AD-A048 113 ARMY TRAINING AND DOCTRINE COMMAND FORT MONROE VA F/G 17/10
PLATOON EARLY WARNING SYSTEM CONCEPT AND EVALUATION REPORT (PEW--ETC(U)
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(11) May 1977

(12) 28p.

ACN 07830

(6) PLATOON EARLY WARNING SYSTEM CONCEPT AND EVALUATION REPORT

(Short Title: PEWS CER)

(9) FINAL REPORT

(19)

DEPARTMENT OF THE ARMY
HEADQUARTERS UNITED STATES ARMY TRAINING AND DOCTRINE COMMAND
FORT MONROE, VIRGINIA 23651

408 082

INFANTRY SCHOOL

UNITED STATES ARMY
TRAINING AND DOCTRINE COMMAND

# PLATOON EARLY WARNING SYSTEM CONCEPT AND EVALUATION REPORT

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### ACKNOWLEDGEMENT

This study was initiated and sponsored by HQ TRADOC, and performed under the auspices of the US Army Infantry School at Fort Benning, Georgia. The USAIS study team was headed by Captain William T. Miller and Dr. Eugene Dutoit.

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PLATOON EARLY WARNING SYSTEM CONCEPT AND
EVALUATION REPORT

# CHAPTER 1

## INTRODUCTION

1-1. PURPOSE. To provide recommendations concerning the Platoon Early Warning System (PEWS) to the Development Acceptance In Process Review meeting 1 June 1977.

1-2. OBJECTIVES.

a. Describe operational and organizational concepts to include the need for the system, employment considerations and general instances of employment in the offense, defense, and in a stabilized situation.

b. Develop a mission profile for the PEWS, addressing targets for the system, possible missions, terrain and environment in which the system might be employed, distance at which a PEWS mission would most likely be conducted, and the mode in which the system would be utilized.

c. Review and analyze OT-II and compare possible configurations of the existing system.

d. Review the cost comparisons of alternative systems to provide input to the performance analysis and recommendations.

1-3. SCOPE.

a. The threat to the PEWS is omitted but can be reviewed in the general REMBASS Threat, which as been updated to include the PEWS.

b. An existing system is not used in the performance analysis as PEWS will not replace a like item in the system.

c. Three alternative configurations of the PEWS will be examined.

1-4. DESCRIPTION.

a. The PEWS is a lightweight, self-powered, portable intrusion detection device designed to be used by small military units or groups such as patrols, platoons or squads. The sensors are designed for hand emplacement and unattended operations in forward combat zones. The system incorporates self-contained sensors capable of detecting personnel and vehicular intrusions at ranges up to 15 meters. The primary system as configured and tested during DT-II and OT-II included two types of sensors, Seismic/Magnetic/Soil Conductance (Type-I) and Electromagnetic/Seismic/Soil Conductance combination (Type-II) sensors. Upon detection of an intruder, the sensor classifies the intruder (man or vehicle) and communicates the detection and classification data to a remote monitor receiver/display by means of a radio-frequency (RF) link or a wire link (WL). The communication option is selectable by means of a switch on each sensor. The communication also identifies the activated sensor by a user-assigned number. The remote receiver/display is capable of receiving the RF and WL transmissions directly and displaying the ID number of the activated sensor and the classification of the intruder by means of lights. The monitor receiver/display is capable of receiving this information. In the WL mode, a wire adapter module is used to interface the communication to the monitor receiver/display. The wire interface module derives its power from the monitor receiver/display which is also capable of operating in the radio and wire modes simultaneously.

b. The primary system tested during DT-II and OT-II consisisted of:

(1) Six each Type-I sensors, DT-577.

(2) Three each Type-II sensors, DT-578.

(3) One each Monitor Receiver, R-1808.

(4) One each Sensor Interface Wire Link,MS-9738.

(5) One each Carrying Case, CY-7524.

c. The system to be proposed consists of:

(1) Ten each sensors, DT-577 or DT-578.

(2) Two each Monitor Receivers, R-1808.

(3) Two each Sensor Interface Wire Link, MX-9738.

(4) Two each Carrying Case, CY-7524.

d. Support equipment consists of:

(1) A Test Set Receiver TS-3565, AN/TRS-2.

(2) A Signal Generator, RF, AN/URM-70 at direct or general support level, currently in inventory.

# CHAPTER 2

## OPERATIONAL CONCEPT

2-1. General. Against current threat forces, US units can expect to be outnumbered and deployed over extended frontages. Small military units, such as platoons, patrols, and squads do not have sufficient personnel and equipment to provide adequate early warning. An enemy, advancing with a rapid moving attack, is better able to "punch through" a unit which is unalerted, not having sufficient time to mass and respond.

2-2. Need for the System.

a. An early warning system is needed that will provide increased coverage and surveillance of areas that cannot be observed by line-of-sight devices such as ground surveillance radar, thermal sights, and light intensification sights. This system should provide a 24-hour detection capability, requiring fewer personnel to be on an alert status during stabilized situations.

b. The unattended ground sensor system should satisfy the platoon's needs for:

(1) Early warning--out to 1500 meters or more, from the platoon's position.

(2) Surveillance--to cover gaps; avenues of approach which are masked by terrain features; or during period of reduced visibility.

(3) Target development to be capable of distinguishing personnel and/or vehicles over a wide variety of terrain and weather conditions.

c. Image viewers cause fatigue due to the necessity of constant operator attention. To reduce monitoring time, a system is needed with a visible and audible alarm.

d. Rear areas and security facilities require an intrusion alerting device satisfied by the PEWS concept.

e. The PEWS will add to the ability of the Military Police to accomplish assigned security missions both forward and in the rear of the combat zone. These missions would include monitoring roads and wooded areas, monitoring the areas surrounding nuclear weapons storage and other high value temporary storage locations.

f. A final and heretofore unvoiced need for the system is to aid in the security of tactical, battalion level command posts, which currently have no dedicated security personnel. Adoption of a PEWS at that level would provide a marked increase in security capabilities of both the command post and "Jump CP" with designated operators assigned to the Tactical Operations Center or the battalion's communications platoon.

2-3. Compatibility With Other Elements of the Force.

a. PEWS must be integrated into the overall surveillance capability of the platoon, patrol or squad. The use of remote sensors provides a capability to monitor areas not presently possible with other observation devices which require line-of-sight. Therefore, no items in the current inventory will be replaced. PEWS will augment other surveillance devices by giving the advantage of providing directional alerting of the enemy's presence through a known location of the activated sensor. Line-of-sight devices should then be used for concentrated observation in the alerted sector.

b. PEWS extends the Remotely Monitored Battlefield Sensor System (REMBASS) by using the small line unit as an intelligence gathering force.

2-4. OPERATION.

a. System Description: PEWS should be designed to be lightweight, self-powered, and man-portable for use by small units. The detecting components of the system should be designed for hand emplacement and unattended operation in both forward combat zones and on security perimeters of sensitive facilities. PEWS sensors should be designed: to transmit information using either a wire link or radio frequency transmission; to discriminate false targets, i.e., wind, animals, aircraft overflights; and to be retrievable, with maintenance confined to cleaning of the equipment and changing of batteries.

b. Employment Considerations:

(1) Sensors should be employed to provide lateral coverage, perpendicular to enemy's expected advance into unit's area.

(2) Where possible, PEWS sensors should be employed in depth, i.e., a sensor field. This employment will determine speed and direction of enemy movement, provide an indication of size of enemy forces, and also serve as a false alarm check, providing greater detection reliability.

(3) PEWS sensors in the radio frequency mode are desirable when time is of the essence. Wire link is advisable if terrain features block line-of-sight transmission and/or in an electronic warfare (EW) environment, when time and resources permit.

2-5. Employment.

a. Offense.

(1) Used for unmanned ambush to inflict casualties with remotely fired munitions or preplanned mortar/artillery fires.

(2) Used by ambushing force for early alert.

(3) Hand emplacement beyond objectives by patrols may reveal route of withdrawal. Also, during the consolidation phase on an objective, early warning and direction of an enemy counterattack may be determined.

b. Defense.

(1) Perimeter or unit frontage for early warning.

(2) Cover gaps and avenues of approach masked by terrain features.

(3) Rear area security.

c. In the stabilized situation such as a tactical halt, PEWS would be employed to augment perimeter security.

# CHAPTER 3

## ORGANIZATIONAL CONCEPT

3-1. General. The organizational concept is dependent on both the using organization's mission and the issued configuration of the PEWS. If type classified standard, 9 or 10 sensors would most likely be the basis of issue and the overall configuration of the system.

3-2. Organization: The PEWS will be issued as follows:

a. One per Infantry Rifle and Aero Rifle Platoon.

b. One per Armored Cavalry Reconnaisance and Infantry Scout Platoon.

c. One per Tank Platoon.

d. One per Military Police and Military Police Security Platoon.

e. One per Military Police Operations, Observer, or Scout Team.

f. Two per Headquarters or Support Company.

g. One per Headquarters Platoon.

3-3. Occupational Specialities. PEWS will require no dedicated operators, and no additional military occupational speciality will be required to operate the system.

## CHAPTER 4

## MISSION PROFILE

4-1. Threat. Not included in this study. The REMBASS threat was updated to include an approved PEWS Threat on 7 April 1975.

4-2. Target for the PEWS (Percent of Total Available Targets).

| | Wheel Vehicle | Track Vehicle | Single Individual | Group | Mean Target Distance From User |
|---|---|---|---|---|---|
| MIDEAST 100% = | 18 | 35 | 10 | 37 | 1043m |
| EUROPE 100% = | 15 | 34 | 9 | 42 | 864m |

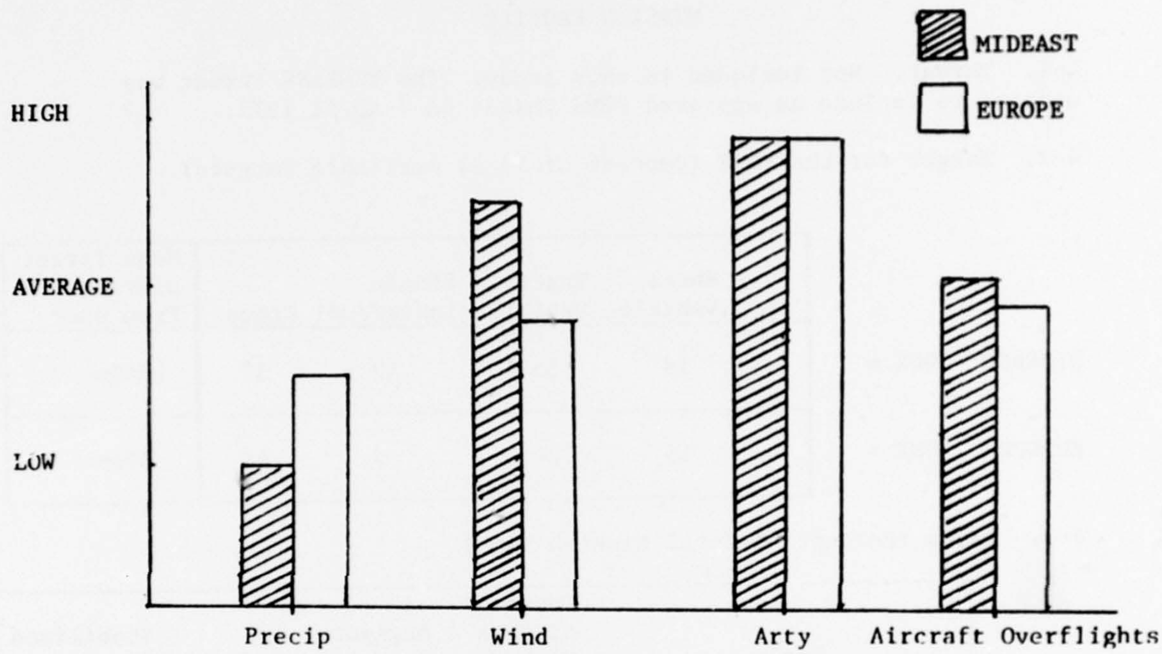
4-3. Tasks (Percent of Total Mission Time).

| | Unmanned Ambush | Early Alert, Ambush | Perimeter Security | Coverage of Gaps & Masked Ave. of Approach | Augment Active Screening of Flanks | Rear Area Security | Stabilized Situation (Tactical Halt, etc.) |
|---|---|---|---|---|---|---|---|
| MIDEAST 100% = | 9 | 11 | 19 | 29 | 13 | 12 | 7 |
| EUROPE 100% = | 11 | 11 | 16 | 34 | 10 | 12 | 6 |

4-4. Operating Mode (Percent of Total Operation, Mideast and Europe).

| | |
|---|---|
| RADIO FREQUENCY (RF) | 30.0 |
| WIRE LINK (WL) | 32.0 |
| SIMULTANEOUS RF AND WL | 38.0 |
| | 100 % |

4-5. Environmental factors affecting PEWS




4-6. Terrain Employment (Percent of Total Missions).

| | FIRM SOIL | | LOOSE SOIL | |
|---|---|---|---|---|
| | LIGHT FOLIAGE | HEAVY FOLIAGE | LIGHT FOLIAGE | HEAVY FOLIAGE |
| MIDEAST 100% = | 31 | 9 | 48 | 12 |
| EUROPE 100% = | 32 | 41 | 12 | 15 |

## CHAPTER 5

## ANALYSIS OF SYSTEM

5-1. Review of Operational Test-II (OT-II).

a. OT-II for the AN/TRS-2, PEWS was conducted at Fort Bragg, North Carolina, by the US Army Airborne, Communication and Electronics Board during the period 30 August-15 October 1976, to provide data and associated analysis to assist in evaluating and assessing the operational effectiveness and military utility.

b. The general findings of the test were that:

(1) Existing TOE's can support the system with a recommendation that a reliable communications link be established between implant teams and operators to verify sensor operation.

(2) The current configuration of PEWS (paragraph 1-3.b. above) is not optimum.

(3) The PEWS increases platoon effectiveness with its early warning capabilities.

(4) Normal platoon tactical functions will not be disrupted by the PEWS in any operational mode.

(5) The POI, as used in OT-II, is adequate for formal instruction.

(6) Reliability and availability standards were not met while maintainability standards were met or exceeded.

(7) There was degradation in PEWS' ability to detect three personnel in swampy terrain.

(8) There was no degradation in the system's ability to detect moving vehicles under any terrain conditions.

(9) The -12 TM was inadequate and the -20: and -30P TM's contained no procedures to order replacement components and parts with potentially high failure rates.

(10) The Type II sensors caused a degradation in the PEWS' ability to correctly classify targets in swampy soil and heavy foliage.

(11) The PEWS is fully acceptable as an air delivery item.

c. The test recommended that:

(1) The system be configured as:

(a) Two Receivers, Radio R-1808/TRS-2 (monitor/receiver).

(b) Ten Detectors, Anti-Intrusion, DT-577 or DT-578, AN/TRS-2 (Type-I/II Sensor).

(c) Two Sensor Interfaces, Wire Link, MX 9738, AN/TRS-2 (Wire Module).

(d) Two Grounding Stakes.

(e) Two Carrying Bags, CY 752, AN/TRS-2.

(f) Two Antennas, Tree.

(g) Two Headsets, PSID.

(h) Two Carrying Straps, Adjustable (one for each monitor/receiver).

(i) Two Operator Manuals.

(2) Corrective actions and suggested improvements noted within the OT-II report be accomplished.

5-2. Alternative Systems.

a. General. There being no base case for comparison of the PEWS, three alternative systems were contrasted for analytical purposes. The three alternative systems as defined by PM REMBASS are Alpha, Beta, and Gamma.

b. Alternative Alpha. Begin production of the system configuration exactly as it was tested in OT-II, using a 6-3 mix of Type-I and Type-II sensors and incorporate a number of minor design changes selected as a result of DT-II/OT-II findings but do not continue to attempt to solve Type-II sensor problems outlined in paragraph 5-1.b. above.

c. Alternative Beta. Solve the Type-II sensor low performance and high false alarm rate problems. Upon solution of those problems, field the PEWS in either the nine sensor (six Type-I and three Type-II), one wire module and one monitor receiver configuration (9-1-1 configuration) as tested in OT-II or in a 10-2-2 configuration requested by the users in OT-II.

d. Alternative Gamma. Eliminate further consideration of the Type-II sensor and enter into production with a 10-2-2 configuration using ten Type-I sensors, incorporating minor design changes based on DT-II/OT-II findings.

e. Additional Considerations. In the PEWS Development the following additional considerations were recommended:

(1) Modify the soil conductivity detection capabilities to include it for built-in sensor testing only.

(2) Include WD-36 wire with a WD-1/TT back up as the wire used with the system.

(3) Use the standard BA-90/u as the system battery.

(4) Use the Platoon Seismic Intrusion Device headset with the PEWS.

5-3. Risk of Alternatives.

a. General. Risk has been defined as being of two types, operational and technological. Further, operational risk is defined as the risk associated with the probability that the system's performance level will meet standards, and technological risk is defined as the risk associated with the probability that technology achieve desired standards or correct noted deficiencies. A high risk in both of these categories would indicate a high probability of operational or technological failure. Table 5.1 displays the risks associated with each alternative.

b. Alternative Alpha. This approach represents a high operational risk since failure to correct Type-II sensor problems could preclude attainment of an acceptable level of overall system performance, even though the other system elements are operating correctly. There is no technological risk as the alternative has no further technological requirements.

c. Alternative Beta. It is not known whether the Type-II sensor can be improved, yielding a high technological risk for the alternative. Realizing the ability to reduce the high operational risk of Alternative Alpha is questionable, the most optimistic risk which can be assigned this alternative is medium.

d. Alternative Gamma. Since this alternative is dealing with known operational capabilities of an existing system, both operational and technological risk are low.

TABLE 5-1

OPERATIONAL AND TECHNOLOGICAL RISK
OF ALTERNATIVES

| ALTERNATIVE / RISK | ALPHA | BETA | GAMMA |
|---|---|---|---|
| High | O | T | - |
| Medium | - | O | - |
| Low | T | - | T/O |

WHERE: O is Operational Risk

T is Technological Risk

5-4. Alternative Costs. Alternative costs are based on a procurement of 3,951 PEWS and 200 Test Set, TS-3565, AN/TRS-2 over a ten year period. These costs are in constant FY 1976 dollars and are presented at Tables 5-2 and 5-3.

5-5. Measures of Performance (MOP).

a. General. MOP were calculated from detection data gathered on the PEWS during OT-II. It should be noted that no data were gathered in the following categories and are therefore not addressed within the MOP. Detection or classification of:

(1) Track-laying vehicles.

(2) Vehicles or personnel in swampy soil with light foliage.

(3) Vehicles or personnel during precipitation or windy weather (winds greater than 5 MPH).

b. Rationale. MOP were developed to calculate relative cost performance of both single sensor types against personnel and vehicles, and the relative cost performance of system alternatives. The Figure of Relative Merit (FORM) was calculated in order to reduce the RP and RCP to a single value for each of the alternative systems.

c. MOP.

(1) Relative Performance and Relative Cost Performance of the Type-I, Type-II and Type-II improved (Type-IIa) sensors in:

(a) MOP 1 -- detection of single personnel.

(b) MOP 2 -- detection of groups of three or more personnel.

(c) MOP 3 -- detection of wheeled vehicles.

(d) MOP 4 -- classification of personnel.

(e) MOP 5 -- classification of wheeled vehicles.

(2) Relative Performance and Relative Cost Performance of Alternatives Alpha, Beta and Gamma in:

(a) MOP 6 -- detection of single personnel.

(b) MOP 7 -- detection of groups of three or more personnel.

TABLE 5-2

ALTERNATIVE 10 YEAR PROCUREMENTS
(In Thousands of FY76 $, Except Per System Data)

| CATEGORY \ ALTERNATIVE | ALPHA | BETA | GAMMA |
|---|---|---|---|
| RESEARCH AND DEVELOPMENT | - | $450 | - |
| INVESTMENT | $10,080 | $10,080 | $10,630 |
| OPERATION AND SUPPORT | $3,000 | $3,000 | $5,800 |
| TOTAL | $13,080 | $13,530 | $16,430 |
| OVERALL 10 YEAR COST PER SYSTEM FIELDED | $3,310.55 | $3,424.45 | $4,158.44 |

TABLE 5-3

ALTERNATIVE SYSTEM HARDWARE COSTS

| ITEM \ ALTERNATIVE | ALPHA | BETA | GAMMA |
|---|---|---|---|
| TYPE-I SENSOR | | $119.86 (6 ea) | $106.34 (10 ea) |
| TYPE-II SENSOR | | $141.33 (3 ea) | |
| RECEIVER | | $230.95 (1 ea) | $196.38 (2 ea) |
| WIRE MODULE | $48.37 (1 ea) | | $41.13 (2 ea) |
| TEST SET | | | $441.43 (1 ea) |
| TOTAL (3951 Systems & 200 Test Sets | $5.7 Million | $5.7 Million | $6.2 Million |
| PER SYSTEM COST | $1,444.82 | $1,444.82 | $1,560.77 |

(c) MOP 8 -- detection of wheeled vehicles.

(d) MOP 9 -- classification of personnel.

(e) MOP 10 -- classification of wheeled vehicles.

(3) Relative Performance and Relative Cost Performance of Alternatives Alpha, Beta and Gamma in the following questions:

(a) Is there a second monitor/receiver available to preclude the entire system from being rendered inoperable if the monitor/receiver is lost or damaged? (MOP 11)

(b) Is there a second wire module to preclude the system from being rendered partially inoperable (in the WL mode) should the wire module be lost or damaged? (MOP 12)

(c) Does the PEWS give a platoon a "second mission capability" by allowing squad sized units to operate independent of each other? (MOP 13)

(d) Does the current number of sensors allow the platoon to cover more than one area in equal depth using either one or two operators. (MOP 14)

d. Calculations.

(1) Data for MOP 1 through 10 were taken from Tables 8.1 and 8.2 of the Operational Test II of AN/TRS-2 Platoon Early Warning System (PEWS) Final Report, dated February 1977, with the exception of data for Type-II improved (Type-IIa) sensors and the Type-IIa input into Alternative Beta. Since this sensor does not currently exist, standards listed in section 2.8 of that report were used as data input.

(2) The base case for MOP 1-5 was the Type-I sensor. The base case for MOP 6-14 was Alternative Alpha.

(3) Relative Performance for all MOP was calculated:

$$R_p = P_a/P_b$$

Where $P_a$ is the performance of the alternative, percent of successful detections or classifications; and $P_b$ is the performance of the base case. Performance in MOP 11-14 was a qualitative value where a "yes" was considered 100% better than a "no" and 50% better than a "limited," is that if one alternative has a capability another alternative does not, the former represents a 100% increase over the latter. This is supported MOP 13, e.g., a system which can be extended to two operational subsystems can be judgmentally assumed to be twice as good as one which cannot.

(4) Relative cost performance for all MOP was calculated:

$$R_{cp} = \frac{P_a/P_b}{C_a/C_b}$$

Where $P_a$ and $P_b$ are described in paragraph 5-5.d.(3) above, $C_a$ is the cost of the alternative (taken from Tables 5-2 and 5-3), and $C_b$ is the base cost, taken from the same tables.

(5) The Figure of Relative Merit is the calculated mean of the $R_p$ and $R_{cp}$ values for each alternative in MOP 6-14. The rationale in this calculation is that since the relative importance of individual MOP is a subject of debate, all MOP were assigned equal weight.

e. Results.

(1) $R_p$ for MOP 1-5 (Table 5-4) shows a preference for either a Type-I or Type-IIa sensor. $R_{cp}$ for MOP 1-5 shows the Type-I sensor to be clearly the most cost effective. This superiority of the Type-I sensor over the Type-II or Type-IIa is in part because the existing sensor (Type-II) is slightly more expensive and the proposed sensor (Type-IIa) necessitates an additional R&D cost, making it the most costly. The Type-I sensor is therefore preferred over any other.

(2) $R_p$ for MOP 6-10 (Table 5-5) shows little or no difference among the three alternatives. This lack of discrimination stems from the facts that:

(a) Alternative Alpha does not meet some test criteria set forth in section 2.8 of the OT-II report.

(b) Alternative Beta is a hypothetical extension of Alpha where the proposed Type-IIa sensor is assumed to meet the performance criteria.

(c) Alternative Gamma is relative performance of the Type-I sensor unencumbered by the shortcomings of the Type-II sensor.

(3) $R_{cp}$ for MOP 6-10 shows Alternatives Alpha and Beta to be approximately equal where Alternative Gamma in this case, shows the lowest cost performance.

(a) It consists of more hardware than the other alternatives and is therefore more expensive.

(b) An incremental increase in performance because of the increase in hardware has not been tested or measured; therefore there is no

Table 5-4

RELATIVE PERFORMANCE AND RELATIVE COST PERFORMANCE

OF INDIVIDUAL SENSORS

| SENSOR / MOP | TYPE-I | | TYPE-II | | TYPE-IIa | |
|---|---|---|---|---|---|---|
| | RP | RCP | RP | RCP | RP | RCP |
| 1 | 1.00 | 1.00 | .87 | .74 | .95 | .45 |
| 2 | 1.00 | 1.00 | .82 | .70 | 1.08 | .51 |
| 3 | 1.00 | 1.00 | 1.08 | .92 | 1.14 | .53 |
| 4 | 1.00 | 1.00 | .99 | .84 | .99 | .47 |
| 5 | 1.00 | 1.00 | .78 | .66 | 1.01 | .47 |
| Mean Value | 1.00 | 1.00 | .91 | .77 | 1.03 | .49 |

Table 5-5

RELATIVE PERFORMANCE AND RELATIVE COST PERFORMANCE

OF ALTERNATIVE CONFIGURATIONS

| MOP \ SYSTEM | ALPHA | | BETA | | GAMMA | |
|---|---|---|---|---|---|---|
| | RP | RCP | RP | RCP | RP | RCP |
| 6 | 1.00 | 1.00 | 1.02 | .99 | 1.04 | .83 |
| 7 | 1.00 | 1.00 | 1.03 | 1.00 | 1.05 | .84 |
| 8 | 1.00 | 1.00 | 1.01 | .98 | .98 | .78 |
| 9 | 1.00 | 1.00 | 1.01 | .98 | 1.00 | .80 |
| 10 | 1.00 | 1.00 | 1.00 | .96 | 1.07 | .85 |
| Mean Value | 1.00 | 1.00 | 1.01 | .98 | 1.01 | .82 |

Table 5-6

RELATIVE PERFORMANCE AND RELATIVE COST PERFORMANCE

OF JUDGMENTAL FACTORS

| MOP \ SYSTEM | ALPHA Response | ALPHA RP | ALPHA RCP | BETA Response | BETA RP | BETA RCP | GAMMA Response | GAMMA RP | GAMMA RCP |
|---|---|---|---|---|---|---|---|---|---|
| 11 | NO | 1.00 | 1.00 | NO | 1.00 | .97 | YES | 2.00 | 1.59 |
| 12 | NO | 1.00 | 1.00 | NO | 1.00 | .97 | YES | 2.00 | 1.59 |
| 13 | NO | 1.00 | 1.00 | NO | 1.00 | .97 | YES | 2.00 | 1.59 |
| 14 | Limited | 1.00 | 1.00 | Limited | 1.00 | .97 | YES | 2.00 | 1.19 |
| Mean Value | | 1.00 | 1.00 | | 1.00 | .97 | | 2.00 | 1.49 |
| Figure of Relative Merit (FORM) | | 1.00 | 1.00 | | 1.01 | .98 | | 1.46 | 1.12 |

change in the numerator of the $R_{cp}$ formula where there is an increase in the formula's denominator of over 20%.

(4) $R_p$ and $R_{cp}$ for MOP 11-14 (Table 5-6) represent the judgmental portion of the study. The rationale in the quantification of this approach is addressed in paragraph 5-5.d.(3). Both $R_p$ and $R_{cp}$ show alternative Gamma to be superior, netting a 12% increase in performance over cost.

(5) The FORM, calculated for each alternative configuration of the PEWS (Table 5-6), indicates clearly that, given the Judgmental MOP, Alternative Gamma shows the best cost performace of the alternatives.

5-6. Additional Findings.

a. A Cost and Training Effectiveness Analysis (CTEA) was not conducted as a part of this CER. The POI used for training OT-II test personnel indicated no training problems which would preclude type classification of the PEWS.

b. Logistical Support concept for the PEWS was included in OT-II. Inadequacies noted in the equipment's technical publications are currently being corrected.

c. Current Reliability, Availability and Maintainability data is deemed acceptable and will be addressed at the DEVA IPR by PM. REMBASS.

## CHAPTER 6

## RECOMMENDATIONS

6-1. It is recommended that:

a. The recommendations of the OT-II test report as shown in paragraph 5-1.c. above be accepted with the modification that the system be configured with ten Detectors, Anti-Intrusion, DT-577 (para 5-1.c.(1)(b)).

b. The Platoon Early Warning System, AN/TRS-2, as described above, be type classified standard and fielded.

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