

Marine Corps Warfighting Laboratory

Tactical Warrior Experiments
Phase I: Information Warrior



To improve Naval expeditionary warfighting capabilities across the spectrum of conflict for current and future operating forces.

Platoon Level Experiments
Experiment After Action Report
December 2001



**UNITED STATES MARINE CORPS
MARINE CORPS WARFIGHTING LABORATORY
MARINE CORPS COMBAT DEVELOPMENT COMMAND
QUANTICO, VIRGINIA 22134-5096**

IN REPLY REFER TO:
3900
C52

From Commanding General

Subj: TACTICAL WARRIOR PHASE I: INFORMATION WARRIOR, INFANTRY
PLATOON LEVEL EXPERIMENTS AFTER ACTION REPORT.

Encl: (1) Information Warrior Experiments After Action Report

1. This report gathers, organizes and synthesizes knowledge from live, force-on-force experiments conducted by the Marine Corps Warfighting Laboratory (MCWL) as the initial phase of a series of experiments entitled *Tactical Warrior*. These experiments occurred during the period 10-26 September 2001 in and around the Camp Butler, Okinawa MOUT Facility.

2. MCWL conducted experiments with Marines from 1st Platoon, Lima Company, 3rd Battalion, 4th Marines, Third Marine Division. We conducted experiments on semi-open, jungle and urbanized terrain against a dedicated opposition force.

3. These experiments looked at ways to improve information management at the platoon level. In addition to addressing structural issues within the infantry platoon, we evaluated the use of the PRC-148 Multi Band Inter/Intra Team Radio that is being fielded to selected units in the Operating Forces.

4. Although much more experimentation is needed, our initial results are positive. They indicate that the concept of training and equipping a Marine to have the primary mission of receiving, organizing, reporting and disseminating information at the rifle squad and platoon level shows great promise to improve operational effectiveness.

5. We will continue to search for better ways to fight and win more effectively and efficiently across the spectrum of conflict for current and future operating forces.

WILLIAM D. CATTO

Distribution:

CG, MCCDC

WDID

TECOM

MAWTS

HQMC:

DC A

DC PP&O

DC P&R

DIR, C4

CG, MARCORSSYSCOM

CG, MARFORPAC

CG, MARFORLANT

CG, MARFORRES

CG, I MEF

CG, II MEF

CG, III MEF

CG, 1st MARDIV

CG, 2nd MARDIV

CG, 3rd MARDIV

CG, 4th MARDIV

CG, 1st MAW

CG, 2nd MAW

CG, 3rd MAW

CG, 4th MAW

TD, ONR

Table of Contents

Executive Summary	1
Section I Experiment Overview.....	3
Background.....	4
Hypothesis	4
Primary Objectives	4
Supporting Objectives.....	4
Functional Taskings.....	4
Personnel Sourcing	5
Venue	5
Task Organization Variations.....	5
Figure 1 Use of Radios and Nets.....	5
Experiment Environments	7
Experiment Control (EXCON).....	7
Measures of Effectiveness (MOE).....	7
Master Experiment Scenario Events List (MESEL)	7
Experiment Scenario	7
Experiment Cycle	7
Data Collection.....	8
Event Adjudication.....	8
Observer/Controllers.....	8
Schedule Adjustments	9
Radio Battalion Support.....	9
Experiment Events	9
Experiment Unit Strength	9
Completed Schedule	10
Pre-Experiment Training	10
Limiting Factors	10
Radio Communication.....	10
Land Navigation	10
Unit Patrolling	11
Basic Urban Skills.....	11
Personnel Stability.....	11
Frequency Spectrum Limitations	11
Use of MILES 2000.....	11
Effectiveness of MILES 2000	12
Findings.....	12
Information Flow.....	13
Participant Preferences.....	14
Casualties	14
ISR Vulnerability	14
Standard Report Formats	15
Conclusions	15
Section II Detailed Descriptions of Events.....	16
Event One	17
Event Two.....	19
Event Three.....	21
Event Four.....	23
Event Five	26
Event Six.....	29
Event Eight.....	35
Event Nine	38
Event Ten.....	41
Event Eleven	44

Annex A Information Flow	46
Annex B Participant Feedback	47
Annex C Casualty Information	55
Annex D Radio Usage Information	56
Annex E PRC-148 MBITR Position Paper	57
Annex F Cost Comparisons	64

Executive Summary

1. The Project Metropolis (ProMet) team from the Marine Corps Warfighting Laboratory (MCWL) conducted the first in the Tactical Warrior series of experiments in Okinawa, Japan during September 2001. This experiment, named *Information Warrior*, examined ways to effectively acquire and exploit tactical information at the infantry platoon level. The experiment hypothesis was:
“That properly trained and equipped Marines, whose primary mission is to receive, organize, report, disseminate and record information at the squad, platoon and company level, will significantly improve overall situational awareness, decision making, maneuver, and operational effectiveness.”
2. Efforts during this phase were focused on and limited to:
 - a. Determining the value-added of Information Warriors (IW) located with the platoon commander, platoon sergeant, and squad leaders.
 - b. Determining the value added by the AN/PRC-148 Multi Band Inter/Intra Team Radio (MBITR) when used by the platoon commander, platoon sergeant, and squad leaders of the infantry platoon. We used the MBITR in the non-secure mode only.
3. All events were structured force-on-force events using scripted routing until enemy contact, after which actions and reactions were free-play. We used four different combinations of personnel and radio equipment. BLUFOR conducted combat patrols against a conventional opposing force (OPFOR) in the close/jungle and conducted Block 3 combat operations against a light conventional force in an urban environment (Combat Town).
4. The concept of the *Information Warrior* has not been fully evaluated at this point, however our synthesis of observations and analysis is that the majority of the platoon leadership feels that the IW gave them improved situational awareness and assisted their decision making at critical junctures; e.g., contact with the enemy, consolidation, etc. Future experimentation is required to gain better insight into this capability, to include modified platoon structures. This type experimentation is planned for later phases of the Tactical Warrior series.
5. Casualties tended to be lower in events where the MBITR was used. The MBITR appears to enhance C^2 significantly for the platoon. Leaders said they could manage multiple nets, and preferred to have two radios rather than one—anytime. All participants were very satisfied with the weight and ease of operation of the MBITR. Furthermore, once they operated with the greater capability, they did not want to give it up.
6. Participants rated the IW more valuable for the platoon commander than for the other platoon leaders. IWs indicated that they had no problems performing assigned tasks during the movement or patrolling phase but had more difficulty performing their duties during actions at the objective. Squad leaders indicated value in assigning one of the squad members the duties of IW. Their main concern was the loss of a "shooter" during contact, but they also stated that the IW is most useful during contact.

7. Sourcing of the IW needs to be addressed. Specifically, is the Info Warrior is an additional duty for selected individuals from within the platoon's structure or is he an addition to the existing unit structure?
 8. The Marine Corps Warfighting Laboratory will forward an UNS recommending the fielding of the MBITR to fill the communications gap in the infantry platoon.
 9. Although not a specific objective of this experiment, two key points about the Intra Squad Radio (ISR) became apparent. First, analysis of radio traffic content collected by Marines from 1st Radio Battalion tends to validate the belief that non-secure transmissions on the ISR are of little real time and/or long-term use to an enemy. And second, the inability to train with the actual Marine Corps issue ICOM ISR is a significant deficiency for units on Okinawa. We used a Motorola radio to serve as a surrogate for the fielded ISR.
 10. We have high confidence in the data and analysis from which we gathered, organized and synthesized the knowledge in this report. Not only were highly qualified O/Cs present for *every* piece of the experiments, Exercise Control monitored—and tape recorded—all radio transmissions. These recordings, in addition to the input from 1st Radio Battalion, were used extensively in the daily event reconstructions and debriefs.
-

Section I

Experiment Overview

1. **Background.** The Project Metropolis (ProMet) team from the Marine Corps Warfighting Laboratory (MCWL) conducted the first in a series of Tactical Warrior experiments in Okinawa, Japan during the month of September 2001. Our efforts were driven by what we have learned in previous experiments that the current paradigm for small unit leaders—company level and below—is built around three primary functions: 1) self-protection, 2) decision making for the employment of their unit, and 3) communicating with lower, higher and adjacent units. And, with all of these competing demands, it is the third element, communication, which most often is neglected. This significantly degrades essential situational awareness (SA) at all levels. Therefore, the focus of *Information Warrior* was to examine the ways to effectively acquire and exploit tactical information at the infantry platoon level. This experiment sought to determine if the dedication of personnel to this task would enhance decision making and operational effectiveness.
2. **Hypothesis.** The hypothesis for this experiment is shown in the text box below.

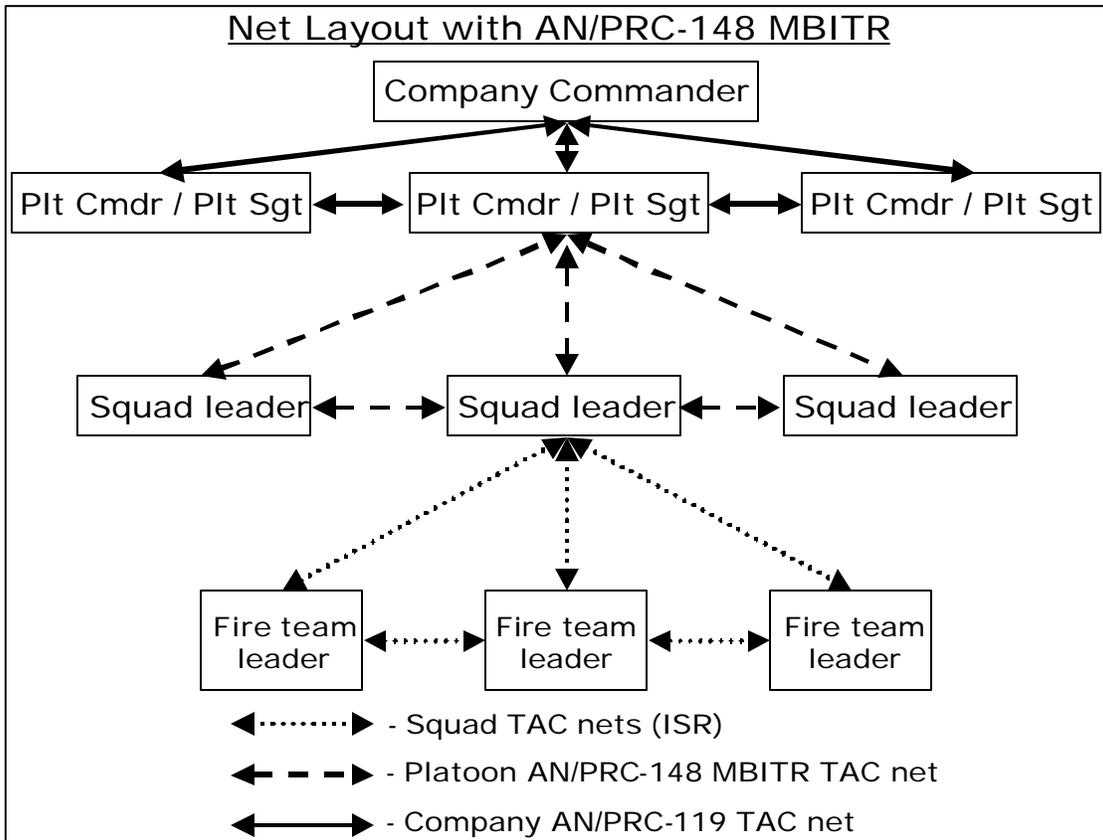
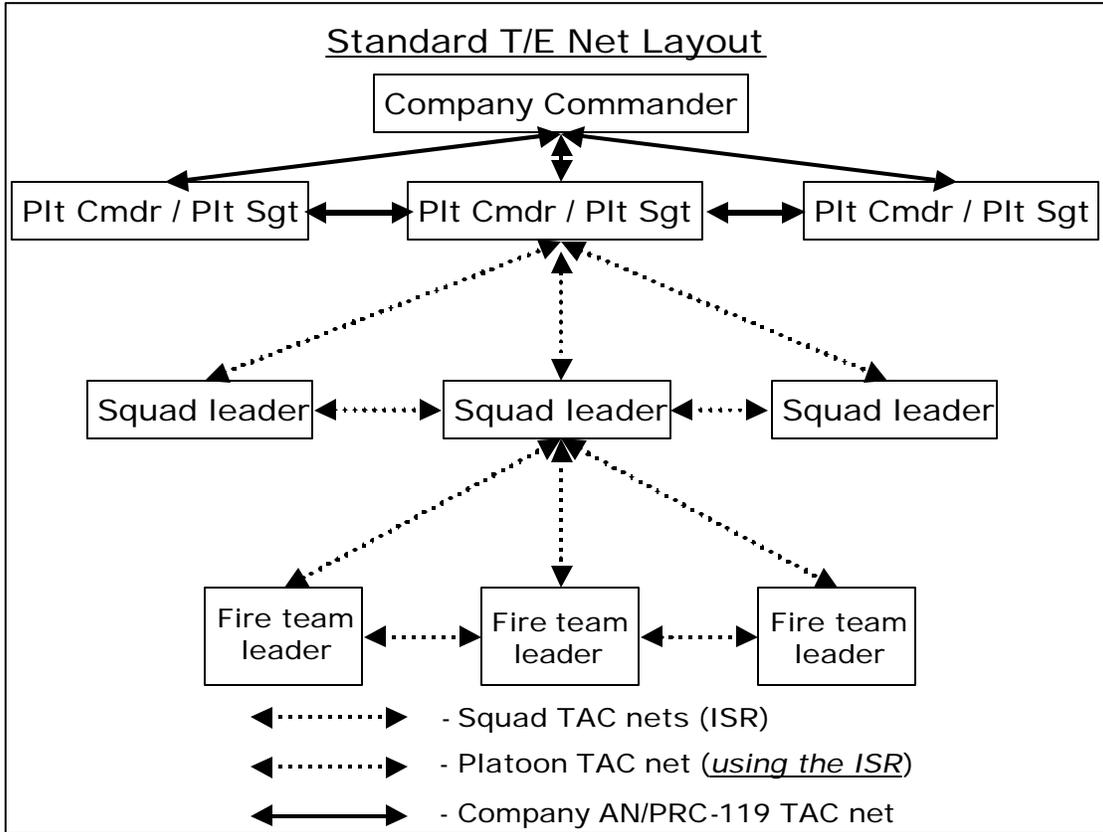
“That properly trained and equipped Marines, whose primary mission is to receive, organize, report, disseminate and record information at the squad, platoon and company level, will significantly improve overall situational awareness, decision making, maneuver, and operational effectiveness.”

3. **Primary Objectives.** Efforts during this phase were focused on and limited to:
 - a. Determining the value-added of Information Warriors (Info Warriors or IW) located with the platoon commander, platoon sergeant, and squad leaders.
 - b. Determining the value the AN/PRC-148 Multi Band Inter/Intra Team Radio (MBITR) provides when used by the platoon commander, platoon sergeant, and squad leaders of the infantry platoon.
4. **Supporting Objectives.** Although outside of realistic expectations for the scope of this initial experiment, the ProMet team attempted to get a general sense of the following issues:
 - a. Manpower requirements.
 - b. Equipment requirements.
 - c. Training/experience requirements.
 - d. Additions and revisions to existing warfighting tactics, techniques and procedures (TTPs).
 - e. Information requirements such as:
 - (1) Who needs what?
 - (2) When do they need it?
 - (3) How is the information generated; i.e., information push or information pull?
5. **Functional Taskings.** Selected Marines from the unit were assigned the primary duty as Info Warriors. They were tasked to assist their element leader in commanding, controlling, and coordinating the activities of the element by:
 - a. Observing activities.
 - b. Communicating with higher, adjacent, and subordinate IWs and leaders.
 - c. Monitoring higher, adjacent, and subordinate communications.
 - d. Recording messages and plotting friendly/enemy locations.

e. Providing situation updates and answering leader's questions.

6. **Personnel Sourcing.** Info Warriors were sourced out of the existing platoon structure.
7. **Venue.** Operations were conducted at Camp Schwab Range 10 complex, the Central Training Area (CTA) and the MOUT site in Okinawa, JA.
8. **Task Organization Variations.** All training practical application and field experiments were structured force-on-force events using scripted routing until enemy contact, after which actions and reactions were free-play. We used four different combinations of personnel and radio equipment. (See figure 1 for how the radio were used.) The four variations were:
 - a. **Variation #1: Standard Table of Organization (T/O) and Table of Equipment (T/E).** This represents the baseline/current capability.
 - (1) T/O is standard infantry platoon with three rifle squads.
 - (2) T/E for communication gear is one AN/PRC-119 VHF SINGARS radio—on company tactical frequency—with the platoon commander. The Platoon Commander, Platoon Sergeant, each squad leader, corpsman, and fire team leader is equipped with the Intra Squad Radio (ISR).
 - (a) (*Note: Because the currently fielded ICOM ISR is not approved for use on Okinawa, we used Motorola radios as surrogates for the ISR.*)
 - (3) Goal is to establish current information gaining and processing capability.
 - b. **Variation #2: Standard T/E with Info Warrior.** This configuration uses standard radio equipment; the standard infantry platoon.
 - (1) Assigns the IW role to the Platoon Commander's radio operator.
 - (2) Assigns the IW role to four other members of the platoon to serve as IWs for the Platoon Sergeant and the three Squad Leaders.
 - (3) Goal is to measure effect of adding the IW function without additional radios.
 - c. **Variation #3: Standard T/O with the addition of the AN/PRC-148 MBITR.** This uses the standard T/O and T/E *plus* five (5) MBITRs to be used by the Platoon Commander, Platoon Sergeant, and each Squad Leader.
 - (1) To measure effect of adding the MBITR without assigning a dedicated IW to receive, organize, report, disseminate and record information.
 - d. **Variation #4. Combined IW and MBITR.** This configuration adds the five MBITRs and also assigns Marines—from the existing platoon structure—to serve as IWs for the platoon commander, platoon sergeant, and each squad leader (total of five IWs) to receive, organize, report, disseminate and record information.
 - (1) To measure the combined effect of equipment and dedicated IW function.

Figure 1 Use of Radios and Nets (Next Page)



9. **Experiment Environments.** Experiments were conducted in two different types of terrain to address the effects on situational awareness driven by unit formations dictated by terrain. Therefore, we conducted events in close/jungle *and* MOUT terrain. BLUFOR conducted combat patrols against a conventional OPFOR in the close/jungle and conducted Block 3 combat operations against a light conventional force in MOUT. The execution sequences were rotated in an effort to offset the "learning curve" effect.
10. **Experiment Control (EXCON).** A higher headquarters white cell was used to simulate the higher company and battalion command and control (C²) functions. Observer/ controllers (O/Cs) were assigned at the platoon commander, platoon sergeant, and squad leader level to control the event, provide input, monitor free-play, maintain data logs, and debrief participants at the end of events. We also assigned O/Cs to the opposing force (OPFOR).
11. **Measures of Effectiveness (MOE).** MOE focused on both the number and quality of situational awareness (SA) information items that could and should be shared among all platoon leadership and members.
 - a. MOE were applied to participant SA relative to "ground truth;" i.e., the information known by O/Cs to be accurate based on their real time separate radio nets and on scene observations. We also applied them to assess SA through immediate (daily) and more fully analyzed (on return to MCWL) post event reconstruction of all scheduled and unscheduled activities. The latter action included use of EXCON records of monitored radio transmissions.
 - b. We employed radio intercept professionals from the Operating Forces to track and assess number of ISR OPSEC and communication protocol violations. Beyond giving us a small sense of the potential for enemy exploitability of our transmissions, it also gave us some feel for training necessary to increase the effectiveness of training for those who use the radio.
 - c. Activities that were part of unit SOPs (e.g. position reports, situation reports, etc.) were also tracked and included as SA measures.
 - d. These included routine and SOP reports. These consisted of both info-push and info-pull reports and requests for information.
 - e. Free-play activities that should have caused an action (e.g. enemy sightings, contact, location of booby traps, casualties, etc.) were used to evaluate the participants' SA.
12. **Master Experiment Scenario Events List (MESEL).** This consisted of planned—and some unplanned—situation-specific inputs that were fed to the participants by EXCON or O/Cs. These included "significant" and "non-significant" data inputs. OPFOR activities were controlled and scripted by ProMet staff to ensure experimentation goals were achieved.
13. **Experiment Scenario.** We provided a *Special Situation* to the Marines as part of the daily fragmentary order (FRAG order) the basic operation order—sometimes written and sometimes in verbal form—prior to each event. This included a mission, friendly and enemy situation, and general patrol route.
14. **Experiment Cycle.** The following is a brief description of the steps in the event cycle:
 - a. **Day prior to experiment event :**

- (1) ProMet staff determined focus of experiment event.
 - (2) ProMet staff developed FRAG order.
 - (3) ProMet staff issued FRAG order to experiment force.
 - (4) Platoon Commander issued warning order to unit leaders.
- b. **Day of experiment event :**
- (1) Safety brief in assembly area.
 - (2) Experiment force prep time.
 - (3) Experiment force issued order.
 - (4) Confirmation brief given to ProMet staff, O/Cs, and unit.
 - (5) Experiment force conducted synchronization drill in assembly area.
 - (6) Conducted experiment.
 - (7) Experiment staff reconstructed event.
 - (8) Experiment staff provided feedback to experiment force.
 - (9) Experiment staff discussed event with key unit leaders and participants.
 - (10) O/Cs conducted detailed debrief of elements.
 - (11) Data packages turned in to Lead Analyst.
15. **Data Collection.** We used a combination of the following methods to collect data.
- a. At appropriate points during the event, O/Cs queried participants as to what they knew.
 - b. Individuals completed questionnaires at individual, fire team, squad, and platoon level.
 - c. O/Cs collected data by direct observation.
 - d. EXCON monitored all tactical nets to establish the flow of each event.
 - e. All radio transmissions were tape recorded in EXCON and used in event reconstruction.
 - f. O/Cs and EXCON personnel applied subjective judgments to establish patterns for performance and apply MOE to confusing situations and activities.
 - g. Radio Battalion Marines used equipment and techniques to monitor and intercept ISR communication on tactical nets.
16. **Event Adjudication.** Force-on-force events used a combination of blanks, simunitions (waxy, blue or red colored paint ball like material fired from a special upper receiver mounted on the M16 and M4 service rifles), pyrotechnics, and judgment calls by O/Cs to produce casualties.
17. **Observer/Controllers.** To ensure consistency in subjective assessments, O/Cs were trained on weapons effects adjudication, data collection procedures, data collection forms, and given an orientation to any new TTPs used.
- a. O/Cs were assigned to the Platoon Commander, Platoon Sergeant, and each squad leader.
 - b. O/Cs were also assigned to the OPFOR.
 - c. O/Cs tracked the unit through mission work-up and attended all mission briefs and rehearsals. They moved with the unit during the event observing, recording, and adjudicating engagements as required.
 - d. O/Cs maintained an activity log to record their element's activities. These were used extensively to facilitate event reconstruction.
 - e. Following the daily event reconstruction, O/Cs guided their element through a detailed debrief that resulted in completion of the *End of Event Questionnaire* and casualty forms.
 - f. O/Cs ensured completion of the complete data package made up of:

- (1) Activity log,
- (2) End of Event Questionnaire,
- (3) Casualty forms—who, when, where, and how individuals were killed or wounded.
- (4) O/C observation notes.
- (5) Ammunition usage data—from which we can develop planning factors for annual training requirements.
- (6) Demographic data on each individual participating in the events.
- (7) Equipment queries related to training and operations—to better understand their utility and use.

18. **Schedule Adjustments.** The experiment began with land navigation and patrolling refresher training. Then, the schedule was adversely affected by two typhoons forcing a change to the experiment plan. Based on the staff's evaluation of the platoon's readiness to operate in the jungle environment and the forced changes in the schedule because of the typhoons, events 1-through 3 were used as training rather than experiment events.

19. **Radio Battalion Support.** Radio Battalion personnel were on hand for every experiment event. They monitored radio transmissions, assessed their significance and debriefed participants every day (See Annex D: Radio Usage Information). This gave us good experiment data and—through the debriefs—emphasized the value of good radio discipline to all participants.

20. **Experiment Events.** Events were all conducted during the day and were similar in length, mission, and complexity. Operations were conducted in two environments: jungle/close, and a combination of jungle/close and MOUT. The eight experiment events were (see Section II for detailed information on each of them.)

- a. Event #4. Baseline, standard T/O and T/E.
 - (1) Conducted in the jungle/close environment.
- b. Event #5. Standard T/E with IW.
 - (1) Conducted in the jungle/close environment.
- c. Event #6. Combined event with both IW and MBITR.
 - (1) Conducted in the jungle/close environment.
- d. Event #7. Standard T/O with MBITR.
 - (1) Conducted in the jungle/close environment.
- e. Event #8. Baseline, standard T/O and T/E.
 - (1) Jungle/MOUT environment.
- f. Event #9. Standard T/E with IW.
 - (1) Jungle/MOUT environment.
- g. Event #10. Standard T/O with MBITR.
 - (1) Jungle/MOUT environment.
- h. Event #11. Combined event with both IW and MBITR.
 - (1) Jungle/MOUT environment.

21. **Experiment Unit Strength.** The mean platoon strength was:

- a. **Blue**: 1 officer, 33 USMC enlisted, and 1 USN Corpsman.
- b. **OPFOR**: The mean OPFOR strength was 9 USMC enlisted.

22. **Completed Schedule.** The following depicts the Info Warrior schedule as executed.

	<u>Date</u>	<u>Date</u>	<u>Date</u>	<u>Date</u>	<u>Date</u>	<u>Date</u>
	<u>27 Aug</u>	<u>28 Aug</u> Advance party to Okinawa	<u>29 Aug</u>	<u>30 Aug</u>	<u>31 Aug</u>	<u>1 Sep</u>
<u>2 Sep</u> Main party arrives	<u>3 Sep</u> Labor Day Set up	<u>4 Sep</u> Set up, Organ. meeting	<u>5 Sep</u> IW and radio training, <i>Schwab</i>	<u>6 Sep</u> Land Nav and GPS training, <i>Schwab</i> (day)	<u>7 Sep</u> Day patrol P/A, <i>Schwab</i> (day/night)	<u>8 Sep</u> Typhoon
<u>9 Sep</u> Typhoon	<u>10 Sep</u> Event #1, Std T/O and T/E	<u>11 Sep</u> Typhoon	<u>12 Sep</u> Typhoon	<u>13 Sep</u> Typhoon	<u>14 Sep</u> Event #2, Std T/O and T/E	<u>15 Sep</u> Event #3, Std T/O w/MBITR
<u>16 Sep</u> Admin	<u>17 Sep</u> Event #4, Standard T/O and T/E	<u>18 Sep</u> Event #5, Std T/O w/MBITR	<u>19 Sep</u> Event #6, Combined IW and MBITR	<u>20 Sep</u> Event #7, Std T/O w/ MBITR	<u>21 Sep</u> Event #8, Standard T/O and T/E	<u>22 Sep</u> Admin
<u>23 Sep</u> Admin	<u>24 Sep</u> Event #9, Std T/E w/ IW	<u>25 Sep</u> Event #10, Std T/O w/ MBITR	<u>26 Sep</u> Event #11, Combined IW and MBITR, and AAR	<u>27 Sep</u> Draft <i>Quick Look Report</i> Equipment turn in and pack-up	<u>28 Sep</u> Admin	<u>29 Sep</u> Return to CONUS
Table 1 Information Warrior Completed Schedule						

23. **Pre-Experiment Training.** The normal ProMet experiment sequence is to first train the unit to a consistent level on the TTPs to be evaluated and then conduct the experiment. But as this experiment involved standard infantry patrolling skills, the work-up training was restricted to classes on information processing, the GPS, and the AN/PRC-148 (MBITR) radio. This approach proved to be inadequate, as the platoon lacked the experience and proficiency in some basic infantry skills needed to hit the ground running in these jungle experiments.

24. **Limiting Factors.** Our analysis identified these major limiting factors.

- a. **Radio Communication.** The major limiting factor in the experiment was the individual Marine's general lack of experience in communicating on the radios. Though the ICOM intra squad radios (ISRs) have been fielded, few of the platoon members had had any experience in using an ISR or any other type of radio. Therefore, they had little experience in communicating, reporting, or using radios for C².
- b. **Land Navigation.** The second major limiting factor was the unit's problem with land navigation. The platoon is from 29 Palms and was not prepared to move and navigate in

the jungle/close environment. Navigation was a significant problem throughout the experiment.

- c. **Unit Patrolling.** The third major problem was the unit's lack of experience in conducting platoon level patrols. The platoon had little experience operating together, and had limited experience with their SOPs.
- d. **Basic Urban Skills.** Only eleven (11) of the thirty-seven (37) platoon members had been through the ProMet Basic Urban skills Training (BUST) program at the former George Air Force Base. Eight of the nine OPFOR had also been at George. However, because all of these Marines (from Lima Company) had operated—somewhat unconventionally—as the OPFOR at the George experiments, they had not reinforced their “conventional” BUST skills. Furthermore, it had been 8 months since the training at George.
- e. **Personnel Stability.** We were not able to keep all of the squad leaders and Info Warrior billet holders in place for every event. Outside requirements frequently drew personnel from the experiment force. Though this broadened the database, it reduced the training and experience levels for some participants.
- f. **Frequency Spectrum Limitations.** From this perspective, Okinawa presented a challenging location for experimentation because the Government of Japan had not approved the specific radio frequencies used by the ISR. Though we began the approval request process months prior to arrival, we were unable to gain approval for use of the ISRs. Therefore, we used Motorola radios as surrogates for the ISRs. Although this proved to be adequate to support the experiment’s hypothesis, Marines were unable to get the training value of using the recently fielded ISR.

25. **Use of MILES 2000.** This was the first experiment with recently modified *Multiple Integrated Laser Engagement System* (MILES) 2000 equipment. MARCORSSYSCOM provided this new gear so we could find out if the firing of the simunition would round activate the MILES scoring system. We obtained seven (7) cases of MILES 2000 equipment from TAVSC at Camp Foster. The specially cut Styrofoam linings completely protected the equipment from shock during transport. However, given the hard rain we experienced, the packing lists on the outside of the cases were completely destroyed—leaving us to guess about the contents of the different cases. Also, we noted that issue and recovery accountability was cumbersome and excessively time consuming. The system consists of:
- a. M-16 laser emitters
 - b. Chest harnesses,
 - c. M-249 laser emitters,
 - d. Control guns, and
 - e. Laser alignment apparatuses (ASAAs).
 - f. Recommendations:
 - (1) Mark the outside of the cases with block letters identifying its contents.
 - (2) Tape or mark the emitters with simple numbers to assist the using units on collecting the gear at the conclusion of the exercise. Create a list at the beginning of the event with a name and number on the emitter handed out could be sufficient for accountability and issue.
 - g. Instruction booklets. These became useless in the inclement weather.
 - (1) Recommend laminate the instruction booklets

- h. Laser Alignment. We distributed and aligned the MILES 2000 equipment in jungle landing zone in the central training area. We had problems aligning the laser emitter to the weapon systems—perhaps because of a light rain. For whatever reason, many units did not register properly with the ASAAF. This resulted in varying degrees of loss of confidence in the equipment by Marines as they became aware of the inability to BZO their respective emitters to their weapon.
 - (1) Recommend issue and align equipment in a rear/administrative area.
- i. Batteries. We encountered short battery life, approximately 15 minutes, with the majority of the batteries used with the ASAAF. Either the ASAAF device drew a large amount of energy from the batteries or we had bad batteries.
 - (1) Recommend evaluate battery strength when drawing equipment; get a manufacturer recommendation for the best/preferred 6V battery to use with the equipment; and, when possible, have a portion of ASAAs adapted to operate from a electrical source other than battery; e.g., wall socket or generator.

26. **Effectiveness of MILES 2000.** Given the conditions (described above) in the operating area, we did not collect quantitative data during the experiment on the effectiveness of the laser emitters to operate using simunition rounds. We did conduct static, standalone test fires at a range of approximately 25 feet. Emitters from our stock of equipment operated sporadically. Using simunitions, sometimes they activated the system and sometimes they did not. And, it appeared to observer controllers that the system did not work all of the time during the practical application engagements.

- a. This was the first time we tried to issue and BZO the equipment ourselves—without the contractor support we have used in the past. We had difficulties aligning the equipment even though our staff has used the equipment in previous Warfighting Lab experiments. Therefore, we think that an average rifle company in the Operating Forces would encounter significant challenges in drawing and using MILES 2000 equipment.
 - (1) Recommend that a MILES 2000 equipment coordinator be available wherever the unit draws the equipment. He must be familiar with using the equipment and prepared to assist the using force in preparing for training with the equipment.
 - (2) Evaluate the modifications to MILES 2000 equipment in a controlled environment to work out the final glitches before using it in an intense field experiment.

27. **Experiment Findings.** Here is the result of our observations and analysis of the data collected. These become the basic findings of the experiment.

- a. Participants felt that the IW was most useful during contact.
- b. More wanted the IW than did not.
- c. The squad leader who was the best using the communication assets, was more positive on the utility of the IW than the others.
- d. The squad leader who used the communication assets the least to command and control, was more negative on the utility of the IW than the others.
- e. Leaders stated that the IW freed them up to pay more attention to commanding and controlling their element rather than dealing with multiple radio messages.
- f. IWs felt that they were useful and could predict or anticipate what info they needed to pass or what info their leader needed.

- g. Participants suggested that there is an advantage to having a smaller weapon for the IW. They felt that it would make it easier for him to work the radio, record messages, and use the map. They suggested either a pistol or M-4.
- h. At first, leaders had some problem getting used to having an IW following them so closely.
- i. Some squad leaders split off their IW and used them as an assistant or extra communication link to the other element.
- j. The ProMet staff provided leaders and IWs a standard air crewman's loose-leaf notebook—with polypropylene pages designed to hold kneeboard size card/paper inserts. We filled these with laminated maps of the area and selected report formats. The IWs stated that this loose-leaf type aid was useful and worked adequately.
- k. Some participants suggested that we should consider using a personal digital assistant (PDA)—e.g., *Palm Pilot* ^{3/4}type system for the leaders and IW.

28. **Information Flow.** See Annex A for additional details.

- a. Information seemed to flow best with the Standard T/O and the MBITR.
- b. O/Cs noted that the quality of information passed on the net appeared to be best when the MBITR was present, in that the majority of the transmissions were related to command and control for maneuver vice in the other situations where the majority of communication was: "*where are you?*" transmissions.
- c. The presence of the MBITR appears to enhance C² significantly both to higher and within the platoon.
- d. In two events where the platoon only had the standard T/E (one AN/PRC-119 on Company TAC), communication to the company was lost when the platoon commander's radio was inoperative.
- e. On two occasions where the AN/PRC-119 was either inoperative or not receiving, the platoon commander used the MBITR to maintain communication with higher.
- f. The presence of the IW did not appear to make a *significant* difference in information flow.
- g. All leaders and IWs agreed that all patrol members need ISRs to improve their overall SA, particularly pointmen and flank security for command and control.
- h. Hand and arm signals in the jungle do not work well. Personnel have very short sight lines and hand and arm signals wind up being too slow as compared to using an ISR.
- i. Few in platoon had experience with radio communication procedures or report formats and were not used to pushing info to higher, adjacent or lower elements.
- j. Participants stated that headsets assisted in being able to hear during periods of heavy rain.
- k. When the platoon only had one AN/PRC-119, they had problems maintaining communication with higher headquarters.
- l. The greatest use of ISRs or MBITRs was to maintain status of team locations and coordinate movement and maneuver.
- m. Personality of the participants had a lot to do with use of communications assets and therefore affected their opinion and utility of IW in their element.
- n. Leaders stated that they could manage multiple nets; and, although it was somewhat of a distraction, they prefer to have two radios rather than one—anytime.
- o. It appeared that C² and maneuver were facilitated when communications were reliable.

- p. Though radio assets facilitated C² and maneuver, other communication techniques were still needed such as face-to-face meetings, hand and arm signals, runners/link men, etc.

29. Participant Preferences. See Annex B for additional details.

- a. The platoon's leadership indicated the following preferences on *after action questionnaires*.
 - (1) Tended to rate IW somewhat or very valuable in general.
 - (2) Rated the IW more valuable for the Platoon Commander than for the other platoon leaders.
 - (3) Rated the Platoon Sergeant's IW less valuable than the Platoon Commander's or Squad Leader's.
 - (4) Indicated that it was more of a problem if the Platoon Commander's IW became a casualty than if either the Platoon Sergeant's or Squad Leader's IW become a casualty.
 - (5) Preferred the Standard T/O with MBITR to the other configurations.
 - (6) Rated the Combined IW and MBITR as their second choice.
 - (7) Rated the Standard T/E with IW as their third choice.
 - (8) Rated the Standard T/O and T/E as their least preferred choice.
- b. Info Warriors indicated the following preferences on after action questionnaires.
 - (1) They had no problems performing assigned tasks during the movement or patrolling phase of the mission.
 - (2) In general, it was somewhat more difficult to perform their duties during actions at the objective, but still "manageable" to "easy."
 - (3) The majority said that it was just "manageable" to perform their duties during contact.
 - (4) The majority said that it is "easy" to perform their duties during consolidation.
- c. Squad/Fire Team Leaders and individual Marines' preferences:
 - (1) Thought that info tended to flow better when the MBITR was present.
 - (2) Tended to mark the Standard T/O with the MBITR as the best of the four configurations.
 - (3) Noted that info flowed the least with the Standard T/O and T/E configuration.
 - (4) Tended to state that there was value in assigning one of the squad members the duties of IW. Their main concern was the loss of a "shooter" during contact, but as shown in the next chart, they tend to feel the IW is most useful during contact.

30. Casualties. See Annex C for additional details.

- a. Casualties tended to be higher in the MOUT events.
 - (1) This is consistent with previous experiment results.
- b. Casualties were highest in the standard T/O with IW configuration events.
- c. Mean casualties tended to be lower in events where the MBITR was used.
- d. Mean casualties tended to be lowest in the combined configuration events.

31. ISR Vulnerability. Although not a specific objective of this experiment, two key points about the ISR became apparent. First, analysis of radio traffic content collected by professionals from the Operating Forces tends to validate the belief that non-secure transmissions on the ISR are of little real time and/or long-term use to an enemy. And second, the inability to train with the actual Marine Corps issue ISR is a significant

deficiency for units on Okinawa. We used a Motorola radio to serve as a surrogate for the fielded ISR.

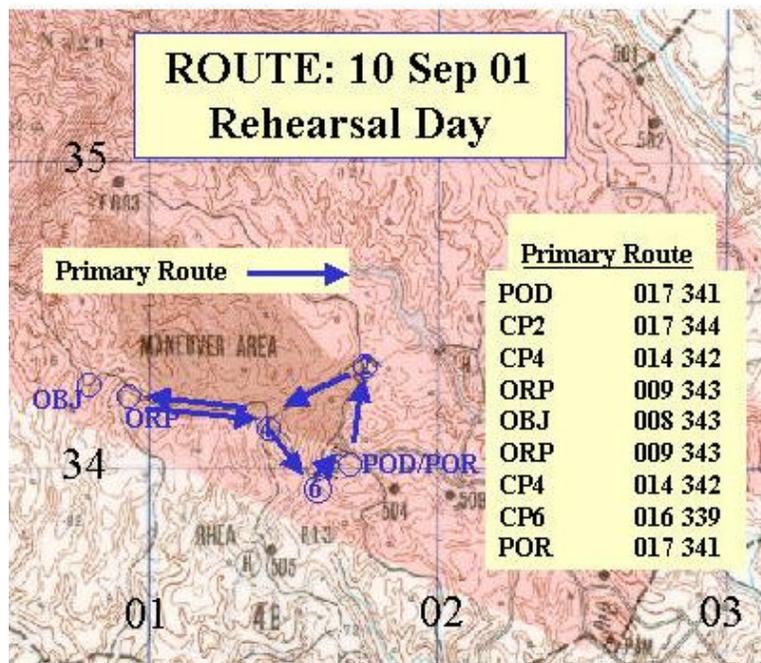
32. **Standard Report Formats.** A lack of standardization seems to exist in radio report formats. During the work-up phase for this experiment, we collected training material that included radio report formats. We discovered that two different formats are being taught for the "SPOT report." One is an expanded SALUTE report (a STANAG report format) and one is a more expanded contact report. Furthermore, we could not find a single sponsor or school that set the standard in this area.
33. **Conclusions .**
- a. The concept of the Info Warrior shows promise, but requires additional experimentation.
 - b. Structure sourcing for the IW needs to be addressed.
 - c. The MBITR can significantly enhance the operational effectiveness of the infantry platoon.
 - d. Marines will need appropriate training on the operation and employment of the radios they will be using as IWs.
 - e. Training in the same areas over and over again leads to disuse of land navigation, and map and compass skills. These then degrade significantly.
 - f. The Marine Corps Warfighting Laboratory will forward an UNS recommending the fielding of the MBITR to fill the communications gap in the infantry platoon.
 - g. The Operating Forces should identify and evaluate other existing gaps in secure tactical communication that could be filled by the fielding of additional MBITRs.
-

Section II

Detailed Descriptions of Experiment Events

Event One

1. Event #1 used baseline T/O and T/E. Current USMC platoon structure with one PRC-119 and Intra Squad Radios (ISRs) for team leaders and above.
 - a. **Note: We used Motorolas as surrogates because the USMC issue ICOM ISR has not been approved for use in Okinawa.**



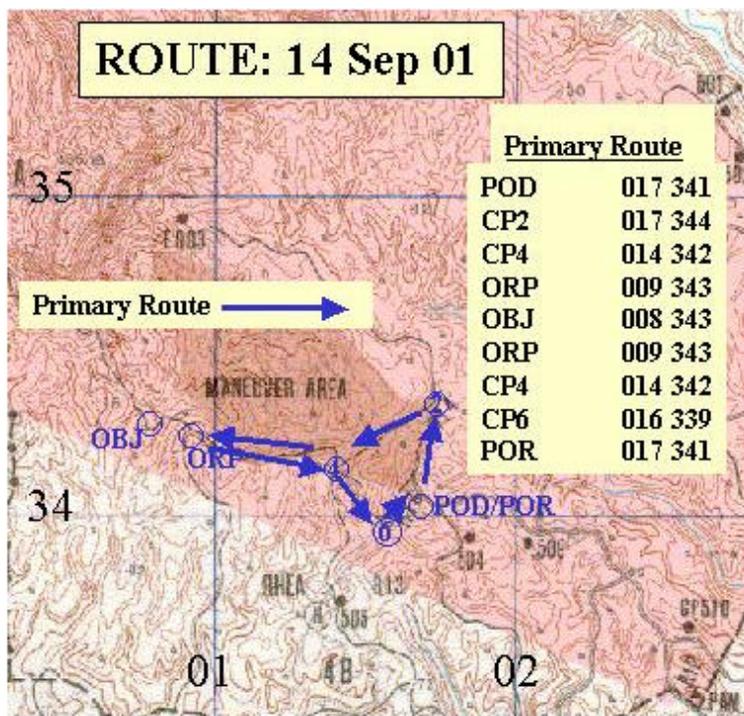
2. Marines had no additional communication equipment.
3. The patrol route is shown in the adjacent graphic. The platoon was tasked to conduct an ambush on a trail. The OPFOR was a nine-man squad identified by camouflage blouses turned inside out. The size of the OPFOR remained the same throughout the experiment.
4. The patrol was through dense jungle terrain.
5. Comments from the post experiment debrief forms—as filled out by the participants—are summarized in the Event One (1) table below.

Event #1	Jungle Patrol – Day – Rehearsal			
	Plt Cdr & Plt Sgt	1 st Squad	2 nd Squad	3 rd Squad
1. Fire Missions				
2. Casualties/PWs				
<i>Blue</i> KIA/WIA/PW				
<i>Opfor</i> KIA/WIA/PW		No Data Recorded On Rehearsal Day.		
Noncombatant KIA/WIA				
3. CASEVAC				
4. Mission Effectiveness				
5. What worked well				
6. What did not work				
7. Unit training readiness				
8. Best training				
9. Missing training				

Event #1	Jungle Patrol – Day – Rehearsal			
	Plt Cdr & Plt Sgt	1st Squad	2nd Squad	3rd Squad
10. Lessons Learned				
Lesson #1				
Lesson #2				
Lesson #3				
11. Equipment damage				
12. Resupply info				
13. Needed organizational or equipment changes				
14. Remarks				

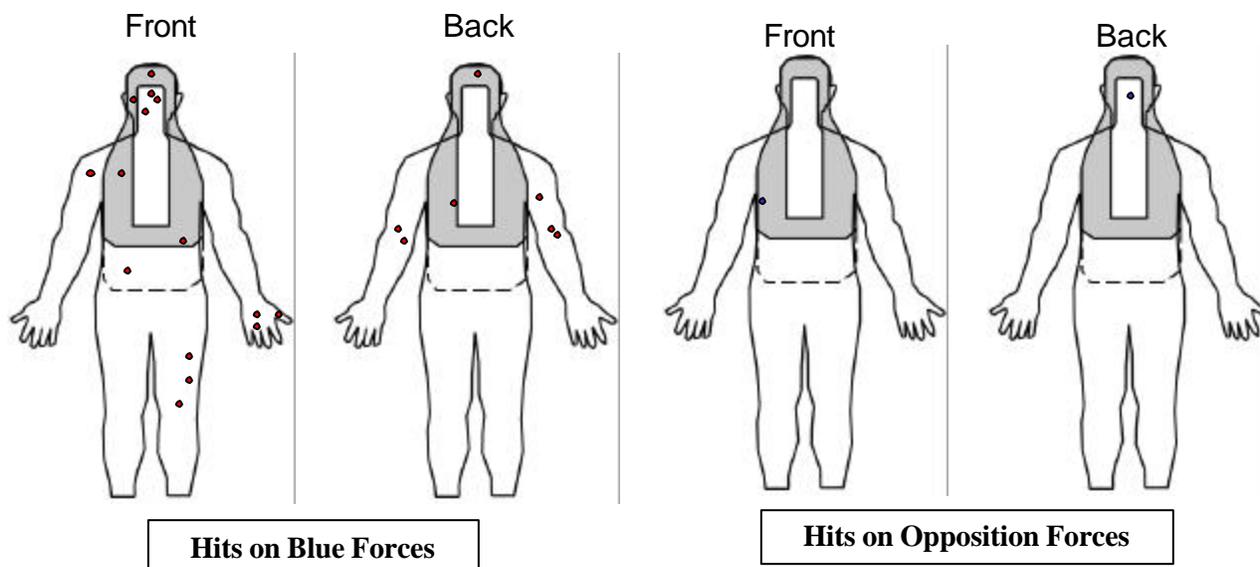
Event Two

1. Event #2 used baseline T/O and T/E.
2. Marines had no additional communication equipment.
3. The patrol route is shown in the adjacent graphic. The platoon was tasked to conduct an ambush on a trail.
4. The ambush patrol was through dense jungle terrain.
5. Comments from the post experiment debrief forms—as filled out by the participants—are summarized in the Event Two (2) table below.



Event # 2	Jungle Patrol – Day			
	Plt Cdr & Plt Sgt	1 st Squad	2 nd Squad	3 rd Squad
1. Fire Missions				
2. Casualties/PWs				
Blue KIA/WIA/PW	1/0/0		2/0/0	3/0/0
Opfor KIA/WIA/PW	5/0/0	9/0/0	4/0/0	3/0/0
Noncombatant KIA/WIA				
3. CASEVAC				
4. Mission Effectiveness	Unit needs to work on ambush and patrolling skills		Unit accomplished mission	We killed enemy in an ambush
5. What worked well	Constant radio comm <i>and</i> hand/arm signals	Knew where they were going; Communicating	Radio helped a lot	Only the MBITER
6. What did not work	Dispersion was irregular Initially, weapons not always employed correctly	Engaged too early; Went too far at checkpoint	Nav got lost GPS 100 m off grid	Radios
7. Unit training readiness	Poor to Average	Above Average	Excellent	Average
8. Best training	Not prepared for patrolling – especially in jungle	Knew from last time; hydration; no kevlar	Experience	Patrolling

Event # 2	Jungle Patrol – Day			
	Plt Cdr & Plt Sgt	1 st Squad	2 nd Squad	3 rd Squad
9. Missing training	Small unit leadership training Jungle patrolling	Go over patrol order; learn to use GPS and radios	Squad level	Nothing
10. Lessons Learned				
Lesson #1	Make sure everybody knows what is going on before stepping off	Hydrate	Comm clears up messes	
Lesson #2	Must have rehearsal	Understand patrol order	Info needs to be published	How to set into an ambush
Lesson #3	Debrief rehearsal before stepping off/more time to prepare	More classes on ambushes and patrolling	Science of moving into ambush correctly	How to egress from an ambush
11. Equipment damage				
12. Resupply info				
13. Needed organizational or equipment changes	Get rid of beep on MBITR; Better earpieces for the radio	Lighter gear; Too many wires on radios	Squad level training; more recon	
14. Remarks	Unit needs to come to experiment better trained in basic infantry TTP.	Start training earlier – step off later; Give order earlier	OPFOR did not die when shot	Ambush was initiated too early and it was also stopped too early

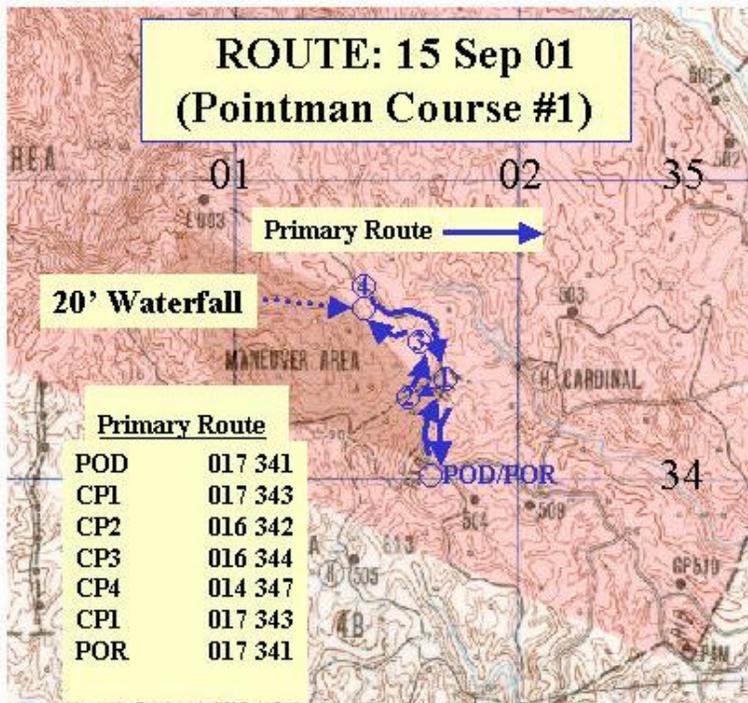


Event Three

1. Event #3 used baseline T/O and a modified T/E

-With the addition of the PRC-148 Multi Band Inter/Intra Team Radio (MBITR). A MBITR was issued to each squad leader, platoon sergeant, and platoon commander.

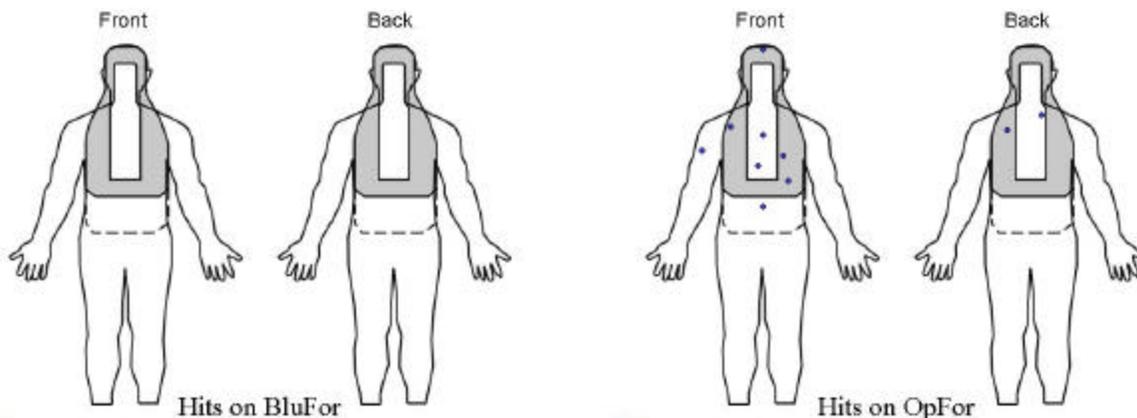
2. The patrol route is shown in the adjacent graphic. The platoon was tasked to conduct a security patrol from a company patrol base.
3. The patrol was through dense jungle terrain. The OPFOR used hit and run tactics throughout the experiment.



4. Comments from the post experiment debrief forms—as filled out by the participants—are summarized in the Event Three (3) table below.

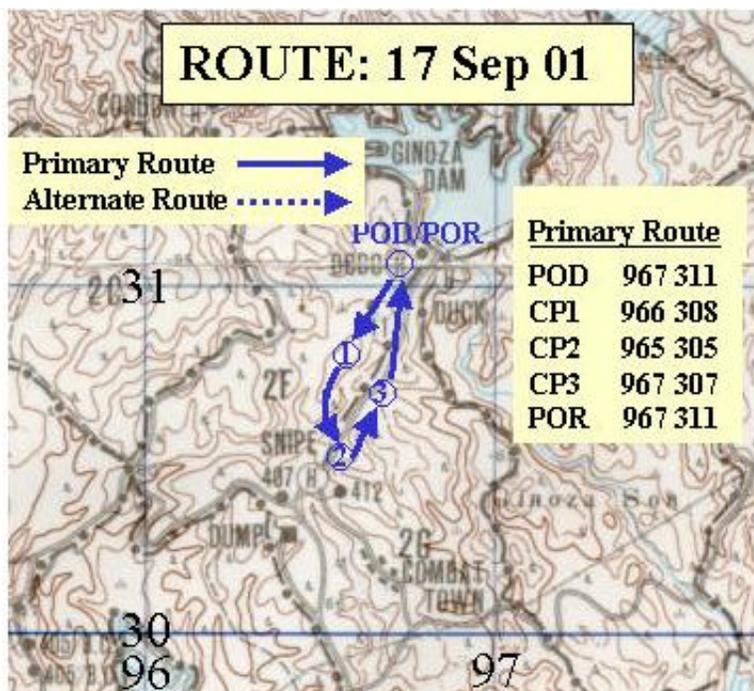
Event #3	Jungle Patrol – Day			
	Plt Cdr & Plt Sgt	1 st Squad	2 nd Squad	3 rd Squad
1. Fire Missions				
2. Casualties/PWs				
Blue KIA/WIA/PW	3/0/7	2/0/0	1/0/0	
Opfor KIA/WIA/PW	5/0/0		4/0/0	
Noncombatant KIA/WIA				
3. CASEVAC				
4. Mission Effectiveness	Squad made to all correct check points and killed OPFOR	Took longer than expected; got lost at first	Killed OPFOR	Due to poor land nav we did not accomplish mission
5. What worked well	Marines applied themselves; Being able to communicate with personnel in immediate location	Open terrain; Radio comm; Head count	ISR helped; used it instead of hand and arm signals; helped eliminate comm problems	Comm with team leaders and Plt Cdr; I knew what every other squad was doing
6. What did not work	Trouble communicating with Plt Cdr Hard to maintain positive control in	Using compass azimuth – got lost; Got lost relying on the lead squad to get	Did not use GPS; Marines think GPS is of no use; Comm did not help lost	Techniques

Event #3	Jungle Patrol – Day			
	Plt Cdr & Plt Sgt	1 st Squad	2 nd Squad	3 rd Squad
	terrain	you there	squads	
7. Unit training readiness	Poor	Excellent	Above average	Poor
8. Best training	Range 400 series except it is in a desert environment	Repetition patrolling, rehearsals	Experience	None; have not had opportunity to work with them in jungle (IA Drills)
9. Missing training	More time patrolling in this type environment	Land navigation fundamentals; intersection/resection	Small unit, squad and team training	Proper time for me to train them
10. Lessons Learned				
Lesson #1	The compass does not lie	Double check land navigation	Comm between squads prevented ambush	The two radios are great tools
Lesson #2	If you don't know, ask somebody	Watchful when setting in 360 ⁰	Squad leader with two radios prevented intra squad talk	
Lesson #3	How difficult it is to control unit in jungle	Hydrate before stepping off	Squad leader overwhelmed with info	
11. Equipment damage				
12. Resupply info				
13. Needed organizational or equipment changes	Headset mouthpiece keeps slipping from your mouth. Motorola earpieces slip out of your ears when they get wet	Fewer radios on one person	Requesting info warrior to help pass info	
14. Remarks				



Event Four

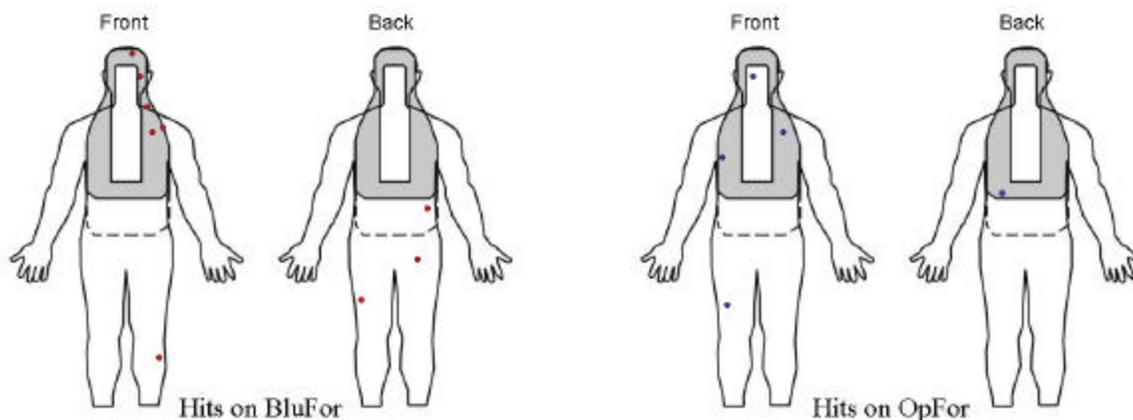
1. Event #4 used baseline T/O and T/E.
2. Marines had no additional communication equipment.
3. The patrol route is shown in the adjacent graphic. The platoon was tasked to conduct a security patrol.
4. The patrol was through dense jungle terrain.
5. Comments from the post experiment debrief forms—as filled out by the participants—are summarized in the Event Four (4) table below.



Event #4	Jungle Patrol - Day			
	Plt Cdr & Plt Sgt	1 st Squad	2 nd Squad	3 rd Squad
1. Fire Missions				
2. Casualties/PWs				
Blue KIA/WIA/PW	3/0/0	3/1/0		
Opfor KIA/WIA/PW	3/0/0		4/0/0	
Noncombatant KIA/WIA				
3. CASEVAC	For (3) on foot from CCP 3			
4. Mission Effectiveness	Nothing that happened today helped us	Secured area, took casualties but completed sweep of area	Did not complete patrol	Did not accomplish mission. Did not know where other squads were when we made contact
5. What worked well	Face-to-face contact w/squad leaders and Plt Sgt; RO passing info without needing to be prompted; Go firm and conference with squad leaders	Basics – 5 senses, radios; The tree line cover	Radios helped between team leaders and squad leader but not much between LT and the squad.	Verbal communication by Platoon Sgt. Radios helped make it easy to pass the word.

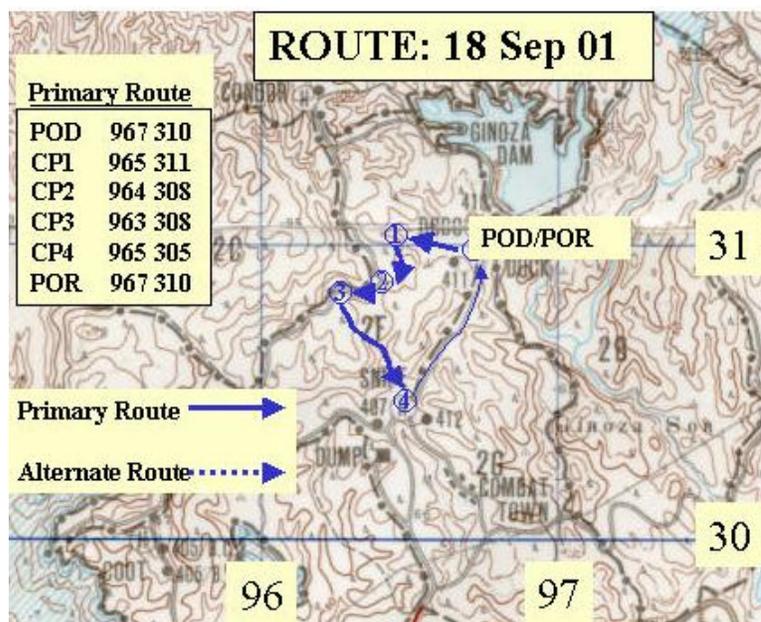
Event #4	Jungle Patrol - Day			
	Plt Cdr & Plt Sgt	1st Squad	2nd Squad	3rd Squad
6. What did not work	Lead element went in wrong direction; Trying to get the whole platoon on line for a couple of enemy; Motorola earpiece constantly fell out; GPS was off..	IA drills – we did not use them; The mis-communication, especially from the 2 line usages	Too much intra platoon talk on radio. There was confusion in tactics and procedures	
7. Unit training readiness	Poor	Average	Average	Poor to Average
8. Best training	The training we've received in the past two weeks	Honestly, I just came to this platoon and I feel that only the classes that have been given lately have helped them	Prior training on Okinawa	Rehearsals
9. Missing training	Need to keep doing practical application in this environment	JWTC	Remedial on basics	Proper order. At least let Squad leader brief after Lt gives order.
10. Lessons Learned				
Lesson #1	No need to fight small group of enemy with whole platoon	Guns and eyeballs	You can never work without the basics	No comm can ruin operation
Lesson #2	Don't always depend on GPS. When in doubt, break out the compass and map	Individual discipline needs to be strong throughout	Communication is key	Sharing channels
Lesson #3	Make squad leaders come to Plt Cdr; Wedge hard to control in this environment	Keep the squads close enough to be able to support each other	Patrolling	Switching from one channel to another
11. Equipment damage	Lost rubber ear pieces for bone mic		One pair of SAW legs broken	
12. Resupply info				

Event #4	Jungle Patrol - Day			
	Plt Cdr & Plt Sgt	1 st Squad	2 nd Squad	3 rd Squad
13. Needed organizational or equipment changes	Get rid of Motorola Keep Plt Cdr/Sgt and squad leader on MBITR and a secondary ISR radio for cross talk. Point man and rear should have radio	Better ear holds for the radios	More radios within platoon/squad	
14. Summary Remarks	Radio problems and breakdown in fundamentals today. Patrol became disjointed and time was wasted trying to link-up and reestablish control	Events are very useful to us right now as this is a young unit We have things to work on but we'll come together. Soon.		



Event Five

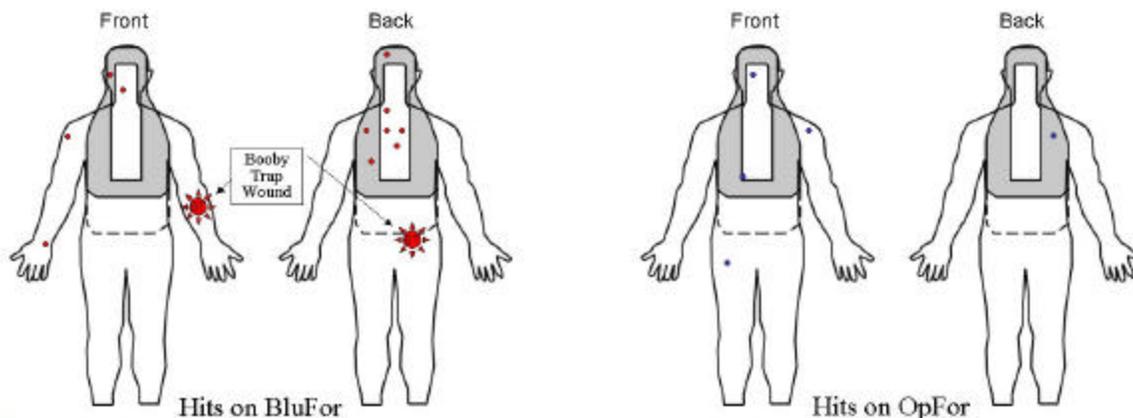
1. Event #5 used an *Info Warrior* T/O and the current T/E
-The platoon T/O was modified to include the use of Information Warriors—members of the platoon assigned as such—whose primary duty was to monitor the ISR.
2. The patrol route is shown in the adjacent graphic. The platoon was tasked to conduct a security patrol, specifically looking for evidence of enemy activity in the area.
3. The patrol was through dense jungle terrain.
4. Comments from the post experiment debrief forms—as filled out by the participants—are summarized in the Event Five (5) table below.



Event #5	Jungle Patrol - Day			
	Plt Cdr & Plt Sgt	1 st Squad	2 nd Squad	3 rd Squad
1. Fire Missions				
2. Casualties/PWs				
Blue KIA/WIA/PW	3/6/0	4/0/0		1/1/0
Opfor KIA/WIA/PW	6/0/0			
Noncombatant KIA/WIA				
3. CASEVAC	Two WIA from CP#2 (Surface) Four WIA from vic CP#6 (Surface)			
4. Mission Effectiveness	Completed recon mission; reported items of interest and destroyed some enemy personnel Control was better; Individual actions by some are unsat	Motorola radio works pretty well within the squad during the patrol	All check points hit, no casualties, enemy was killed	We found some info that enemy was nearby.
5. What worked well	Good movement techniques; Change of lead from 1 st squad to 3 rd	Followed train/path from the leader's recon in the morning	Info Warrior helped free leaders to accomplish the	When radios were up, I knew what was going on.

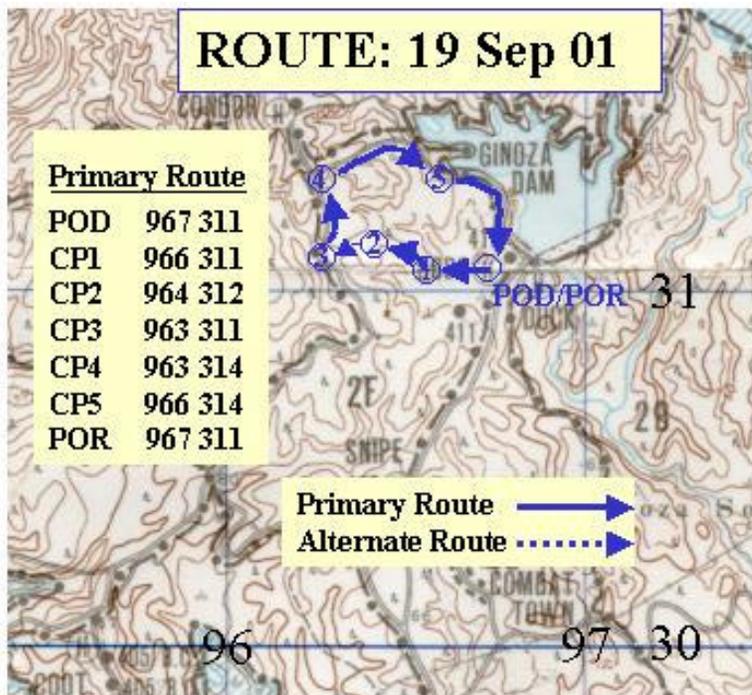
Event #5	Jungle Patrol - Day			
	Plt Cdr & Plt Sgt	1 st Squad	2 nd Squad	3 rd Squad
	squad went well		mission. Info warriors helped pass pertinent info to higher and enabled the squad leaders to control Marines.	
6. What did not work	Staying on the trail. Info warrior makes too much noise. Reaction from platoon too slow; Marines tended to shout and go admin.		Info Warrior too close to me during movement. GPS off from map.	Equipment radios – small ones
7. Unit training readiness	Poor	Excellent	Above Average	Average
8. Best training	Training during the past two weeks	Patrolling / Land Nav	Learning from prior mistakes.	Knowing exactly what to do
9. Missing training	Need more training for patrol in this type environment. Info warriors need to have SOPs and have specific duties outlined.	Our squad worked very well as lead element	Remedial training	
10. Lessons Learned				
Lesson #1	Stay off the trails and rotate the lead element upon multiple contact	<u>Inter</u> squad communication;	More and maybe better comm.	When comm breaks, don't lose bearing
Lesson #2	Train for overwatch posits and mass return fires on contact	Flank elements and connecting files	Do not chase small force, just move on.	
Lesson #3	Do not lose sight of the person in front; still need hand/arm signals		Need more remediation on squad level.	
11. Equipment damage				
12. Resupply info				

Event #5	Jungle Patrol - Day			
	Plt Cdr & Plt Sgt	1 st Squad	2 nd Squad	3 rd Squad
13. Needed organizational or equipment changes	Train IW for specific duties and develop SOPs	More ammo for lead element Fog free masks	All Marines have scanner to listen to commands and situations rather than leadership moving around to pass word.	
14. Summary Remarks	Info Warrior is a good addition but was more of a hindrance than any good today because we lacked SOPs. But, because it was the first day for this, we probably did not understand how to use him			



Event Six

1. Event #6 used an Info Warrior T/O and T/E.
 - a. **The Information Warriors**—members of the platoon assigned as such—had the primary duty to monitor *both* the ISR and the MBITR.
 - b. The **PRC-148 MBITR** was issued to each squad leader, each *info warrior*, platoon sergeant, and platoon commander.

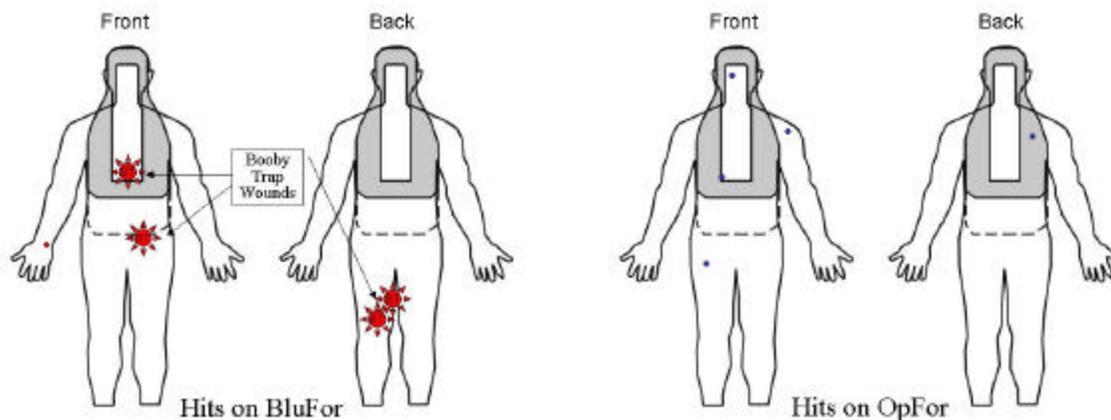


2. The patrol route is shown in the adjacent graphic. The platoon was tasked to conduct a security patrol.
3. The patrol was through dense jungle terrain.
4. Comments from the post experiment debrief forms—as filled out by the participants—are summarized in the Event Six (6) table below.

Event #6	Jungle - Day			
	Plt Cdr & Plt Sgt	1 st Squad	2 nd Squad	3 rd Squad
1. Fire Missions				
2. Casualties/PWs				
Blue KIA/WIA/PW	5/0/0	5/0/0		
Opfor KIA/WIA/PW	3/0/0	5/0/0		
Noncombatant KIA/WIA				
3. CASEVAC	Five at intersection (surface)			
4. Mission Effectiveness	Platoon got split up on contact – never got together again	Made contact and reported to higher	IW info helped during security halts.	The squad hit every point.

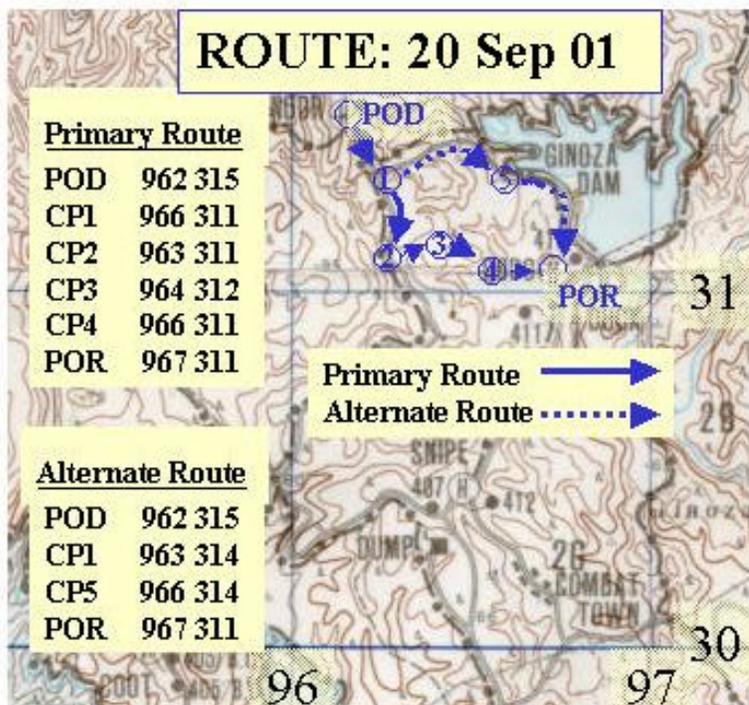
Event #6	Jungle - Day			
	Plt Cdr & Plt Sgt	1 st Squad	2 nd Squad	3 rd Squad
5. What worked well	IW was great help in managing location, contact and casualty count. IW consolidated info and reported to higher while I concentrated on how to deal with enemy.	Hand/arm signals and flank security. Radios kept us better informed.	Radios helped in setting in hasty ambush. Shift in contact passed over radios.	
6. What did not work	Platoon got split up on contact. Ran out of SAW ammo. Marines hesitated on initial contact	Bounding with the fire teams	ISR did not work well in dense terrain.	
7. Unit training readiness	Poor	Above Average	Above Average	
8. Best training	Past two weeks' training.	Repetition	Past two weeks training.	
9. Missing training	Continuation of platoon and squad training – especially patrolling and bounding and overwatch.		Squad level training, remediation; squad on squad training.	
10. Lessons Learned				
Lesson #1	Ensure you can always see person in front and behind you.	Proper navigation	Point man needs a radio—Marines now have to run up to stop the point.	Have one station just for Info Warrior.
Lesson #2	Don't wait for someone to tell you to react, when you should already know what to do.	Knowing route and staying with it.	Need better head bands – maybe spandex.	
Lesson #3	When separated, make link up the priority.		More Marines need radios – scanners for everyone.	
11. Equipment damage				
12. Resupply info				

Event #6	Jungle - Day			
	Plt Cdr & Plt Sgt	1 st Squad	2 nd Squad	3 rd Squad
13. Needed organizational or equipment changes	Use IW to monitor squad tac then MBITR to talk with other squads' IWs, Plt Cdr, Plt Sgt and squad ldr. Need better earpieces.	More ammunition. Binoculars. Better masks	More radios.	
14. Summary Remarks	Despite comm gear, keeping visual sight is a must. Push point team out farther in front of the lead squad and keep comm with them so they can relay what they see to platoon SA. IW is a good tool for collecting information during movement (tracking location), informing of danger. IW is especially important during contact and consolidation. He frees leader to focus on the enemy and enables him to coordinate and employ his forces.	Pvts, PFCs and LCpls said that info from radio is getting passed to them so they do not feel lost. Need a better system for a SAW barrel – carry it in a better bag like a camel back.		Give team leaders chance to have more input.



Event Seven

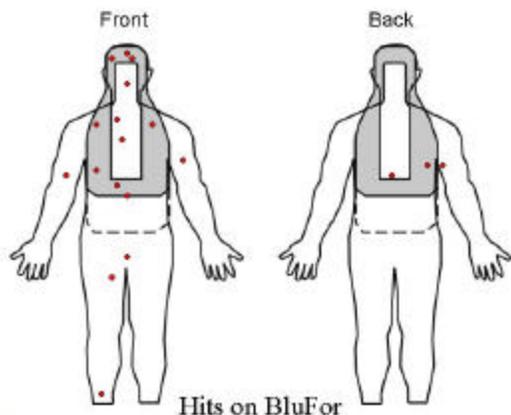
- Event #7 used baseline T/O and a modified T/E.
 -With the addition of the PRC-148 MBITR. A MBITR was issued to each squad leader, the platoon sergeant, and platoon commander.
- The patrol route is shown in the adjacent graphic. The platoon was tasked to conduct a patrol with a planned helo extraction in LZ Dodo.
- The patrol was through dense jungle terrain.
- Comments from the post experiment debrief forms—as filled out by the participants—are summarized in the Event Seven (7) table below.



Event #7	Jungle Patrol - Day			
	Plt Cdr & Plt Sgt	1 st Squad	2 nd Squad	3 rd Squad
1. Fire Missions	Two (2) 60mm mortar fire missions to clear area outlined on captured enemy map.			
2. Casualties/PWs				
Blue KIA/WIA/PW	4/3/0	1/2/0	2/0/0	2/0/0
Opfor KIA/WIA/PW	4/0/0	3/0/0		
Noncombatant KIA/WIA				
3. CASEVAC	Four (surface)		Two from CP2 (surface)	

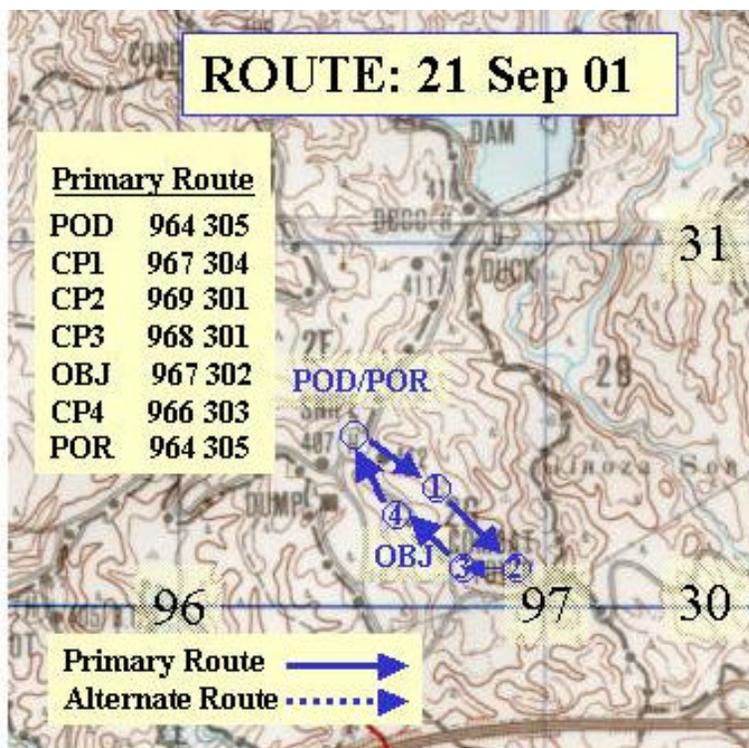
Event #7	Jungle Patrol - Day			
	Plt Cdr & Plt Sgt	1 st Squad	2 nd Squad	3 rd Squad
4. Mission Effectiveness	Completed assigned route, reported enemy and eliminated him on contact. Captured map from dead enemy. Failed to clear enemy from LZ prior to endex.	Yes. Helped to clear enemy from our area and secure LZ.	All missions and commander's intent carried out.	Squad had chance to maneuver instead of a platoon ranger file.
5. What worked well	Clear comm was the key today for all aspects of the Op. Maintaining visual contact; connecting files. Using Motorola as backup comm asset. Making RTO more proactive. The "Go Firm" technique	Tactics and steady communication. Coordination, patrol rehearsals, slow movement. Leadership. Aggressiveness.	Comm played a big part aiding our tactics. Comm helped a lot during post contact consolidation.	Two radios. Squad leader and team leaders knew what was going on because of the radios.
6. What did not work	When visual contact lost, control was lost for that element	The PRC 148s.	At times, comm failed.	I needed an Info Warrior today.
7. Unit training readiness	Poor – Today was great improvement.	Outstanding	Above average	Average
8. Best training	Training we've been doing for last 2 weeks. Getting used to working w/radios.	Repetition and rest.	Training from NCOs on last deployment to Okinawa.	Rehearsals with radios.
9. Missing training	Need to continue what we are doing.	Preparatory classes leading to missions.		
10. Lessons Learned				
Lesson #1	Maintain visual contact between elements	Travel light.	Pointman needs a radio.	Two radios are a good idea.
Lesson #2	When attacked crossing danger area, defend yourself and then push across the area to keep pressure on the enemy.	Maintain visuals with others.	Slow is smooth, smooth is fast.	Sometimes IW is good idea

Event #7	Jungle Patrol - Day			
	Plt Cdr & Plt Sgt	1 st Squad	2 nd Squad	3 rd Squad
Lesson #3	Cannot have everybody of the same freq like we did. The pushing of info on ISR	Ranger file works, stay with it.	Enemy intel benefits unit when found.	
11. Equipment damage				
12. Resupply info				
13. Needed organizational or equipment changes	Need a toggle switch for channels on the ISR. The squad should have the option for the IW – or at the least designate a man in the squad to concentrate on info that the IW/RTO has gathered and make the best tactical decision.	Sim rounds for M249 SAW. Paint mortars. Better/fog free masks. Artillery simulators. Clearer maps.	Scanners to all Marines (i.e., SAW gunners, 203 and Rifleman.	Need better buttons on radios.
14. Summary Remarks	I like having two radios, but ear pieces are a big problem	782 gear is cumbersome and creates excessive noise.		



Event Eight

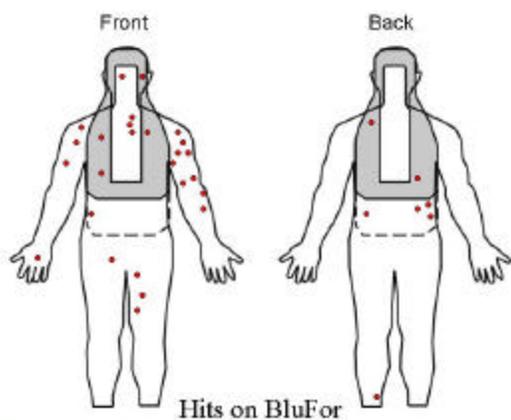
1. Event #8 used baseline T/O and T/E
2. Marines had no additional communication equipment.
3. The patrol route beginning in the jungle and emerging into Combat Town is shown in the adjacent graphic.
4. Comments from the post experiment debrief forms—as filled out by the participants—are summarized in the Event Eight (8) table below.



Event #8	Jungle Patrol into MOUT - Day			
	Plt Cdr & Plt Sgt	1 st Squad	2 nd Squad	3 rd Squad
1. Fire Missions				
2. Casualties/PWs				
Blue KIA/WIA/PW	8/0/0			11/0/0
Opfor KIA/WIA/PW	1/0/0	5/0/0	1/0/0	1/0/0
Noncombatant KIA/WIA				
3. CASEVAC				
4. Mission Effectiveness	Yes; but we took excessive casualties.	Yes. Land nave good. Assault through town was good.	As security squad, we held security for assault element and secured the village.	
5. What worked well	Being able to communicate when headed the wrong way or when an ambush happened. It helped a lot not having to use a runner for comm.	Land nav for our squad. Stayed calm during MOUT; did not get wild. Comm let us know where everyone was.	Motorolas helped link-ups. Alternate comm plans.	Having radio

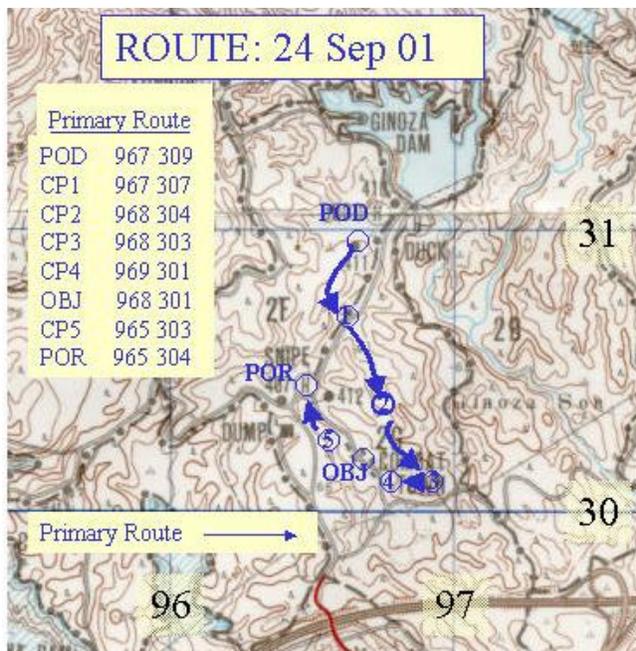
6. What did not work	Having to roll back and forth on different nets. Too aggressive in building clears.	Land nav from lead squad. Clearing techniques. Got scattered and separated.	Shortage of radios. We need two radios. Having to roll through frequencies. Tactics: During movement we split up and had to rely on comm.	Having only one radio. Need two and an Info Warrior.
7. Unit training readiness	Average to Above Average	Above Average	Above Average	Average
8. Best training	BUST in Victorville – although it has been eight months since getting this training.	Rehearsals, previous weeks; ProMet.	ProMet 2001	ProMet
9. Missing training	BUST refresher course.	More MOUT training.	More squad level MOUT training.	MOUT training. We need to do that maybe one week per month.
10. Lessons Learned				
Lesson #1	Use “Go Firm” to regain control of the platoon.	Patrolling into a MOUT situation.	Movements need to be slower and precise.	MOUT training is a must.
Lesson #2	Slow down and concentrate.	Hasty clear through towns.	Comm will not always provide security.	It’s a big change from jungle to MOUT.
Lesson #3	Give the Big 5 two radios all the time.	Patrolling from jungle to MOUT.	Alternate comm is needed.	
11. Equipment damage				
12. Resupply info				
13. Needed organizational or equipment changes	We need a net for squad leaders and a net for higher. Also the squad leaders need a net for their teams. An Info Warrior would be helpful.	Practice MOUT more.	One radio with an Info Warrior and alternate comm plans.	Rehearse the comm plan.

14. Summary Remarks	Marines changed from sluggish movement in the jungle to over aggressiveness in MOUT. This caused a lot of unnecessary casualties Jungle to MOUT is a very difficult tactical transition.			
---------------------	---	--	--	--



Event Nine

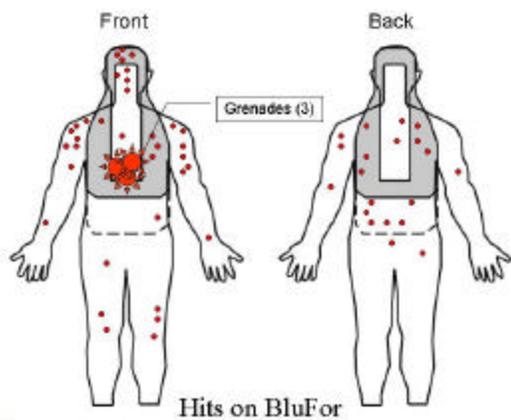
1. Event #9 used Info Warrior T/O with current T/E.
-The platoon T/O was modified to include the use of *Information Warriors*—members of the platoon assigned as such—whose primary duty was to monitor both the ISR and the MBITR.
2. Marines had no additional communication equipment.
3. The patrol route beginning in the jungle and emerging into Combat Town is shown in the adjacent graphic. The platoon was informed that the enemy was known to operate out of the Combat Town. The platoon was tasked to eliminate any enemy presence within the Combat Town.



4. The patrol was through dense jungle terrain and into Combat Town for MOUT.
5. Comments from the post experiment debrief forms—as filled out by the participants—are summarized in the Event Nine (9) table below.

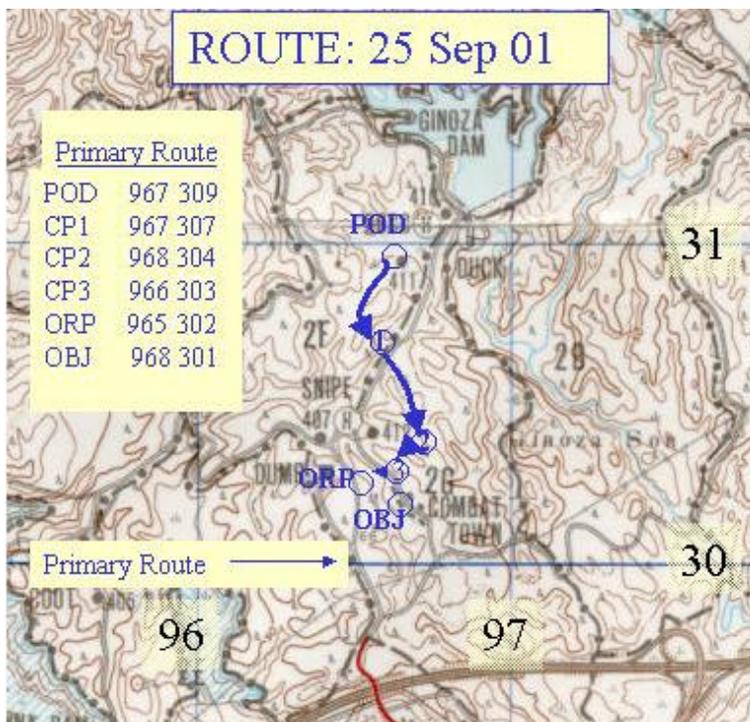
Event #9	Jungle Patrol into MOUT - Day			
	Plt Cdr & Plt Sgt	1 st Squad	2 nd Squad	3 rd Squad
1. Fire Missions				
2. Casualties/PWs				
Blue KIA/WIA/PW	4/0/0		7/0/0	13/0/0
Opfor KIA/WIA/PW	2/0/0			
Noncombatant KIA/WIA				
3. CASEVAC				
4. Mission Effectiveness	If fight were allowed to continue, we would have to fall back, and would not be able to go on or retrieve our dead w/o reinforcements and fire support.		Our element took total casualties before endex; caused mostly by stacking while waiting to enter building.	Team did not have a grasp on where Marines were or what they were doing after I got killed.

5. What worked well	Calming Marines down to listen or push information up. Nothing really worked today.	Radios, hand and arm signals. Communication	Techniques on link-up. Comm on link-up. Comm to get enemy locations.	Radios. I had good SA on where other squads were.
6. What did not work	Hot mic tied up the net. Very few people used their radios.	Terrain, weather, all the gear. Radio not working. MOUT tactics – getting bunched up.	Marines failed to keep correct separation. MOUT tactics failed.	
7. Unit training readiness	Poor	Above Average	Above Average	Poor
8. Best training	Previous day.	Rehearsals	ProMet and previous Okinawa deployment.	
9. Missing training	More of same training and applying learned skill and comm.	Proper eye protection. Five paragraph order.	Remediation in patrolling and MOUT.	What info to send up – not me going down and asking.
10. Lessons Learned				
Lesson #1	Info must be pushed up.	Need better 5 paragraph orders	Hesitation kills.	Use more initiative with radios.
Lesson #2	Do not stack outside of buildings.	Need minimal gear (have too much on)	Use of the Info Warrior helps regardless of the situation. Staying focused pays off when nobody else is.	
Lesson #3	Learn how to land navigate.	Need non-foggy goggles.		
11. Equipment damage				
12. Resupply info				
13. Needed organizational or equipment changes	Ability to scan or change channels efficiently.	Goggles kept fogging up.	Sims, SAWs and multiple radios in squad.	New ISR radios. Not the Motorolas.
14. Summary Remarks	Wish I had my Info Warrior today.	5 paragraph order needs to be complete – not frag order	Headset in the heavy rain is much better than an open radio. It is much clearer and easier to hear.	



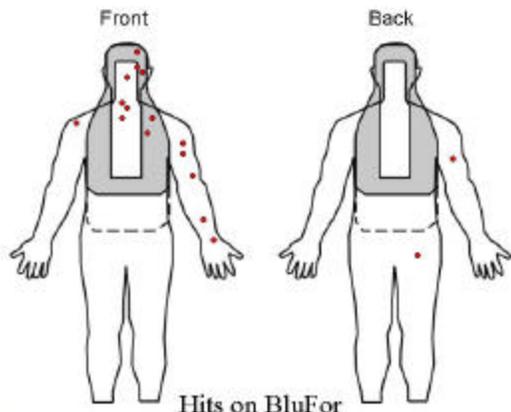
Event Ten

1. Event #10 used baseline T/O with a modified T/E.
The PRC-148 MBITR was issued to each squad leader, the platoon sergeant, and platoon commander.
2. Marines had no additional communication equipment.
3. The patrol route beginning in the jungle and emerging into Combat Town is shown in the adjacent graphic. The platoon was informed that the enemy was known to operate out of the Combat Town. The platoon was tasked to eliminate any enemy presence within the Combat Town.
4. Comments from the post experiment debrief forms—as filled out by the participants—are summarized in the Event Ten (10) table below.



Event #10	Jungle Patrol into MOUT - Day			
	Plt Cdr & Plt Sgt	1 st Squad	2 nd Squad	3 rd Squad
1. Fire Missions	One 60mm mortar.	Two 60mm mortar		
2. Casualties/PWs				
Blue KIA/WIA/PW	11/6/0		5/0/0	6/0/0
Opfor KIA/WIA/PW	2/0/0			
Noncombatant KIA/WIA				
3. CASEVAC				
4. Mission Effectiveness	Not completely. This mission probably not for a platoon.	Better maneuver; good comm; more repetitions.	All was accomplished.	Radios had great positive impact on maneuver

5. What worked well	Comm was awesome today. "Go Firm" to get land nav problems straightened out. Small unit leadership much improved today Comm by voice and radio to build everyone's SA.	Repetition. Good comm. Good attack plan.	Radios during plan changes and withdrawal.	Radios
6. What did not work	Land nav. Marines hesitating on gaining foothold in buildings. Marines unable to fall back from A3 to A4 due to OPFOR.	Hot mic at times. Land nav. Too much traffic on 1 st channel for squad.	Land nav failed due to lack of attention.	
7. Unit training readiness	Average	Excellent	Above Average	Average to Above Average
8. Best training	ProMet training. Practicing basics.	Repetition	ProMet	Using radios for the last couple of days.
9. Missing training	More of this type of training.	More ammo	More remediation.	
10. Lessons Learned				
Lesson #1	Stay calm in the heat of the moment.	Good comm.	How to work a feint.	Use two radios
Lesson #2	Set up SBF every time you move.	More ammo.	Two radios are better than one.	Have Info Warrior.
Lesson #3	Two radios are better than one.	More smoke.	Info Warriors are not always needed.	
11. Equipment damage				
12. Resupply info	Requested ammo and smoke. Got it.			
13. Needed organizational or equipment changes	More ammo; a SMAW or AT4. Motorola earpieces for hurt when you wear them for a long time.	AT4s. More ammo.		
14. Summary Remarks	Platoon has made improvement last three MOUT days. Best event platoon has conducted.	Better word is getting passed to fire team ldrs, PFC and Pvt's using comm..	Squad ldr died, team leader picked up radios w/o IW; Needed IW.	



Event Eleven

1. Event #11 used Info Warrior T/O with a modified T/E. T/O and T/E.

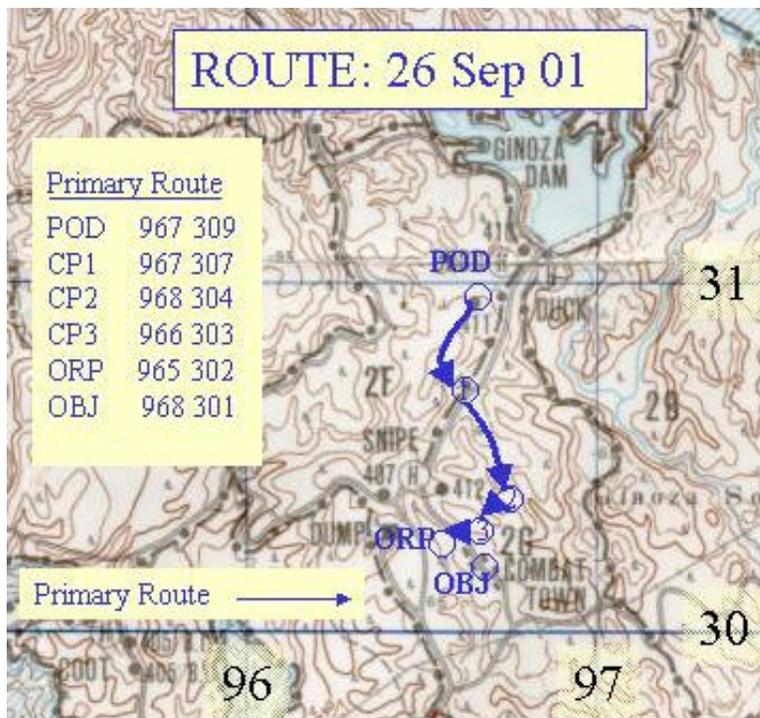
a. **The Information Warriors** —members of the platoon assigned as such—had the primary duty to monitor *both* the ISR and the MBITR.

b. The PRC-148 MBITR was issued to each squad leader, each *info warrior*, platoon sergeant, and platoon commander.

2. Marines had no additional communication equipment.

3. The patrol route beginning in the jungle and emerging into Combat Town is shown in the adjacent graphic. The platoon was informed that the enemy was known to operate out of the Combat Town. The platoon was tasked to eliminate any enemy presence within the Combat Town.

4. Comments from the post experiment debrief forms—as filled out by the participants—are summarized in the Event Eleven (11) table below.



Event #10	Jungle Patrol into MOUT - Day			
	Plt Cdr & Plt Sgt	1 st Squad	2 nd Squad	3 rd Squad
1. Fire Missions				
2. Casualties/PWs				
Blue KIA/WIA/PW	8/0/0			
Opfor KIA/WIA/PW	1/0/0			
Noncombatant KIA/WIA				
3. CASEVAC				
4. Mission Effectiveness				
5. What worked well				
6. What did not work				
7. Unit training readiness				
8. Best training				

9. Missing training				
10. Lessons Learned				
Lesson #1				
Lesson #2				
Lesson #3				
11. Equipment damage				
12. Resupply info				
13. Needed organizational or equipment changes				
14. Summary Remarks				

Annex A

Information Flow

The chart below depicts the percent of information items that "should" have been known at the platoon commander's and squad level and the number actually noted by O/Cs. These included enemy sightings, contacts, booby trap locations, check points, calls for fire, check points, etc. Data was recorded and tracked by a combination of O/Cs observation and records, EXCON monitoring and recording radio transmissions, and Radio Battalion intercepts.

Event	Percent of Information Items Recorded				Info Items Recorded Compared to No. Possible
	Std. T/O and T/E	Std. T/E with IW	Std. T/O with MBITR	Combined IW and MBITR	
4	25%				5/20
5		75%			24/32
7			90%		28/31
6				71%	12/17
8	85%				17/20
9		57%			8/14
10			100%		18/18
11				91%	29/32
Mean	55%	66%	95%	81%	

Findings

1. Information seemed to flow best with the Standard T/O and the MBITR.
2. O/Cs noted that the quality of information passed on the net appeared to be best when the MBITR was present, in that the majority of the transmissions were related to command and control for maneuver vice in the other situations where the majority of communication was on "where are you" transmissions.
3. The presence of the MBITR appears to enhance C² significantly both to higher and within the platoon.
4. In two events where the platoon only had the standard T/E (one AN/PRC-119 on Company TAC), communication to the company was lost when the platoon commander's radio was inoperative.
5. On two occasions where the AN/PRC-119 was either inoperative or not receiving, the platoon commander used the MBITR to maintain communication with higher.
6. The presence of the IW did not appear to make a significant difference.

Annex B

**Summary of Participant Feedback
 Responses on Final Questionnaire**

Leadership summary. The following charts depict the platoon leadership and Info Warrior responses on the final questionnaire.

Rate Value of:	Hindrance	Not Valuable	Valuable	Somewhat Valuable	Very Valuable
IW in close terrain		1	1	4	1
IW in urban terrain			2	2	3
IW in general		1	2		4
IW for the Platoon Commander			1		5
IW for the Platoon Sergeant		1	1	2	2
IW for the Squad Leader		1	1	1	4
Totals		4	8	9	19

Table E-1. Ratings for Value of Information Warrior

Summary of Ratings:

1. Tended to rate IW somewhat or very valuable.
2. Rated the IW more valuable for Platoon commander.
3. Rated Platoon Sergeant's IW less valuable than the Platoon Commander's or Squad Leader's.

Which Do You Prefer?	No Opinion	Least Preferred	Third Choice	Second Choice	First Choice
Standard T/O and T/E	1	3	3		
Standard T/E with IW		1	3	3	
Standard T/O with MBITR for Platoon Sgt and Squad Leaders				2	5
Combined IW and MBITR		1	1	1	4

Table E-2. T/O and T/E Preferences

Summary of Preferences:

1. Preferred the Standard T/O with MBITR to the other configurations.
2. Second choice was the Combined IW and MBITR.
3. Third choice was Standard T/E with IW.
4. Least preferred choice was the Standard T/O and T/E.

When asked to: "Rate the difficulty or ease of doing the following tasks?" Info Warriors responded:

During Movement/Patrolling	Impossible To Do	Very Difficult	Manageable	Easy To Do	Very Easy
Monitoring the radio			2		1
Keeping track of unit positions			1	2	
Recording information			2	1	
Transmitting information				2	1
Keeping leader informed				2	1

During Actions at the Objective	Impossible to do	Very Difficult	Manageable	Easy to Do	Very Easy
Monitoring the radio			2		1
Keeping track of unit positions			1	2	
Recording information			2	1	
Transmitting information		1		1	1
Keeping leader informed				3	

During Contact	Impossible to Do	Very Difficult	Manageable	Easy to Do	Very Easy
Monitoring the radio			2		1
Keeping track of unit positions			2	1	
Recording information		1	2		
Transmitting information			3		
Keeping leader informed			3		

During Consolidation	Impossible to do	Very difficult	Manageable	Easy to do	Very easy
Monitoring the radio				2	1
Keeping track of unit positions				3	
Recording information				3	
Transmitting information				2	1
Keeping leader informed				2	1

Summary of Difficulty Ratings:

1. They had no problems performing assigned tasks during movement or patrolling mission.
2. In general it was somewhat more difficult to perform their duties during actions at the objective, but still manageable to easy.
3. The majority felt that it was just "manageable" to perform their duties during contact.
4. The majority responded that it is "easy" to perform their duties during consolidation.

When leaders and Info Warriors were asked: “What info should the IW keep track of during the movement to contact, actions upon enemy contact, actions at the objective, or consolidation?” they responded:

This set of charts depicts their responses by info item.

Higher Element Positions	Not Needed	Nice to Have	Needed	Desired	Required
Movement to contact/patrolling			2		5
Actions upon enemy contact			1		6
Actions at the objective			1		6
Consolidation					7

1. Most needed during consolidation.
2. Least important during movement/patrolling

Adjacent Unit Positions	Not Needed	Nice to Have	Needed	Desired	Required
Movement to contact/patrolling			1	1	5
Actions upon enemy contact					7
Actions at the objective			1		6
Consolidation			1		6

1. Most needed during actions upon enemy contact.
2. Least needed during movement/patrolling

Sub-element Positions	Not Needed	Nice to Have	Needed	Desired	Required
Movement to contact/patrolling		2	1		4
Actions upon enemy contact		1			6
Actions at the objective		1	1		5
Consolidation		1			6

1. Most needed during actions upon enemy contact and consolidation.
2. Least needed during movement/patrolling.

Enemy Info in Your Area	Not Needed	Nice to Have	Needed	Desired	Required
Movement to contact/patrolling				1	6
Actions upon enemy contact					7
Actions at the objective			1		6
Consolidation					7

1. Most needed during actions upon enemy contact and consolidation.
2. Least needed during actions at the objective.

Casualty Data	Not Needed	Nice to Have	Needed	Desired	Required
Movement to contact/patrolling			2	1	4
Actions upon enemy contact				1	6
Actions at the objective			1	1	5
Consolidation			1	1	5

1. Most needed during actions upon enemy contact.
2. Least needed during movement/patrolling.

Logistics	Not Needed	Nice to Have	Needed	Desired	Required
Movement to contact/patrolling		3	2		2
Actions upon enemy contact		2	2		3
Actions at the objective		1	2	1	3
Consolidation		1	1	1	4

1. Most needed during consolidation.
2. Least needed during movement/patrolling.

This set of charts depicts their responses by mission phase:

Movement to Contact / Patrolling	Not Needed	Nice to Have	Needed	Desired	Required
Higher element positions			2		5
Adjacent unit positions			1	1	5
Sub-element positions		2	1		4
Enemy info in your area				1	6
Casualty data			2	1	4
Logistics		3	2		2

1. Most needed is enemy info in your area.
2. Least needed is logistics data

Actions Upon Enemy Contact	Not Needed	Nice to Have	Needed	Desired	Required
Higher element positions			1		6
Adjacent unit positions					7
Sub-element positions		1			6
Enemy info in your area					7
Casualty data				1	6
Logistics		2	2		3

1. Most needed are adjacent unit positions and enemy info in your area.
2. Least needed is logistics.

Actions at the Objective	Not Needed	Nice to Have	Needed	Desired	Required
Higher element positions			1		6
Adjacent unit positions			1		6
Sub-element positions		1	1		5
Enemy info in your area			1		6
Casualty data			1	1	5
Logistics		1	2	1	3

1. Most needed are higher element positions, adjacent unit positions, and enemy info in your area.
2. Least needed are logistics data.

Consolidation	Not Needed	Nice to Have	Needed	Desired	Required
Higher element positions					7
Adjacent unit positions			1		6
Sub-element positions		1			6
Enemy info in your area					7
Casualty data			1	1	5
Logistics		1	1	1	4

1. Most needed are higher element positions and enemy info in your area.
2. Least needed is logistics.

When asked "How serious a problem is it when the IW becomes a casualty?"

	No Problem	An Irritation	Minor Problem	Serious Problem	Major Problem
Platoon Commander's			2	2	2
Platoon Sergeant's		1	3	1	1
Squad Leader's		1	2	1	1

1. Most felt that it was more of a problem if the Platoon Commander's IW became a casualty.
2. Most were less concerned about either the Platoon Sergeant's or a Squad Leader's IW becoming a casualty.

When asked to "Rate the value of assigning a Marine out of the unit to serve as the Info Warrior."

	Not Worth It	Minor Problem	Neutral	Worth the Loss	Major Advantage
During movement/patrolling	1	1	2	1	2
During contact while moving	2	1	2		2
During actions at the objective	2		1	2	2

1. More respondents stated that the IW was worth the loss or an advantage during actions at the objective.
2. More respondents stated that they were either neutral, it was a minor problem, or not worth it than were in favor of the IW concept during movement or contact while moving.
3. Platoon Sergeant and 1st Squad Leader were not in favor of the Info Warrior concept.
4. The Platoon Sergeant did state he wanted an IW if he became the Platoon Commander.

When asked to "Rate the value of the Info Warrior in assisting in maintaining control in the squad during:"

	Un Sat	Below Average	Average	Excellent	Outstanding
Movement/patrolling	1	1	1	1	3
Contact while moving	1		3	1	2

1. More respondents felt that the IW was of excellent to outstanding value to the squad during movement/patrolling.
2. Fewer respondents felt that the IW was of excellent to outstanding value during contact while moving.

As the experiment forces became more familiar with the concept, the following questions were asked the leadership during the event debriefs.

Are you in favor of having an Info Warrior? Yes / No

	Event 8	Event 9	Event 10	Event 11
Platoon Commander	Yes	?	Yes	Yes
Platoon Sergeant	Yes	?	No	No
1 st Squad Leader	No	Y	No	No
2 nd Squad Leader	No	Y	No	Yes
3 rd Squad Leader	Yes	?	Yes	Yes

1. The Platoon Sergeant tended to say "NO" unless he was the Platoon Commander, then he felt that an Info Warrior was useful.

When is Info Warrior most useful?

	Event 9	Event 10	Event 11
Platoon Commander	Contact	Contact	Contact
Platoon Sergeant	Movement	Contact	Contact
1 st Squad Leader	Movement	Contact	Movement
2 nd Squad Leader	Movement	Contact	Movement
3 rd Squad Leader	Contact & Movement	Contact	Contact & Movement

The leaders tended to state that they felt the IW was most useful during contact, though the responses provided during debriefs of events with the IW (events 9 and 11), they tended to state that they felt that the IWs were most useful during movement.

Annex C

Summary of Casualty Information

Casualties. Casualties were assessed by a combination of simunitions and O/C calls.

Event	Total of BLUFOR	Standard T/O and T/E	Standard T/O with IW	Standard T/O with MBITR	Combined IW and MBITR	% Casualties
4	37	4				11%
5	36		9			25%
7	34			7		21%
6	34				5	15%
8	36	12				33%
9	34		24			71%
10	33			10		30%
11	33				6	18%
Mean	35	8	17	9	6	

Notes:

1. Events 4-7 were conducted in jungle/close terrain.
2. Events 8-11 were conducted in combination of jungle/close and MOUT terrain.

Findings:

1. Casualties tended to be higher in the MOUT events.
 - a. This is consistent with previous experiment results.
 - b. -Casualties were highest in the standard T/O with IW configuration events.
2. Casualties tended to be lower in events where the MBITR was used.
3. Casualties tended to be lower in the combined configuration events.

Annex D

Radio Usage Information

From Intercepts

Date	All Transmissions					COMSEC Violations						% of	
	Tac	Total	Position	Situation	Radio	OPSEC	Position	DF	Radio	Situation	Total		Violations
	Environ	Xmit	Report	Report	Check	Codes ¹	Report ²	Danger ³	Etiquette ⁴	Report ⁵	Violations	to Total	
<i>Data not available for earlier dates</i>													
19-Sep	Jungle	124	7	28	9	3	2	1		2	3	11	8.87%
20-Sep	Jungle	424	24	7	3	4				2		6	1.42%
21-Sep	MOUT	126	9	50	2	7		0		1	10	18	14.29%
24-Sep	MOUT	142	11	14	3	1		2		3	2	8	5.63%
25-Sep	MOUT ⁶	60	6	9		1					3	4	6.67%
26-Sep	MOUT	180	17	25	3	2	1	3		7	0	13	7.22%
Totals		1056	74	133	20	18	3	6		15	18	60	5.68%
1 - Giving away code words, names/ranks that would give an idea of the network; includes disclosure of frequencies.													
2 - Disclosing location either grid coordinates or description of surroundings so that the position is easily known.													
3 - Length of transmission of too frequent that could cause the enemy to DF/get bearing on their position.													
4 - Routine non tactical violations such as use of profanity.													
5 - Disclosing casualties, unit strength, supply numbers.													
6 - Partial data for this date due to morning stand down by collecting unit.													

Annex E

PRC-148 MBITR Position Paper

- ✓ **PRC 148 MBITR enables effective C² of maneuver warfare by the rifle platoon through covered communication between platoon leader and squad leaders.**
- ✓ **PRC 148 MBITR reduces the weight of platoon level radio gear^{3/4} end item and batteries^{3/4} by sixteen pounds (80%) per person.**
- ✓ **PRC 148 MBITR is currently in use by selected units of the Operating Forces.**
- ✓ **Additional MBITRs can be added to the inventory of the Operating Forces.**
 - ▶ **Without requiring additional manpower to operate, maintain/encrypt.**

- ✓ **Enables Effective C2 of Maneuver Warfare at Rifle Platoon Level.**
 1. Proven through current usage in the Operating Forces and during experimentation conducted by Marine Corps Warfighting Laboratory in September 2001 in Okinawa.
 2. Gives secure communication among platoon commander, platoon sergeant and squad leaders.
 3. Performs all the functions of SINCGARS radio. *Technical Specifications* at **TAB A**
 4. Adds compatibility with the fielded USMC Intra Squad Radio (ISR).
 - a. This capability does not exist today in the Operating Forces.
 5. Currently being fielded by MARCORSYSCOM.
 - a. Fielding Plan (dated 10 SEP 2001) at **TAB B**.
 - b. Graphic illustration of proposed asset replacement and distribution at **TAB C**.
 - c. Summary of recommended additional radios and associated costs at **TAB D**.
 6. MARCORSYSCOM (Logicon) weight/cost analysis at **TAB E**.

- ✓ **MBITR reduces the weight of platoon level radio gear by 16 pounds per person.**
 1. Significant weight and cost savings of this radio compared to man-packing an AN/PRC-119, AN/PRC-113 and its associated KY-57, and all the BA-5590's need to support those assets
 2. MBITR weighs 2 pounds with two (2) Lithium-Ion batteries.
 3. SINCGARS weighs 18.5 pounds with one (1) BA 5590 battery.
 4. PRC-148 uses same battery—BA-5123—as CYZ-10 (crypto fill). In USMC supply system.

- ✓ **The PRC 148 MBITR is available now.**
 1. COTS item.
 - a. Current cost of End Item two rechargeable batteries, all SL-3 gear and operator training from vendor is \$6,200.
 2. Float item—no required RAM study, supportability or training for technicians.
 - a. Return to vendor for repair.

- ✓ **MBITR adds Capability without increasing manpower requirements.**
 1. No additional 2531/0631's will be required because this radio is intended to be in the hands of the shooter, not a radio operator.

MBITR **AN/PRC-148(V)(C)**

Multiband Inter/Intra Team Radio

- **30-512 MHz Contiguous Frequency Coverage**
 - **AM/FM; Voice/Data**
 - **Selectable RF Output Power (100 mwatts to 5 watts)**
 - **US Type 1 COMSEC**
 - **Immersibility**
 - **20 Meter Maritime Version**
 - **2 Meter Urban Version**
 - **Less than 29 Ounces, 34 Cubic Inches**
 - **SINGARS SIP/HAVEQUICK II**
- Optional**

The MBITR is more capable than any hand held radio available today. In a ruggedized package weighing less than two pounds, the MBITR provides unprecedented interoperability with existing military legacy systems and commercial radios, while ensuring future operation with the next generation of communication equipment. Seven programmable devices, supported by flash memory, are incorporated into the MBITR architecture, creating a truly software-based hand held radio. With MBITR's combination of software upgradeability, Type 1 encryption and 30-512 MHz AM/FM RF capability, you benefit from a radio that satisfies both current and future communications requirements. MBITR, the hand held radio of the 21st century, is here today.

The Most Capable Hand Held Radio in the World



RACAL

Communicating Through Technology

MBITR - AN/PRC-148(V)(C) Multiband Inter/Intra Team Radio

Technical Specifications

Frequency Range

30-512 MHz Contiguous
5 and 6.25 kHz Step Size

Modulation Types

AM and FM (Software)

Frequency Stability

Less than ± 5.0 PPM

Receive Sensitivity

FM: -116 dBm 12 dB SINAD
AM: < 1.5 μ V 10 dB SINAD

Adjacent Channel Rejection

Greater than 60 dB at ± 25 kHz

Spurious & Image Rejection

Greater than 55 dB

Third Order Intercept Point

Greater than +5 dBm

Receive Audio Distortion

Less than 10% at Rated Audio Power

Acoustic Output Power

Greater than 77 dB SPL

Transmit Output Power

0.1, 0.5, 1.0, 3.0 & 5.0 watts (FM)
1.0 & 5.0 watts (AM)
User Selectable

Transmit Characteristics

Spurious Output: Less than -13 dBm
Audio Distortion: Less than 10%
FM Hum & Noise: Less than 40 dB
AM Hum & Noise: Less than 34 dB

Reliability

MTBF: > 11,400 hours
MTTR: < 8 minutes

Interoperability

AN/PRC-77, AN/VRC-12
AN/PRC-68, AN/PRC-117A-D
AN/PRC-119A/B
AN/PRC-113, AN/PRC-139
Motorola MX300 Series

QUALITY SYSTEM
CERTIFIED
ISO 9001



Emergency Beacons and GPS

AM Swept Tone Beacon
GPS Interface to PLGR

Programmable Channels

100 Memory Preset Channels
Menu Selectable Groups
User Programmable from:
• Front Panel Menu
• PC Programmer
• Radio-to-Radio Cloning

Controls

On/Off/Volume/Whisper/Zeroize Knob
16-Position Channel Select Knob
Large Tactile Push-To-Talk Switch
Squelch Override Push-button
Backlit 7-Button Keypad (NVG Compatible)
Software Configurable Option Keys

Indicators

32 x 80 Pixel Backlit LCD (NVG Compatible)
Intuitive Menu Driven User Interface
• Channel Name/Frequency
• Group Name
• Clear/Secure Mode
• Key Location
• Battery Capacity
• Transmit Power

Connectors

50 Ohm TNC Antenna
10-Pin Multi-Function Immersion Sealed Top Connector (20 Meter)
6-Pin Multi-Function Top Connector (2 Meter)
18-Pin Side Connector for Extended Capabilities and Upgrades

COMSEC

US Type 1
VINSON & FED STD-1023
Selective Key Zeroization
Panic Radio Zeroization with Mechanical Interlock Protection
Receive OTAR Compatible
6 Key Locations

TEMPEST Compliance

NTSISSM TEMPEST/1-92

Physical Parameters (with battery)

Length: 8.44 inches (21.44 cm)
Width: 2.63 inches (6.68 cm)
Depth: 1.52 inches (3.86 cm)
Volume: 33.74 cubic inches (552.8 cubic cm)
Weight: 28.8 ounces (816.5 gm)

Finish

NBC Compatible
Matte Black, Non-Reflective

Environmental Specifications

Temperature:
Operating: -31° to +60° C
Storage: -33° to +71° C
Humidity: 95% Non-condensing
Shock: ELA-603-1992
Vibration: ELA-603-1992
Altitude: 30,000 Feet
Immersion:
AN/PRC-148(V)1(C) 20 Meter Version
AN/PRC-148(V)2(C) 2 Meter Version

Batteries

Rechargeable Lithium-Ion
• 2700 mAh
• >8 Hours Life at 5 watts*
Non-Rechargeable Battery Holder
• Commercial Lithium Cells
• 12 Hour Life at 5 watts*
*Standard Duty Cycle (8:1:1)

Antenna Set

30-90 MHz
30-512 MHz

Accessories

Vehicle Adapter
Radio Holster
Radio System Carrying Bag
AC Powered Single Battery Charger
AC/DC Powered 6-Way Battery Charger

Racal Communications, Inc.

5 Research Place
Rockville, MD 20850
Phone: 301.948.4420
Fax: 301.948.6371
Email: RC1@racalcomm.com
Website: www.racalcomm.com

Specifications are subject to change without notice.



UNITED STATES MARINE CORPS
MARINE CORPS COMBAT DEVELOPMENT COMMAND
QUANTICO, VIRGINIA 22134-5001

IN REPLY REFER TO:
3900
C 442
10 SEP 2001

From: Commanding General, Marine Corps Combat Development
Command, 3300 Russell Road, Quantico, Virginia
22134-5001

Subj: STATEMENT OF NEED (SON) FOR AN INTERIM TACTICAL HAND HELD
RADIO (THHR) (NO. CCC 1.48); CHANGE 2

Ref: (a) CJCSI 3170.01B

Encl: (1 THHR Distribution Plan

1. Purpose. To transmit pen changes to the basic SON for an interim THHR. Per the reference, the following change to the THHR SON is approved.
2. Action. Replace the current THHR Distribution Plan with the enclosure.
3. The Marine Corps point of contact for this requirement is the Command, Control, Communication, Computers, and Intelligence (C 442), Equipment Requirements Division, Marine Corps Combat Development

A handwritten signature in black ink, appearing to read "R. J. Antonich".

R. J. ANTONICH
Director, Equipment Requirements Division
Acting

Copy to:
COMMARCORSYSCOM
HQMC (C4)
MCCDC (C 53)

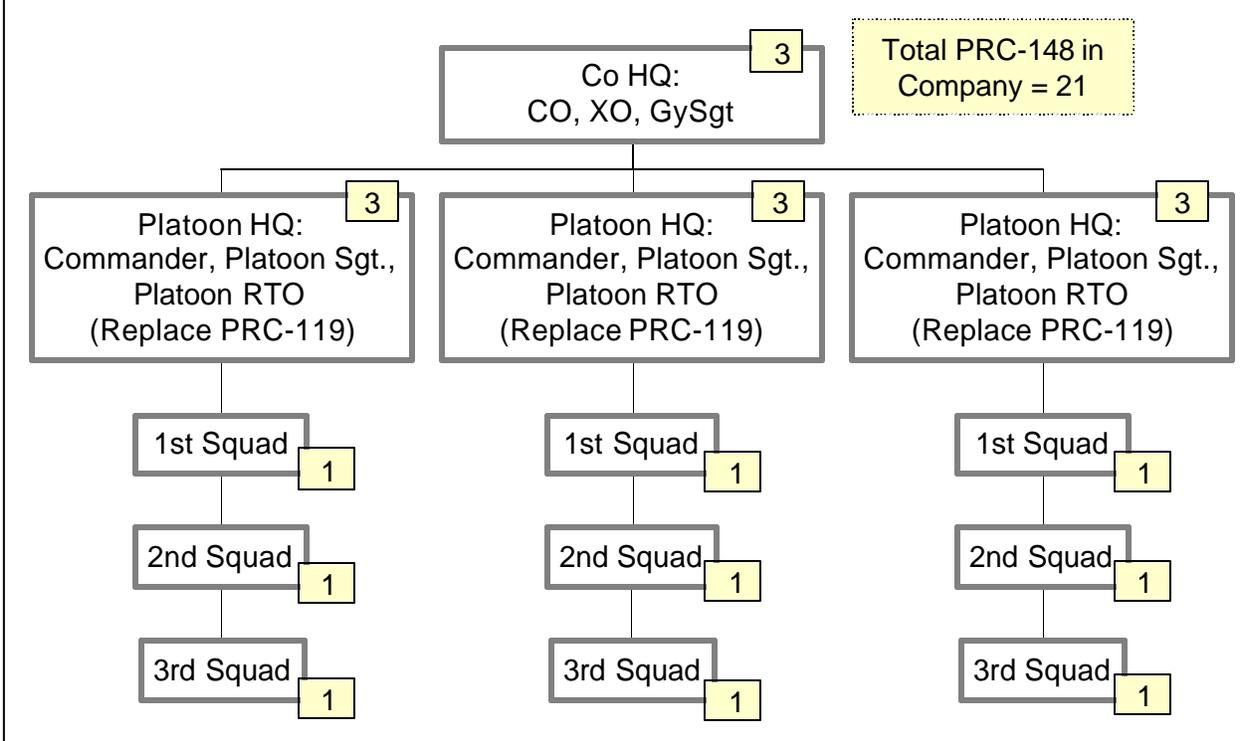
TACTICAL HAND HELD RADIO DISTRIBUTION PLAN

T/E NO	UNIT NAME	UNIT PLANNED ALLOWANCE	MULTIPLIER	TOTAL
TIER 1 & 2 AN/PRC-148(V)1 (MARITIME)				
5980	EWTGLANT AN/PRC-148(V)1	10	1	10
5981	EWTGPAC AN/PRC-148(V)1	10	1	10
M 4623	Force Recon Co, MARFORRES	100	2	200
N 1411	HqSvcCo, ReconBn, 1st MarDiv	155	1	155
N 1421	HqSvcCo, ReconBn, 2d MarDiv	155	1	155
N 1431	HqSvcCo, ReconBn, 3d MarDiv	12	1	12
N 1432	Distance Recon Co, 3d MarDiv	75	1	75
N 1433	Deep ReconCo, ReconBn 3rd MarDiv	75	1	75
N 1441	HqSvcCo, Recon Bn, 4th MarDiv	60	1	60
N 4618	Force Recon Co, 1 MEF	100	1	100
N 4637	HqSvcCo, 1st Radio Bn	54	1	54
N 4718		100	1	100
N 4737	HqSvcCo, 2nd Radio Bn	36	1	36
				1042
TIER 3 AN/PRC-148(V)2 URBAN				
M 4928	Force Headquarters, H&S Bn, MarForPac	9	1	9
N 1164	Rifle Co, Inf Bn, 1st MarDiv	6	30	180
N 1174	Rifle Co, Inf Bn, 2d MarDiv	6	24	144
N 1184	Rifle Co, Inf Bn, 3d MarDiv	6	12	72
B 1184	Rifle Co, Inf Bn, 3d MarDiv (Hi)	6	6	36
N 1194	Rifle Co, Inf Bn, 4th MarDiv	6	27	162
N 2101	HqBtry, Arty Regt, 1st MarDiv	4	1	4
N 2109	HqBtry, Arty Bn, (M198), Arty Regt, 1st MarDiv	2	4	8
N 2201	HqBtry, Arty Regt, 2nd MarDiv	4	1	4
N 2209	HqBtry, Arty Bn, (M198), Arty Regt, 2nd MarDiv	2	4	8
B 2309	HqBtry, Arty Bn, (M198), Arty Regt, 3rd MarDiv (HI)	2	1	2
N 2301	HqBtry, Arty Regt (-), 3rd MarDiv	4	1	4
N 2309	HqBtry, Arty Bn, (M198), Arty Regt, 3rd MarDiv	2	1	2
N 2401	HqBtry, Arty Regt, 4th MarDiv	4	1	4
N 2409	HqBtry, Arty Bn, Arty Regt, 4th MarDiv	2	5	10
N 3113	Comm Co, H&S Bn, 1 FSSG	77	1	77
N 3213	Comm Co, H&S Bn, 2 FSSG	77	1	77
N 3313	Comm Co, H&S Bn, 3 FSSG	52	1	52
N 4915	HQ MEU, I MEF	11	3	33
	HQ MEU, II MEF	11	3	33
	HQ MEU, III MEF	10	1	10
				931

ENCLOSURE (1

T/E NO	UNIT NAME	UNIT PLANNED ALLOWANCE	MULTIPLIER	TOTAL
TIER 4				
5980	EWTGLANT AN/PRC-148(V)2	10	1	10
5981	EWTGPAC AN/PRC-148(V)2	10	1	10
7442	MCTSSA	6	1	6
4734	CCSS, MCCDC	14	1	14
7450	IOC (TBS, MCSCHLS, MAGT&E, MCCDC, Quantico, VA??)	20	1	20
N 4605	SOTG I MHG	12	1	12
N 4705	SOTG II MHG	12	1	12
N 4805	SOTG III MHG	12	1	12
	TOTAL			96
	Total Allowance TIER 1 & 2 AN/PRC-148(V)1 (MARITIME)			1042
	Total Allowance TIER 3 & 4 AN/PRC-148(V)2 (URBAN)			1027
	TOTAL ALLOWANCE			2069

PRC-148 Multi Band Inter/Intra Team Radio (MBITR) Proposed Distribution



Tactical Hand Held Radio Distribution Plan									
Existing Distribution Plan					Revised Distribution Plan				
T/E No	Unit Name	Unit Planned Allowance	No of Units	Total	Unit Planned Allowance	No of Units	Total	Additional Radios Required	Additional Cost @ \$6200
Tier 1 & 2 PRC-148 (V)1 (MARITIME: Submersible to 20 meters)									
5980	EWTGLANT	10	1	10	10	1	10	0	
5981	EWTGPAC	10	1	10	10	1	10	0	
M 4623	Force Recon Co. MARFORRES	100	2	200	100	2	200	0	
N 1411	HqSvcCo. ReconBn. 1st MarDiv	155	1	155	155	1	155	0	
N 1421	HqSvcCo. ReconBn. 2d MarDiv	155	1	155	155	1	155	0	
N 1431	HqSvcCo. ReconBn. 3d MarDiv	12	1	12	12	1	12	0	
N 1432	Distance Recon Co 3d MarDiv	75	1	75	75	1	75	0	
N 1433	Deep ReconCo. ReconBn. 3d MarDiv	75	1	75	75	1	75	0	
N 1441	HqSvcCo. Recon Bn. 4th MarDiv	60	1	60	60	1	60	0	
N 4618	Force Recon Co. I MEF	100	1	100	100	1	100	0	
N 4637	HqSvcCo. 1st Radio Bn	54	1	54	54	1	54	0	
N 4718		100	1	100	100	1	100	0	
N 4737	HqSvcCo. 2nd Radio Bn	36	1	36	36	1	36	0	
Subtotal Tiers 1 and 2 (MARITIME)				1042			1042	0	
Tier 3 PRC-148 (V)2 (URBAN: Submersible to 2 meters)									
M 4928	Force HQ. H&S Bn. MARFORPAC	9	1	9					
N 1164	Rifle Co. InfBn. 1st MarDiv	6	30	180	21	30	630	450	\$ 2,790,000
N 1174	Rifle Co. InfBn. 2d MarDiv	6	24	144	21	24	504	360	\$ 2,232,000
N 1184	Rifle Co. InfBn. 3d MarDiv	6	12	72	21	12	252	180	\$ 1,116,000
B 1184	Rifle Co. InfBn. 3d MarDiv (HI)	6	6	36	21	3	63	27	\$ 167,400
N 1194	Rifle Co. InfBn. 4th MarDiv	6	27	162	21	27	567	405	\$ 2,511,000
N 2101	HqBtry, Arty Regt. 1st MarDiv	4	1	4	4	1	4	0	
N 2109	HqBtry, Arty Bn (M198), 1st MarDiv	2	4	8	2	4	8	0	
N 2201	HqBtry, Arty Regt. 2d MarDiv	4	1	4	4	1	4	0	
N 2209	HqBtry, Arty Bn (M198), 2d MarDiv	2	4	8	2	4	8	0	
B 2309	HqBtry, Arty Bn (M198), 1st MarDiv (HI)	2	1	2	2	1	2	0	
N 2301	HqBtry, Arty Regt (-). 3d MarDiv	4	1	4	4	1	4	0	
N 2309	HqBtry, Arty Bn (M198), 3d MarDiv	2	1	2	2	1	2	0	
N 2401	HqBtry, Arty Regt. 4th MarDiv	4	1	4	4	1	4	0	
N 2409	HqBtry, Arty Bn. Arty Regt. 4th MarDiv	2	5	10	2	5	10	0	
N 3113	Comm Co. H&S Bn. 1 FSSG	77	1	77	77	1	77	0	
N 3213	Comm Co. H&S Bn. 2 FSSG	77	1	77	77	1	77	0	
N 3313	Comm Co. H&S Bn. 3 FSSG	52	1	52	52	1	52	0	
N 4915	HQ MEU I MEF	11	3	33	11	3	33	0	
	HQ MEU II MEF	11	3	33	11	3	33	0	
	HQ MEU III MEF	10	1	10	10	1	10	0	
Subtotal Tier 3 (URBAN)				931		2344	1422		
Tier 4 PRC-148 (V)2 (URBAN: Submersible to 2 meters)									
5980	EWTGLANT	10	1	10	10	1	10	0	
5981	EWTGPAC	10	1	10	10	1	10	0	
7442	MCTSSA	6	1	6	6	1	6	0	
4734	CCSS, MCCDC	14	1	14	14	1	14	0	
7450	IOC (TBS, MCSchls. MAGT&E, MCCDC)	20	1	20	20	1	20	0	
N 4605	SOTG I MHG	12	1	12	12	1	12	0	
N 4705	SOTG II MHG	12	1	12	12	1	12	0	
N 4805	SOTG III MHG	12	1	12	12	1	12	0	
Subtotal Tier 4 (URBAN)				96		96	0		
Total Allowance Tier 1&2 (V) 1 (MARITIME)				1042		1042			
Total Allowance Tier 3&4 (V) 2 (URBAN)				1027		2440	1422		
Total Allowance				2069		3482	1422	\$ 8,816,400	
Current (Funded) Acquisition Objective									
Revised Acquisition Objective									
Additional Cost									

Annex F

**Cost Comparison of the Tactical Hand Held Radio (AN/PRC-148 (V) (C)) to
Comparable Fielded Systems**



Prepared by:
Logicon Communications Technology Group
2848 Jefferson Davis Highway, Suite 102
Stafford, Virginia 22554

Prepared for:
Marine Corps Systems Command
(C4I)
Quantico, Virginia 22134

MARCH 2000

EXECUTIVE SUMMARY

This study is being performed at the request of the Deputy Commander, Command, Control, Communications, Computers, and Intelligence (C4I). This study focuses upon three aspects of fielding the Tactical Hand Held Radio (THHR) (AN/PRC-148 (V)(C)): the potential Operations and Maintenance (O&M) cost savings; the procurement costs; and the weight reduction of the combat load of Marines.

Each aspect of this comparison was assessed in relation to the scenarios developed for the Comparison of the Single Channel Ground and Airborne Radio System (SINCGARS) and the THHR (November 1999). For the purposes of this study, it was assumed that these scenarios (recon patrol and combat patrol) would be performed twice a month. The combat patrol was used in the analysis of the infantry battalion, while the recon patrol was used for analysis of the Recon Bn and Force Recon Co. O&M costs examined include consumables (batteries) and battery disposal costs. The SINCGARS radio used in the scenarios is the AN/PRC-119A, with the logic that the THHR would replace the older, heavier radio. However, procurement costs are provided for both the AN/PRC-119A and AN/PRC-119F.

The replacement ratio for the THHR vs. Legacy equipment for the combat patrol is as follows: 4 THHRs will replace 1 AN/PRC-119A and 1 AN/PRC-113 with KY-57. The replacement ratio for the THHR vs. Legacy equipment for the recon patrol is as follows: 4 THHRs will replace 1 AN/PRC-119A, 4 SABERS, and 1 AN/PRC-113 with KY-57. Cost and weight savings are predicated on those ratios for each patrol.

The AN/PRC-94, AN/PRC-68, and AN/PRC-112A were originally to be included in this examination; however, it was determined that inadequate usage data was available due to the age of the AN/PRC-94 and AN/PRC-112A and the lack of use of the radios. Although the lack of usage data precluded performing an O&M cost comparison of the THHR to these radios, it is concluded that the THHR can fill the holes left in the tables of equipment (T/Es) by these radios due to its capabilities.

Table 1 provides an overall summary of the cost and weight savings of using THHR equipment versus legacy equipment. Battery cost savings reflect the cost savings for one patrol (combat or recon) to complete 24 missions each year for ten years. Procurement costs reflect the one-time cost of purchasing equipment according to the ratios described above.

Attachment 1 provides individual battery and disposal costs, procurement, and weight savings information for each individual radio in the scenarios. *Attachment 2* provides a detailed breakdown of O&M costs, to include unit price per battery, weight per battery, and disposal costs per battery. Although the patrols did not use rechargeable batteries in the scenarios, an informational table is provided in *Attachment 2* comparing rechargeable battery life, weights, and costs. *Attachment 2* also contains a table of cost savings for the Infantry Battalions, Recon Battalions, and Force Recon Companies.

Table 1. Summary: Cost and Weight Savings of Using THHR vs. Legacy Equipment

	THHR	Legacy	Savings
Batteries, Combat Patrol	\$305,510.40	\$640,764.00	\$335,253.60
Batteries, Recon Patrol	\$305,510.40	\$812,008.80	\$506,498.40
Procurement Costs, Combat Patrol, Radios	\$22,560.00	\$28,815.81	\$6,255.81
Procurement Costs, Recon Patrol, Radios	\$25,232.00	\$42,165.21	\$16,933.21
Weight, Combat Patrol	52 lbs	128 lbs	76 lbs
Weight, Recon Patrol	52 lbs	136 lbs	84 lbs

Note 1. This table shows cost savings for a single patrol to perform 24 missions each year over a 10-year cycle.

Note 2. Weight savings reflect the weight of equipment and batteries for a single mission.

Note 3. Attachment 2, Table 4 provides cost savings across the USMC.

Attachment 1

Tables 1 and 2 provide O&M cost information for one combat patrol and one recon patrol to perform their relevant missions twice a month over a ten year cycle.

Table 1. O&M Costs: Combat Patrol (Disposable Batteries)

Equipment	Battery and Disposal Costs
AN/PRC-119A w/ BA-5590	\$320,382.00
AN/PRC-113 w/ BA-5590	\$213,588.00
KY-57 w/ BA-5590	\$106,794.00
O&M Costs for Legacy Equipment	\$640,764.00
AN/PRC-148 w/ BA-5123	\$305,510.40
O&M Costs for THHR Equipment	\$305,510.40
COST SAVINGS USING THHR V. LEGACY	\$335,253.60

[Sources: Comparison of the Single Channel Ground and Airborne Radio System and the Tactical Hand Held Radio, November 1999; Abbreviated Life Cycle Cost Estimate for the Enhanced Position Location Reporting System, November 1999]

Table 2. O&M Costs – Recon Patrol

Equipment	Battery and Disposal Costs
AN/PRC-119A w/ BA-5590	\$320,382.00
SABER w/ NTN-4569*	\$171,244.80
AN/PRC-113 w/ BA-5590	\$213,588.00
KY-57 w/ BA-5590	\$106,794.00
O&M Costs for Legacy Equipment	\$812,008.80
AN/PRC-148 w/ BA-5123	\$305,510.40
O&M Costs for THHR Equipment	\$305,510.40
Cost Savings Using THHR V. Legacy	\$506,498.40

* Note. The cost for the SABER does not include disposal costs, as the information was unavailable. If included, this cost would increase battery and disposal costs for Legacy equipment, making the cost savings of the THHR even greater.

[Source: Comparison of the Single Channel Ground and Airborne Radio System and the Tactical Hand Held Radio, November 1999; Abbreviated Life Cycle Cost Estimate for the Enhanced Position Location Reporting System, November 1999]

As discussed in the Executive Summary of this Annex, the Combat Patrol scenario was used to address the Infantry Bn. The replacement ratio for the THHR vs. Legacy equipment for the combat patrol is as follows: 4 THHRs will replace 1 AN/PRC-119A and 1 AN/PRC-113 with 1 KY-57.

Table 3 (below) provides procurement cost information for an individual combat patrol.

	Unit Cost	Total Procurement Costs
AN/PRC-119A	\$10,117.00	\$10,117.00
AN/PRC-113	\$16,769.00	\$16,769.00
KY-57	\$1,929.81	\$1,929.81
Total Procurement Costs (Legacy Equipment)		\$28,815.81
	Unit Cost	Total Procurement Costs
AN/PRC-148	\$5,640.00	\$22,560.00
Total Procurement Costs (THHR Equipment)		\$22,560.00
Cost Savings Using THHR VS. Legacy		\$6,255.81

Note. If replacing the AN/PRC-119F vice the AN/PRC-119A, savings would be \$560.68

[Sources: FEDLOG Database, January 2000; User’s Logistic Support Summary for Single Channel Ground and Airborne Radio System, Final Draft, (ULSS 001991-15, Revision 3); MSgt Mark Averitt, Project Officer, Tactical Hand Held Radio, MARCORSYSCOM]

As discussed in the Executive Summary, the Recon Patrol scenario was used to address the Recon Bn and the Force Recon Co. The replacement ratio for the THHR vs. Legacy equipment for the recon patrol is as follows: 4 THHRs will replace 1 AN/PRC-119A, 4 SABERS, and 1 AN/PRC-113 with KY-57. Table 4 provides procurement costs for an individual recon patrol.

	Unit Cost	Total Procurement Costs
AN/PRC-119A	\$10,117.00	\$10,117.00
SABER	\$3,337.35	\$13,349.40
AN/PRC-113	\$16,769.00	\$16,769.00
KY-57	\$1,929.81	\$1,929.81
Total Procurement Costs (Legacy Equipment)		\$42,165.21
	Unit Cost	Total Procurement Costs
AN/PRC-148	\$6,308.00	\$25,232.00
Total Procurement Costs (THHR Equipment)		\$25,232.00
Cost Savings Using THHR VS. Legacy		\$16,933.21

Note. If replacing the AN/PRC-119F vice the AN/PRC-119A, savings would be \$11,238.08

[Sources: FEDLOG Database, January 2000; User's Logistic Support Summary for Single Channel Ground and Airborne Radio System, Final Draft, (ULSS 001991-15, Revision 3); MSgt Mark Averitt, Project Officer, Tactical Hand Held Radio, MARCORSSYSCOM; Captain G.W. Dickey, S-6, First Force Recon.]

The following tables provide weight reduction information within the context of the scenarios used in the Comparison Study.

SINCGARS/Legacy	THHR
1 AN/PRC-119A 18 BA-5590 Batteries	4 AN/PRC-148 w/ BA-5123 44 battery packs- BA-5123
1 AN/PRC-113 12 BA-5590 Batteries	
1 KY-57 w/ BA-5590 6 BA-5590 batteries	
Total Weight = 128 lbs	Total Weight = 52 lbs
Total Weight Savings Using THHR Vs. Legacy Equipment = 76 lbs.	

[Source: Comparison of the Single Channel Ground and Airborne Radio System and the Tactical Hand Held Radio, November 1999]

Table 6. Weight Reduction: Recon Patrol

SINGARS/Legacy	THHR
1 AN/PRC-119A 8 BA-5590 Batteries 1 AN/PRC-113 2/ BA-5590 12 BA-5590 Batteries 1 KY-57 6 spare BA-5590 4 SABERS w/ 24 NTN-4569 batteries*	4 AN/PRC-148 w/ BA-5123 44 battery packs w/ BA-5123
Total Weight: 136 lbs	Total Weight: 52 lbs.
Total Weight Savings Using THHR Vs. Legacy Equipment: 84 Lbs.	

*Weight information for the NTN-4569 is not included in the weight analysis, as it was unavailable. If included, it would increase the total weight for Legacy equipment and therefore increase the weight savings of using the THHR vice Legacy equipment.

[Source: Comparison of the Single Channel Ground and Airborne Radio System and the Tactical Hand Held Radio, November 1999]

Attachment 2

TABLE 1. BATTERY COSTS, DISPOSABLE

	Unit Price	# Used Per Mission	Total Cost Per Mission	Total Battery Cost for 10 Years (24 missions per year)
SINGGARS:				
AN/PRC-119A w/ BA-5590	\$71.62	18	\$1,289.16	\$309,398.40
THHR:				
AN/PRC-148 w/ BA-5123	\$2.16	576	\$1,244.16	\$298,598.40
Other Radios:				
AN/PRC-113 w/ BA-5590	\$71.62	12	\$859.44	\$206,265.60
KY-57 w/ BA-5590	\$71.62	6	\$429.72	\$103,132.80
SABER w/ NTN-4569A	\$29.73	24	\$713.52	\$171,244.80

TABLE 2. RECHARGEABLE BATTERY COMPARISON

	Battery Life (after charge)	# of Recharges	Battery Cost	Battery Weight
THHR (ICR-18650)	8 hours	600 (minimum)	\$212.00*	.06 lbs
Legacy (BB-390)	8 hours	500	\$293.00	3.92 lbs

*The THHR requires 12 batteries (vice 1 for the SINGGARS, AN/PRC-113, or KY-57), so costs should be multiplied appropriately.

	Weight	Disposal Cost per lb	Disposal Cost per Battery	# Batteries Used Per Mission	Total Disposal Cost Per Mission	Total Disposal Cost Over 10 Years
SINGGARS:						
AN/PRC-119A w/ BA-5590	2.25	\$1.13	\$2.54	18	\$45.77	\$10,983.60
THHR:						
AN/PRC-148 w/ BA-5123	.04	\$1.13	\$0.05	576	\$28.80	\$6,912.00
Other Radios:						
AN/PRC-113 w/ BA-5590	2.25	\$1.13	\$2.54	12	\$30.51	\$7,322.40
KY-57 w/ BA-5590	2.25	\$1.13	\$2.54	6	\$15.24	\$3,657.60
SABER w/ NTN-4569A*				24		

*Weight and disposal information for the NTN-4569A was unavailable

Table 4 shows the cost savings to a single Infantry Battalion, Recon Battalion, and Force Recon Company if they were to replace legacy equipment with THHR equipment in the ratios used in the combat patrol and recon patrol scenarios.

Table 4. Cost Savings: USMC Impact

	Infantry Bn (9 platoons)	Recon Bn (9 platoons)	Force Recon Co (6 platoons)
Batteries	\$3,017,282.40	\$4,558,485.60	\$3,038,990.40
Procurement	\$56,302.29	\$152,398.89	\$101,599.26

