000
342720141007050202020101000000000
342721151109060303030201000000000
342721151109060303030201000000000
342720141007050202020101000000000
342721151109060303030201000000000
110907050302010101010000000000000
030702010101010101010000000000000
```

```
1109070503020 010101000000000000
34272115110906030303020100000000
34272014100705020202010100000000
34272115110906030303020100000000
00000000000000000000909090909090
00000000000000000000000000000000
00000000000000000000808080808080
00000000000000000000999999999999
00000000000000000000202020202020
00000000000000000000959595959595
00000000000000000000999999  9999
00000000000000000000303030303030
00000000000000000000999999999999
00000000000000000000999999999999
00000000000000000000303030303030
00000000000000000000999999999999
00000000000000000000909090909090
000  000000000000000000000000000
000    0000000000000909090909090
0000000000000000    999999999999
00000000000000000000000000000020
00000000000000000000959595959595
00000000000000000000505050505050
00000000000000000000000000000000
00000000000000000000202020202020
00000000000000000000959595959595
00000000000000000000454545454545
00000000000000000000959595959595
00000000000000000000979797979797
00000000000000000000505050505050
00000000000000000000979797979797
00000000000000000000979797979797
00000000000000000000505050505050
00000000000000000000979797979797
00000000000000000000505050505050
```

```
00000000000000000000000000000000
00000000000000000000202020202020
00000000000000000000363636363636
00000000000000000000020202020202
00000000000000000000363636363636
00000000000000000000000045454500
00000000000000000000000015151500
00000000000000000000000045454500
00000000000000000000000087878700
00000000000000000000000097979700
00000000000000000000000087878700
00000000000000000000000096969600
00000000000000000000000097979700
00000000000000000000000096969600
00000000000000000000000096969600
000000000000000000000000979  700
0000000000000000000000009  69600
00000000000000000000000045 54500
00000000000000000000000015151500
00000000000000000000000045454500
00000000000000000000000068686800
00000000000000000000000062626200
00000000000000000000000068686800
00000000000000000000000000000000
00000000000000000000000000000000
00000000000000000000000000000000
00000000000000000000000000000000
000000000  000000000000000000000
00000000000000000000000000000000
00000000000000000000000000000000
00000000000000000000000000000000
00000000000000000000000000000000
00000000000000000000000000000000
80808080808080808080808080808080
00000000000000000000000000000000
```

```
00000000000000000000000000000000
00000000000000000000030000000000
00000000000000000000000000000000
00000000000000000000000000000000
00000000000000000000000000000000
00000000000000000000000000000000
***** COMBAT SAMPLE DAY HEADING CARD
**TARGET ACQUISITION MODEL SAMPLE RUN**      0971      0    0    1
***** ACQUISITION CLOCK TIME DISTRIBUTION DECK
00000000000000000000000000000000000000000000000000000000000000000000000000000
03707911216034242244650354356458860663665467169575077480082185689295 5
00000000000000000000000000000000000000000000000000000000000000000000000000000
00000000000000000000000000000000000000000000000000000000000000000000000000000
***** MULTIPLE ACQUISITION DISTRIBUTION DECK
   .0   .0   .0   .0   .0   .0   .0   .0   .0   .0
.3760.2510.1380.0950.0845.0140.0254.0175.0051.0025
***** TARGET ARRAY DECK
   16573070102 1   30312013120 3 5
   28672940102 1   23312013120 3 5
   38623071102 1   41311814118 4 5
   48723111110115  406 30 3 30 0 1
   58833181110115  516 20 3 20 0 1
   68743041110115  336  0 2  8 0 1
   76883191100115  546  0 1 10 0 1
   88913151100115  536  0 1  5 0 1
   98733240011 3   522 7019 70 0 1
  108862761002 1   16312013120 3 5
  119022671002 1   14312013120 3 5
  128962891002 1   33311814118 4 5
  139092911100115  416 30 3 30 0 1
  148862841100115  236 20 3 20 0 1
  158782851110115  206  0 2  8 0 1
  168973041100115  456  0 1 10 0 1
  179142851100115  376  0 1  5 0 1
  189042990011 3   442 7013 70 0 1
  198683351002 1   703  013120 3 3
  209013211102 1   623  013120 3 5
  219203330102 1   823  014118 4 5
  228913421110115  776 30 3 30 0 1
  239093441110115  876 20 3 20 0 1
  249063290011115  736  0 2  8 0 1
  258903361100115  716  0 1 10 0 1
  268903281100115  646  0 1  5 0 1
  278933470011 3   812 6617 66 0 1
  288833710011112  992 3512 39 1 1
  298903081100115  476  0 1  7 0 1
  308833121100115  476  0 1  4 0 1
  318673111100115  386  0 1  7 0 1
  328623221100115  456  0 1  4 0 1
  339022761100115  236  0 1  7 0 1
  348962951100115  386  0 1  4 0 1
  359142781100115  306  0 1  7 0 1
  36 [illegible]32781100115  416  0 1  4 0 1
```

37886350100115	806	0	1	8	0	1
38880355100115	856	0	1	5	0	1
39871361100115	346	0	1	8	0	1
40883361100115	896	0	1	5	0	1
41944338100115	986	0	1	8	0	1
42937342100115	986	0	1	5	0	1
43904382010112	1182	3916		39	0	1
44914347010115	936	0	3	15	0	1
45917345010115	916	0	3	7	0	1
46917341010115	886	0	3	[illegible]	0	1
47893279100115	226	0	2	16	0	1
48908274100115	246100		2	9	0	1
49879300100115	336	0	2	9	0	1
50899308110115	404	71	6	71	0	2
51913365010110	1072	7423		74	0	1
529173520101 4	986	41	6	41	0	1
539153090011 12	59210946109				0	2
5491836[illegible]12110	10 [illegible]21499214				0	2
559232551002 1	13312013120				3	2
569522441002 1	18312013120				3	5
579442561002 1	24311814118				4	5
58933261100115	246	30	3	30	0	1
59954250100115	246	20	3	20	0	1
60918259100115	156	0	2	8	0	1
61948273100115	416	0	1	10	0	1
62945277100115	446	0	1	5	0	1
639442690101 3	372	7019		70	0	1
649692561012 1	38312013120				3	5
659902471102 1	39312013120				3	5
669962571102 1	49311814118				4	5
67985263100115	526	30	3	30	0	1
68971261100115	436	20	3	20	0	1
69984252110115	416	0	2	8	0	1
70993263100115	596	0	1	10	0	1
71980268100115	536	[illegible]	1	5	0	1
72 02610101 3	572	7019		70	0	2
7[illegible]9422951102 1	583	013120			3	3
[illegible]3712770102 1	58312013120				3	5
75 82890102 1	84311814113				4	5
76972288110115	676	30	3	30	0	1
77 14294101115	916	20	3	20	0	1
78985276110115	[illegible]36	0	2	8	0	1
79 6298100115	926	0	1	10	0	1
80992295100115	836	0	1	5	0	1
819852990101 3	832	6617		66	0	2
82 0306011112	972	4312		39	1	1
83939279100115	436	0	1	7	0	1
84[illegible]8284100115	476	0	1	7	0	1
85932268100115	306	0	1	7	0	1
86957266100115	406	0	1	4	[illegible]	1
87 8268100115	616	0	1	7	0	1
88 9273100115	716	0	1	4	0	1
89969266100115	476	0	1	7	0	1
90969272100115	516	0	1	4	0	1
91995114100115	1016	0	1	0	0	1
92967303100115	786	0	1	5	0	1
93977329100115	1056	0	1	8	0	1
94985335100115	1146	0	1	5	0	[illegible]
95996339100115	1246	0	1	8	0	[illegible]
96 4331100115	1196	0	1	5	0	1
97 14321001112	1152	7916		39	0	2
98 18310110115	1076	[illegible]	3	15	0	2
99 23309010115	1096	0	3	7	0	1
100 17305010115	1036	0	3	7	0	2
101939288100115	526	0	2	16	0	1
[illegible]02976269110115	526	0	2	9	0	1
103 15280110115	706	0	2	9	0	1
104949281100115	516	71	6	71	0	1
105 31307010110	1112	7424		74	0	2

```
1069823120101 4   923 41 6 41 0 1
1079513O4001112   712109321O9 0 2
10897833OO10110 1142214992l4 0 2
1O99254130101 3 15531151311S 3 5
1109624161102 3 1753  013115 3 3
1119734471102 3 2083  014118 4 3
112943425110115 1736 50 6 50 0 1
113951417010115 1716 18 4 18 0 1
114956427100115 1816  0 1 10 0 1
115974423100115 1886  0 1  5 0
116963429OO11 3 1872 7019 70 0 2
117 134310101 3 21131151311S 3 5
118 354280101 3 21931151311S 3 5
119 403951102 3 1943  014118 4 3
120 484371OO115 2356 50 6 50 0 1
121996392010115 1726 18 4 18 0 1
122 294361OO115 2236  0 1 10 0 1
123 494521OO115 2476  0 1  5 0 1
124 434520011 3 2442 7019 70 0 1
125 423480101 3 1533115131l5 3 1
126 583480101 3 1613115131l5 3 5
127 683830102 3 1953  014118 4 3
128 623741101l5 1856 50 6 50 0 2
129 573661101l5 1766 18 4 18 0 1
130 533551OO115 1646  0 1 10 0 1
131 363591OO115 1506  0 1  5 0 1
132 433580011 3 1622 7019 70 0 3
133 534690O1112 2632 4312 39 1 2
134947430100115 1806  0 1  7 0 1
135945447100115 1946  0 1  4 0 1
136973412100115 1786  0 1  7 0 1
137976432100115 1956  0 1  4 0 1
138 153741OO115 1626  0 1  7 0 1
139 613791OO115 1896  0 1  4 0 1
140 384351OO115 2276  0 1  7 0 1

141 464431OO115 2386  0 1  4 0 1
142 46 271OO115 2246  0 1  8 0 1
143 504181OO115 2186  0 1  5 0 1
144 414681OO115 2486  0 1  8 0 1
145 544611OO115 2586  0 1  5 0 1
146 334701OO115 2556  0 1  8 0 1
147 484681OO115 2596  0 1  5 0 1
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765241153[illegible]00115	674	69	6	69	0	1
466104240100115	[illegible]74	69	6	69	0	1
766244150100115	[illegible]74	69	6	69	0	1
4671[illegible]424310011[illegible]	[illegible]14	69	6	69	0	1
767244153100115	[illegible]14	69	6	69	0	1
466220306010112	1792	8019		90	0	2
764360218010112	1792	8019		90	0	2
459216299100115	17[illegible]4	69	6	69	0	1
[illegible]709100115	[illegible]	64	6	69	0	1
470210295100115	1694	69	6	69	0	1
770350296100115	1694	69	6	69	0	1
471210503100115	1754	69	6	69	0	1
771350213100115	1754	69	6	69	0	1
472292418010112	3192	9524		95	0	2
772832328010112	3192	9524		95	0	2
473280422100115	3154	33	5	33	0	1
773420332100115	3154	33	5	33	0	1
474295411100115	3154	33	5	33	0	1
774432321100115	3154	33	5	33	0	1
475183260[illegible]1112	1242	7316		73	0	2
775222170[illegible]1112	1242	7316		73	0	2

476189259100115	1274	56	6	56	0	1
776329169100115	1274	56	6	56	0	1
477214271110213	1504	0	6	56	0	2
777354181110213	1504	0	6	56	0	2
478233284110215	1714	56	6	56	0	4
778373194110215	1714	56	6	56	0	4
479253386010112	260214616148				0	3
779393296010112	26021[illegible]				0	3
480306424100115	3316	0	1	16	0	1
780446334100115	3316	0	1	16	0	1
4[illegible]1298408100115	3146	0	1	5	0	1
781438318100115	3146	0	1	5	0	1
482281430100115	3246	0	1	8	0	1
782421340100115	3246	0	1	8	0	1
483291423100115	3226	0	1	5	0	1
783431333100115	3226	0	1	5	0	1
484320394100115	3056	0	1	8	0	1
784460304100115	3056	0	1	8	0	1
485309391100115	3066	0	1	5	0	1
785449301100115	3066	0	1	5	0	1
485195449100115	2926	0	1	16	0	1
786335359100115	2926	0	1	16	0	1
487186464100115	3016	0	1	5	0	1
787326374100115	3016	0	1	5	0	1
488214423100115	2806	0	1	8	0	1
788354333100115	2806	0	1	8	0	1
489[illegible]274251 00115	2896	0	1	5	0	1
789167335100115	2896	0	1	5	0	1
4901[illegible]2427100115	2566	0	1	8	0	1
790307337100115	2566	0	1	8	0	1
491181411100115	2536	0	1	5	0	1
791321321100115	2536	0	1	5	0	1
492290345100115	2566	0	1	16	0	1
792[illegible]0115	2566	0	1	16	0	1

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443266            115 2466  0 1  5 0 1
7934062511C0115 2466  0 1  5 0 1
4942693261C0115 2296  0 1  6 0 1
7944092361C0115 2296  0 1  6 0 1
4952261 361C0115 1736  0 1  5 0 1
7953662061C0115 1796  0 1  5 0 1
4962293261C0115 2056  0 1  8 0 1
7953692361C0115 2096  0 1  8 0 1
4972334011C0115 [illegible]  0 1  5 0 1
7973737011100115 [illegible]  0 1  5 0 1
4 [illegible]  115 [illegible]  0 1  16 0 1
7983082541C0115 18[illegible]  0 1 16 0 1
4991475501C0115 1846  0 1  5 0 1
7993222401C0115 1946  0 1  5 0 1
5001613441C0115 2036  0 1  6 0 1
8003012761C0115 2036  0 1  8 0 1
5011523441C0115 1806  0 1  5 0 1
8012922541C0115 1906  0 1  5 0 1
5021363641C0115 1906  0 1  6 0 1
8022752781C0115 1906  0 1  6 0 1
5031233711C0115 1876  0 1  5 0 1
803263281100[illegible]   1876  0 1  5 0 1
5041452900[illegible]  1242  6016  60 0 2
8042752080C10112 1242  6016  60 0 2
50517   3110C115 1214  63 6 63 0 1
8052682011C0115 1214  63 6 63 0 1
5061262821C0115 1144  63 6 63 0 1
8062661921C0115 1144  63 6 63 0 1
5071322841C0115 1184  63 6 63 0 2
8072731941C0115 1184  63 6 63 0 2
5081702810C10112 1352  6015 60 0 2
8093101910C10112 1352  6019 60 0 2
5091792631C0115 1904  7516 75 0 2
8093191931C0115 1404  7516 75 0 2
5101602781   115 1394  75 6 75 0 1
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81032018810C0115 1394  75 6 75 0 1
51117427510C0115 1344  75 6 75 0 1
81131416510C0115 1344  75 6 75 0 1
51219634C110110  21021284112 8  0 8
81233625011010110 21021284112 8  0 8
51319644411011 5  28841764817 6  0 5
81333635411C115 28841764817 6  0 5
90134361110101 12  5052250335 05  0 4
90233552701C1  3  4392249502 49  0 7
9032456551101 11  4424079040 7  010
90435062301011C  5352234602 44  0 7
9053086461011 1C  5252316993 16  0 7
90326461300111C  4632  9517  55  0 2
9072546561101 1C  5102125231 25  0 3
9082875840101 1C  5452160461 60  0 4
9092035330101 15  3714287182 97  0 7
9103225430101 11  4432  9525  95  0 3
9113065371C0115  4303  33 2 33  0 3
9123365471C0116  4553  33 2 33  0 3
9133705640101 15  4642241182 41  0 3
91424561200111 7  5002148191 48  0 3
9152686901C0115  5306  47 6 47  010
9163675941C0115  5056  47 6 47  010
917215504010 1 6  3554  4831  483110
918352534160 2 2-3624  4831  4831 6
91917[illegible] 51101 6  3094  4831  483110
9201935290011 16  3582  3112  31  0 2
92120554810011 6  3596  26 4 26  010
9221655171101 16  3356  26 4 26  010
92320548610011 6  3056  47 6 47  010
9242465180101 10  3752336993 36  010
92531647511C1 6  3794  4831  483110
92617652010 02 8  4484  4831  4831 8
92736148011C1 6  4734  4831  48311[illegible]
```

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9283515420011 0 4532 3131 31 0 2
9293164530111 16 3536 26 4 26 010
9304115151 0116 4536 26 4 26 010
93137449010111 16 4236 47 6 47 010
93235352001011 0 4352366993 4 011
93331558201 01 6 4443 4431 45311 0
93436362 71002 4 4363 431 4511 4
93536956 51101 5 4834 4831 48311 0
93637560 60111 0 5292 3131 31 0 2
93719757410011 5 4746 25 4 26 010
9363346351011 16 5256 25 4 25 010
939297601101116 4806 47 5 47 010
94 3506410101 1 0 5412356996 6 010
94127747200111 2 3322 5015 50 0 2
94256247200111 2 51024 18704 15 0 5
94542257300111 0 52221151411 5 0 3
94453333711011 1 37223838 3 3 1 5
94551653701011 0 4552454994 54 0 5
94653551401011 0 5342 2125121 0 3
94764041510021 3 4982 9824 49 0 3
94815464811011 0 44721 47201 47 0 3
94917268301011 0 4802 8313 83 0 2
95054249201111 0 5122157201 57 0 4
95119464700111 0 455228799267 0 7
```

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9526013920101 0 455228799287 0 7
953 9063200111 0 3962230992 3 0 0 5
954178591100213 4082 044195 0 7
955495333110 1 0 3492195 4195 0 4
956456355010110 350216048160 0 3
957282478110110 3532180221 60 0 5
958362448010110 3502175401 75 0 3
959544251002 13 4552200372 00 0 6
960342375010110 5912210232 10 0 5
961125606110110 431210029100 0 4
962294542010110 423217551175 0 3
963468558001110 530215025150 0 3
96413  9901011 0 2992 7314 73 0 3
9654     7010110 3452 7316 73 0 3
9659 9   700111 0 3732145 46145 0 3
9571125850101 10 3642405994 05 0 8
968625595010110 4722405994 05 0 9
959195736110110 5352457994 57 010
970461568110110 3652427994 27 0 7
971 42593010110 3382386993 86 0 4
977105530010110 3142178391 78 0
973123558001110 3542117151 17 0 2
974326645110110 5402 9043 90 0 4
99999999999999999999999999999999
```

***** RUN STOP CARD

9999 99999999999999999999999 99999999 9999999999999999999999999999999

TARGET ACQUISITION MODEL

CHAPTER VI
SAMPLE OUTPUT LISTING

1. General. - The sample output listing that follows is based on a run of TAM with the inputs exactly as specified in the sample input listing contained in Chapter V. The user will not be able to repro e the run because of the stochastic processes involved. The sampl output is in three sections. The first section (see pages VI-5 through VI-9) is a time sequenced list of the acquisitions which occur during the 6-hour time period. This list is a line printer output. The second section is a summary of acquisition events (see page VI-10). The third section (see pages VI-11ff) is a listing of the card punch output of the acquired target list.

2. Abbreviations

a. Acquired Target List tion. - Column heading abbreviations used in the section are:

(1) TIME: Clock time that acquisition occurs

(2) TARG: Target identification number

(3) COORDS: Target coordinates

(4) CT: Target category

(5) OWT: Open, Woods, Town codes

(6) M: Mobility code

(7) RFEBA: Target distance in hectometers

(8) T: Type element detected

(9) NEL: Number of elements T in target

(10) DET: Number of elements T detected

(11) EST: Estimated number of elements T in the targe

(12) RAD: Actual target radius (first digit) and estimated target radius (last digit)

(13) SENSORS: List of sensors which detected the target

b. Summary Section. - The upper matrix presents an analysis of the input targe array by target category (column headings) and by target radii (row headings). The last row presents the distribution of the targets in the array by 16 range bands (described by user input). The lower matrix presents analogous data based on the acquired target list. The data presented by categories and radii includes multiple acquisitions of the same target. The data presented by range band do not include multiple acquisition. The user can conclude from the sample output that 97 distinct units were detected. These detections resulted in 238 acquisitions (and fire mission requests). The only abbreviation used in the summary is REP, which means replications performed.

c. Card Punch Section. - The data presented in this section has no headings. The interpretation of these data are outlined in Table VI-1.

TABLE VI-1. Punched Data Output Format

Columns	Data Description
1-4	Clock time acquisition occurs
5-8	Target identification number
9-14	Target coordinates
15-16	Target category code
17-19	Target environment code
20	Target mobility code
21	Type element detected code
22-23	Target true radius code
24-25	Target estimated radius code
26	Detecting sensor code (one for observed targets; two otherwise)
27-29	Troops at risk to artillery
30-31	Tanks at risk to artillery
32-33	Equipment type three at risk to artillery

69-71	Number of observed tanks and armored vehicles
72-74	Number of tanks and armored vehicles in target

3. Diagnostics. - If any of the target array inputs exceed the constraints stated in the input specifications, the output will be headed by a column of target identification numbers. The numbers will refer the user to the specific target card which contains unacceptable data elements.

TARGET ACQUISITION MODEL SAMPLE RUN REPS = 29

.IME	TARG	COORDS	CT	OWT	M	RFEBA	T	NEL	DET	EST	RAD	SENSORS
601	902	335527	3	010	1	438	2	50	1	7	702	5
603	812	336250	10	110	1	210	2	41	1	7	802	5
603	779	393296	12	010	1	260	2	18	1	7	302	5
604	162	24386	6	010	1	178	3	10	1	4	201	5
604	770	350206	15	100	1	169	4	6	1	6	101	5
605	955	495333	10	110	1	349	5	195	1	26	401	5
608	750	370272	10	001	1	237	2	63	1	7	202	5
611	725	326306	15	100	1	244		1	1	3	101	5
611	337	124184	6	110	2	31	3	13	4	13	403	2
612	709	291305	12	001	1	223	1	20	1	20	101	5
615	813	336354	15	110	1	288	4	48	1	6	501	5
615	301	38221	9	100	2	14	3	13	11	13	403	1
619	399	253403	12	001	1	286	1	110	1	20	301	5
621	57	944256	1	100	2	24	3	14	14	40	508	1
622	188	14245	4	110	2	45	3	4	1	4	101	1 2
622	448	136359	10	001	1	185	5	56	1	26	201	5
623	925	316475	6	110	1	379	4	31	1	6	1001	5
623	943	422573	10	001	1	522	5	115	1	26	301	5
625	390	246372	15	100	1	258	6	1	1	3	101	5
627	97	14321	12	001	1	415	2	16	1	7	202	7
645	640	285099	6	100	2	45	3	13	5	13	403	1
64	920	183529	10	001	1	358	2	12	1	7	202	5
648	14	686284	15	100	1	23	6	3	3	3	101	1
648	92	967303	15	100	1	78	6	1	1	3	101	7
648	468	220300	12	010	1	179	2	19	1	7	202	5
649	953	90632	10	001	1	396	2	99	1	7	502	5
649	57	944256	1	100	2	24	3	14	14	40	508	1
653	966	498357	10	001	1	373	2	46	1	7	302	5
654	59	954250	15	100	1	24	5	20	3	26	101	1
656	907	264656	10	110	1	510	5	125	1	26	301	5
657	354	169211	15	100	1	77	6	1	1	3	101	7
657	471	210303	15	100	1	175	5	69	1	26	101	5
658	604	194139	12	010	1	29	1	62	3	50	101	1
658	66	996257	1	110	2	49	5	118	1	94	503	1
659	11	902267	1	100	2	14	3	13	13	13	503	1 2
659	733	440298	12	001	1	299	1	156	1	20	301	5
700	630	247216	10	010	1	123	5	215	1	26	303	7
700	307	87210	9	110	2	31	3	13	6	13	503	2
701	2	867294	1	010	2	23	3	13	3	13	503	1
701	2	867294	1	010	2	23	3	13	3	13	503	1
701	970	461368	10	110	1	365	5	427	1	26	701	5
701	711	303303	15	001	1	184	6	6	1	3	101	5
702	66	996257	1	110	2	49	5	118	1	94	503	1
702	188	14245	4	110	2	45	3	4	1	4	101	1 2
702	12	898289	1	100	2	33	3	14	14	40	508	1 2

703	905	266201	15	100	1	121	5	63	1	26	01	7	
705	2	867294	1	010	2	23	3	13	3	13	503	1	
706	227	116489	15	110	1	314	4	4	1	6	201	5	
706	20	901321	1	110	2	62	3	13	13	40	508	2	
707	14	886284	15	100	1	23	6	3	3	3	101	1	
707	03	245655	11	110	1	498	5	407	1	26	1001	5	
708	58	933261	15	100	1	24	6	3	3	3	101	1	
708	56	952244	1	100	2	18	3	13	13	13	503	2	
708	83	939279	15	100	1	43	6	1	1	3	101	1	
709	59	954250	15	100	1	24	5	20	3	26	101	1	
709	337	124184	6	110	2	31	3	13	4	13	403	2	
709	493	266341	15	100	1	246	6	1	1	3	101	5	
710	318	94205	15	100	1	31	6	1	1	3	101	1	
710	196	991353	10	001	1	133	5	56	1	26	101	7	
710	606	230107	9	010	2	22	3	13	3	13	503	1	
710	395	202297	15	100	1	169	6	1	1	3	101	5	
711	56	952244	1	100	2	18	3	13	13	13	503	2	
711	11	902267	1	100	2	14	3	13	13	13	503	1	2
711	640	285099	6	100	2	45	3	13	5	13	403	1	
711	304	54229	12	010	1	29	1	62	6	50	101	1	
712	606	230107	9	010	2	22	3	13	3	13	503	1	
713	55	923253	1	100	2	13	3	13	13	13	203	1	2
713	340	145169	6	100	2	45	3	13	13	13	403	1	2
713	637	264034	6	110	2	31	3	13	7	13	403	2	
714	1	857307	1	010	2	30	3	13	6	13	503	1	
~~715~~	~~10~~	~~886276~~	~~1~~	~~100~~	~~2~~	~~16~~	~~3~~	~~13~~	~~13~~	~~13~~	~~503~~	~~1~~	~~2 3~~
717	83	939279	15	100	1	43	6	1	1	3	101	1	
~~718~~	~~58~~	~~933261~~	~~15~~	~~100~~	~~1~~	~~24~~	~~6~~	~~3~~	~~3~~	~~3~~	~~101~~	~~1~~	
720	188	14245	4	110	2	45	3	4	1	4	101	1	2
~~720~~	~~188~~	~~14245~~	~~4~~	~~110~~	~~2~~	~~45~~	~~3~~	~~4~~	~~1~~	~~4~~	~~101~~	~~1~~	~~2~~
721	469	216299	15	100	1	174	5	69	1	26	101	5	
~~722~~	~~13~~	~~909291~~	~~15~~	~~100~~	~~1~~	~~41~~	~~5~~	~~30~~	~~1~~	~~26~~	~~101~~	~~1~~	
722	106	982312	4	010	1	92	5	41	1	26	101	7	
~~722~~	~~1~~	~~857307~~	~~1~~	~~010~~	~~2~~	~~30~~	~~3~~	~~13~~	~~6~~	~~13~~	~~503~~	~~1~~	
722	152	997445	10	001	1	215	5	74	1	26	201	5	
~~723~~	~~307~~	~~87210~~	~~9~~	~~110~~	~~2~~	~~31~~	~~3~~	~~13~~	~~6~~	~~13~~	~~503~~	~~2~~	
723	274	35411	10	110	1	207	2	41	1	7	802	5	
~~723~~	~~323~~	~~94263~~	~~15~~	~~100~~	~~1~~	~~80~~	~~6~~	~~1~~	~~1~~	~~3~~	~~101~~	~~7~~	
724	2	867294	1	010	2	23	3	13	3	13	503	1	
~~725~~	~~602~~	~~191118~~	~~9~~	~~110~~	~~2~~	~~10~~	~~3~~	~~13~~	~~1~~	~~4~~	~~401~~	~~2~~	
726	123	49452	15	100	1	247	6	1	1	3	101	5	
728	973	123558	10	001	1	351	2	15	1	7	202	5	
728	956	456355	10	010	1	3[illegible]0	2	48	1	7	302	5	
728	47	893279	15	100	1	22	6	2	2	—	101	1	
728	1	857307	1	010	2	30	3	13	6	13	503	1	
731	640	285099	6	100	2	45	3	13	5	13	403	1	
731	13	909291	15	100	1	41	5	30	1	26	101	1	
732	308	87225	12	100	2	44	2	16	6	7	402	2	
736	47	893279	15	100	1	22	6	2	2	3	101	1	

743	613	199127	15	100	1	22	6	1	1	3	101	1		
743	939	297601	16	101	1	480	6	6	1	3	1001	5		
745	606	230107	9	010	2	22	3	13	3	13	503	1		
745	47	893279	15	100	1	22	6	2	2	3	101	1		
745	288	354333	15	100	1	280	6	1	1	3	101	5		
746	302	51208	9	110	2	10	3	13	13	40	408	3		
747	303	48236	8	100	2	30	3	13	8	13	[illegible]	2		
748	480	306424	15	100	1	331	[illegible]	1	1	3	101	5		
748	449	258322	10	001	1	219	5	56	1	26	201	5		
750	228	996288	12	010	1	79	1	73	1	20	202	7		
750	242	940406	15	100	1	156	6	1	1	3	101	5		
751	66	996257	1	110	2	49	5	118	1	94	503	1		
752	184	70425	12	001	1	233	1	110	1	20	201	5		
753	83	939279	15	100	1	43	6	1	1	3	101	1		
754	177	130467	15	100	1	301	6	1	1	3	101	5		
755	265	946467	15	100	1	211	5	28	1	26	101	5		
756	489	27425	15	100	1	289	6	1	1	3	101	5		
757	188	14245	4	110	2	45	3	4	1	4	101	1	2	
759	236	980477	12	001	1	238	1	148	1	20	201	5		
759	12	898289	1	100	2	33	3	14	14	4	508	1	2	
803	606	230107	9	010	2	22	3	13	3	13	503	1		
804	1	857307	1	010	2	30	3	13	6	13	503	1		
805	11	902267	1	100	2	14	3	13	13	13	503	1	2	
805	340	145189	6	100	2	45	3	13	13	13	403	1	2	
806	302	51208	9	110	2	10	3	13	13	40	408	3		
808	10	886276	1	100	2	16	3	13	13	13	503	1	2	3
809	337	124184	6	110	2	31	3	13	4	13	403	2		
810	640	285099	6	100	2	45	3	13	5	13	403	1		
812	56	952244	1	100	2	18	3	13	13	13	503	2		
812	607	227120	9	110	2	31	3	13	13	40	508	2	3	
817	188	14245	4	110	2	45	3	4	1	4	101	1	2	
818	267	919394	15	100	1	135	4	6	1	6	101	7		
821	40	285099	6	100	2	45	3	13	5	13	403	1		
822	415	279248	15	100	1	180	6	1	1	3	101	5		
824	482	281430	15	100	1	324	6	1	1	3	101	5		
824	340	145199	6	100	2	45	3	13	13	13	403	1	2	
827	55	923255	1	100	2	13	3	13	13	13	203	1	2	
831	14	886284	15	100	1	23	6	3	3	3	101	1		
836	10	886276	1	100	2	16	3	13	13	13	503	1	2	3
838	2	867294	1	010	2	23	3	13	3	13	503	1		
846	303	48236	8	100	2	30	3	13	8	13	503	2		
849	426	[illegible]9384	15	100	1	235	6	1	1	3	101	5		
850	613	199127	15	100	1	22	6	1	1	3	101	1		
850	56	952244	1	100	2	18	3	[illegible]	13	13	503	2		
852	18	904299	3	001	1	44	2	[illegible]	6	17	104	1		
857	2	867294	1	010	2	23	3	13	3	13	503	1		
906	58	933261	15	100	1	24	6	3	3	3	101	1		
906	2	867294	1	010	2	23	3	13	3	13	503	1		
911	370	188226	12	001	1	100	1	66	1	20	101	7		
912	83	939279	15	100	[illegible]	43	6	1	1	3	101	1		

913	307	87210	9	110	2	31	3	13	6	13	503	2		
920	52	917352	4	010	1	98	5	41	1	26	101	7		
933	640	285099	6	100	2	45	3	13	5	13	403	1		
934	606	230107	9	010	2		3	13	3	13	503	1		
942	14	886284	15	100	1	23	6	3	3	3	101	1		
944	613	199127	15	100	1	22	6	1	1	3	101	1		
945	637	264094	6	110	2	31	3	13	7	13	403	2		
948	303	48236	8	100	2	30	3	13	8	13	503	2		
949	66	996257	1	110	2	49	5	118	1	94	503	1		
953	1	857307	1	010	2	30	3	13	6	13	503	1		
953	606	230107	9	010	2	22	3	13	3	13	503	1		
954	18	904299	3	001	1	44	2	19	6	17	104	1		
954	66	996257	1	110	2	49	5	118	1	94	503	1		
954	613	199127	15	100	1	22	6	1	1	3	101	1		
956	59	954250	15	100	1	24	5	20	3	26	101	1		
1000	446	221432	10	010	1	293	2	26	1	7	202	5		
1001	14	886284	15	100	1	23	6	3	3	3	101	1		
1001	613	199127	15	100	1	22	6	1	1	3	101	1		
1002	303	48236	8	100	2	30	3	13	8	13	503	2		
1003	14	886284	15	100	1	23	6	3	3	3	101	1		
1005	59	954250	15	100	[illegible]	24	5	20	3	26	101	1		
1007	188	14245	4	110	2	45	3	4	1	4	101	1	2	
1008	465	100243	15	100	1	67	4	6	1	6	101	8		
1008	58	933261	15	100	1	24	6	3	3	3	101	1		
1008	12	898289	1	100	2	33	3	14	14	40	508	1	2	
1009	343	164211	12	010	1	74	2	16	1	7	101	7		
1010	14	886284	15	100	1	23	6	3	3	3	101	1		
1012	66	996257	1	110	2	49	5	118	1	94	503	1		
1014	640	28509	6	1[illegible]	2	45	3	13	5	13	403	1		
1014	307	87210	9	110	2	31	3	13	6	13	503	2		
.016	607	227120	9	110	2	31	3	13	13	40	508	2	3	
1021	647	267146	12	001	1	85	1	75	1	20	101	7		
1027	465	100243	15	100	1	67	4	6	1	6	101	8		
1033	11	902267	1	100	2	14	3	13	13	13	5[illegible]	1	2	
1034	188	14245	4	110	2	45	3		1	4	101	1	2	
1037	10	886276	1	100	2	16	3	1	13	13	503	1	2	3
1042	465	100243	15	100	1	67	4	6	1	6	101	8		
1049	606	230107	9	010	2	22	3	13	3	13	503	1		
1056	302	51208	9	110	2	10	3	13	13	40	408	3		
1100	57	944256	1	100	2	24	3	14	14	40	508	1		
1100	11	902267	1	100	2	14	3	13	13	13	503	1	2	
1102	465	100243	15	100	1	67	4	6	1	6	101	8		
1102	[illegible]	857307	1	010	2	30	3	13	6	13	503	1		
1103	10	886276	1	100	2	16	3	13	13	13	503	1	[illegible]	3
1107	613	199127	15	100	1	22	6	1	1	3	101	1		
1108	606	230107	9	010	2	22	3	13	3	13	503	1		
1110	66	996257	1	110	2	49	5	118	1	94	503	1		
1111	465	100243	15	100	1	67	4	6	1	6	101	8		
1112	640	285099	6	100	2	45	3	13	5	13	403	1		

1112	12	898289	1	100	2	33	3	14	14	40	508	1	2	
~~1113~~	~~607~~	~~227120~~	~~9~~	~~110~~	~~2~~	~~31~~	~~3~~	~~13~~	~~13~~	~~40~~	~~508~~	~~2~~	~~3~~	
1113	58	933261	15	100	1	24	6	3	3	3	101	1		
~~1113~~	~~303~~	~~48236~~	~~8~~	~~100~~	~~2~~	~~30~~	~~3~~	~~13~~	~~8~~	~~13~~	~~503~~	~~2~~		
1114	465	100243	15	100	1	67	4	6	1	6	101			
~~1115~~	~~14~~	~~886284~~	~~15~~	~~100~~	~~1~~	~~23~~	~~6~~	~~3~~	~~3~~	~~3~~	~~101~~	~~1~~		
1119	57	944256	1	100	2	24	3	14	14	40	508	1		
~~1121~~	~~307~~	~~87210~~	~~9~~	~~110~~	~~2~~	~~31~~	~~3~~	~~13~~	~~6~~	~~13~~	~~503~~	~~2~~		
1122	307	87210	9	110	2	31	3	13	6	13	503	2		
~~1123~~	~~302~~	~~51208~~	~~9~~	~~110~~	~~2~~	~~10~~	~~3~~	~~13~~	~~13~~	~~40~~	~~408~~	~~3~~		
1127	14	886284	15	100	1	23	6	3	3	3	101	1		
~~1129~~	~~606~~	~~230107~~	~~9~~	~~010~~	~~2~~	~~22~~	~~3~~	~~13~~	~~3~~	~~13~~	~~503~~	~~1~~		
1129	[illegible]	145189	6	100	2	45	3	13	13	13	403	1	2	
~~1130~~	~~318~~	~~94205~~	~~15~~	~~100~~	~~1~~	~~31~~	~~6~~	~~1~~	~~1~~	~~3~~	~~101~~	~~1~~		
1131	55	923253	1	100	2	13	3	13	13	13	203	1	2	
~~1131~~	~~188~~	~~14245~~	~~4~~	~~110~~	~~2~~	~~45~~	~~3~~	~~4~~	~~1~~	~~4~~	~~101~~	~~1~~	~~2~~	
1131	14	886284	15	100	1	23	6	3	3	3	101	1		
1132	59	954250	15	100	1	24	5	20	3	26	101	1		
1133	301	38221	9	100	2	14	3	13	11	13	403	1		
1134	307	87210	9	110	2	31	3	13	6	13	503	2		
1134	302	51208	9	110	2	10	3	13	13	40	408	3		
1135	602	191118	9	110	2	10	3	13	1	4	401	2		
1136	10	886276	1	100	2	16	3	13	13	13	503	1	2	3
1136	20	901321	1	110	2	62	3	13	13	40	508	2		
1137	83	939279	15	100	1	43	6	1	1	3	101	1		
1137	313	94205	15	100	1	31	6	1	1	3	101	1		
1138	11	902267	1	100	2	14	3	13	13	13	503	1	2	
1138	14	886284	15	100	1	23	6	3	3	3	101	1		
1139	301	38221	9	100	2	14	3	13	11	13	403	1		
1139	318	94205	15	100	1	31	6	1	1	3	101	1		
1142	640	285099	6	100	2	45	3	13	5	13	403	1		
1143	302	51208	9	110	2	10	3	13	13	40	408	3		
1143	83	939279	15	100	1	43	6	1	1	3	101	1		
1144	11	902267	1	100	2	14	3	13	13	13	503	1	2	
1145	302	51208	9	110	2	10	3	13	13	40	408	3		
1145	307	87210	9	110	2	31	3	13	6	13	503	2		
1146	18	904299	3	001	1	44	2	19	6	17	104	1		
1147	337	124184	6	110	2	31	3	13	4	13	403	2		
1148	318	94205	15	100	1	31	6	1	1	3	101	1		
1148	10	886276	1	100	2	16	3	13	13	13	503	1	2	3
1153	11	902267	1	100	2	14	3	13	13	13	503	1	2	
1153	18	904299	3	001	1	44	2	19	6	17	104	1		
1155	55	923253	1	100	2	13	3	13	13	13	203	1	2	
1157	602	191118	9	110	2	10	3	13	1	4	401	2		
1159	301	38221	9	100	2	14	3	13	11	13	403	1		

TARGET ACQUISITION MODEL SAMPLE RUN REPS= 29

INPUT STATISTICS ***

CATEGORY	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	TOTAL
RADIUS 1	0	0	6	24	0	1	0	0	0	16	0	29	0	0	355	0	431
RADIUS 2	1	0	4	2	0	5	0	0	0	35	0	48	14	0	27	0	136
RADIUS 3	2	0	5	0	0	16	0	1	0	28	1	10	5	0	1	2	71
RADIUS 4	0	0	0	0	0	10	0	0	12	7	0	8	2	0	3	0	42
RADIUS 5	15	0	4	0	0	0	0	12	4	4	1	1	4	0	2	0	47
RADIUS 6	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
RADIUS 7	0	0	1	0	0	0	0	0	0	5	0	0	1	0	1	0	8
RADIUS 8	0	0	0	0	0	6	0	3	0	5	0	0	0	0	0	0	14
RADIUS 9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RADIUS 10	0	0	0	0	0	6	0	0	0	4	1	0	0	0	2	9	22
TOTAL	18	0	20	26	0	44	0	15	16	104	3	96	27	0	391	11	772
RANGE	0	0	0	0	0	0	0	0	0	2	37	61	59	90	90	425	772

OUTPUT STATISTICS **

CATEGORY	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	TOTAL
RADIUS 1	0	0	0	11	0	2	0	0	3	8	1	10	0	0	74	1	110
RADIUS 2	0	0	1	0	0	0	0	0	0	9	0	5	0	0	0	0	15
RADIUS 3	43	0	0	0	0	19	0	5	21	1	0	0	0	0	0	0	89
RADIUS 4	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	4
RADIUS 5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RADIUS 6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RADIUS 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RADIUS 8	10	0	0	0		0	0	0	10	0	0	0	0	0	0	0	20
RADIUS 9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RADIUS 10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	53	0	5	11	0	21	0	5	34	18	1	15	0	0	74	1	238
RANGE	0	0	0	0	0	0	0	0	0	2	17	14	2	9	5	48	97