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Reconfigurable Tactical Operations Simulator (RTOS) Operational Demonstration: Post Deployment Build 6 Follow Up

by John K. Hawley, Anna L. Mares, and John I. Fallin

ARL-MR-0703 **June 2008**

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14. ABSTRACT
The current report is a follow-up to ARL-SR-0156 which describes the operational demonstration of a part-task, less-than-full-fidelity simulator in an operational Patriot unit. The specific objectives of this follow up assessment were to (1) determine whether the Reconfigurable Tactical Operations Simulator (RTOS) operating first with a Post-Deployment Build (PDB) 5.5.2 emulation and then a PDB-6-like model could be used to train PDB-6 fire control crews (both Information and Coordination Central [ICC] and Engagement Control Station [ECS] on selected tasks); and (2) begin formulating a list of changes that would be required for the RTOS to adequately support PDB-6 fire control crew training. Results from the follow-up assessment indicated that the current RTOS model has limited PDB-6 functionality and should not be used to support PDB-6-specific training in Patriot units. This conclusion does not mean that the current RTOS does not have training value for PDB-6 equipped units. Follow Up participants expressed a view that the current RTOS does have training value in PDB-6 equipped units to train fire control personnel from entry up through gunnery table IV. A list of modifications to the RTOS to make it usable for PDB-6 specific training in Patriot units also resulted from the Follow Up exercise.

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Introduction

Background

During the combat operations phase of Operation Iraqi Freedom (OIF), Army Patriot air defense missile units were involved in two fratricides, or shoot-downs of friendly aircraft. In the first, a British Tornado was misclassified as an anti-radiation missile and subsequently engaged and destroyed. The second fratricide involved a Navy F/A-18 Hornet that was misclassified as a tactical ballistic missile and also engaged and destroyed. Three flight crew members lost their lives in these incidents. The war involved a total of 11 Patriot engagements by U.S. units. Of these, nine resulted in successful missile engagements; the other two were fratricides.

In the spring of 2004, a team from the Army Research Laboratory's (ARL's) Human Research and Engineering Directorate (HRED) began looking into Patriot performance and training issues at the invitation of the then Ft. Bliss Commander, Major General (MG) Michael A. Vane. After reviewing conclusions from the Army board of inquiry, which was formed to look into the fratricides, MG Vane was convinced that human performance issues were part of the problem leading to those incidents. He was particularly concerned by what he termed a "lack of vigilance" on the part of Patriot operators along with an apparent "lack of cognizance" of what was being presented to them on situation displays with a resulting "absolute trust in automation." MG Vane requested that HRED conduct a human-performance-oriented critical incident assessment to complement the official inquiries and report back to him regarding potential problems and solutions.

The HRED project team spent most of the Summer and Fall of 2004 performing the requested critical incident assessment and delivered an initial report to MG Vane in October 2004. In developing the incident assessment and recommendations, the team focused on how Patriot got to those incidents. MG Vane was not interested in a further dissection of the specifics of the fratricides, since those details had been the focus of the board convened to examine the incidents. Rather, he wanted to understand how Patriot units got into a situation in which those incidents were almost inevitable. HRED's results were intended to be explanatory in a broad, conceptual manner rather than a narrow, technical sense. Moreover, the intent was to point the way to actionable solutions rather than to lay further blame. Hawley and Mares (2006) provides detailed results from HRED's incident assessment.

HRED's report to MG Vane recommended two primary actionable items to address the problems identified during the incident assessment:

1. Reexamine air defense battle command automation concepts to emphasize effective operator control: Look into ways to mitigate situational awareness problems resulting from undisciplined automation of Patriot control functions.

2. Develop more effective battle command teams: Reexamine the level of expertise required to employ systems such as Patriot on the modern battlefield.

A later report on Patriot system performance during OIF prepared by the Defense Science Board reinforced HRED's recommendations concerning the importance of effective operator control and improved training.

After reviewing results from the incident assessment, the Army Training and Doctrine Command (TRADOC) Capability Manager (TCM) for Patriot requested that HRED's work continue into a second phase. The initial phase of the project resulted in a technical report addressing the impact of automation on air defense battle command (Hawley, Mares, & Giammanco, 2005). The TCM specifically requested that the project team expand this overview material and prepare two, more detailed reports, one concerned with design for effective supervisory control (Hawley & Mares, 2006) and a second addressing training for automated battle command systems (Hawley, Mares, & Giammanco, 2006). In the TCM's words, the intent of these reports was to inform the air defense community on "what right looks like" in each of these topic areas.

Both reports contain a summary and discussion of the technical state of the art in each topic area as it pertains to air defense systems and operations. In developing the reports, the HRED team took considerable care to ensure that the material reflected a consensus regarding the state of the art. Together, these three reports formed the conceptual basis for what were later to be turned into actual design and training actions.

In the late summer of 2005 after MG Vane had left Ft. Bliss for another assignment, the project team briefed his replacement, MG Robert Lennox, on the status and results of the project and follow-on work. Following this meeting, MG Lennox formally requested that ARL continue the project so that the team could work with the air defense community implementing selected actions. A major aspect of follow-on implementation was to serve as the MANPRINT (Manpower and Personnel Integration) evaluator during an operational test of a major software upgrade for the Patriot system—Post Deployment Build 6, or PDB-6. The PDB-6 upgrade was developed to address several of the Patriot system's operational deficiencies that were considered to have contributed to the unacceptable fratricide rate. MANPRINT is the Army's human-system integration initiative.

Training Problems Observed During the PDB-6 Operational Test

From the Fall of 2005 through the Summer of 2006 during the train-up period for the PDB-6 operational test, the team's observations regarding the progress of training for the test unit sounded an alarm. Training was not progressing satisfactorily. Training events were being completed, but individual and crew performance objectives were not being met. Many of the training issues identified during HRED's follow-up to the initial fratricide inquiry were surfacing and were not being addressed adequately by New Equipment Training (NET) or training events in the test unit. The team viewed these training deficiencies as a serious problem because

inadequate test player training would compromise the validity of test results and undermine the basis for evaluating the value added of PDB-6 software changes.

In spite of the observed training difficulties, the HRED project team was able to make several defensible observations regarding Patriot training as experienced by the test unit. These observations led the Air Defense Artillery (ADA) School to agree that the level of expertise required to employ the Patriot system properly with the PDB-6 upgrade exceeded the current training standard. The earlier Army board of inquiry report on the fratricides had reached a similar conclusion, noting that "the system [Patriot] is too lethal to be placed in the hands of crews trained to such a limited standard." Further, a later review of results from the PDB-6 operational test prepared by the Department of Defense's Director, Operational Test and Evaluation (DOT&E) concurred that "The level of expertise required for PAC-3 [Patriot Advanced Capability 3] PDB-6 operations exceeds the current Army training standard." DOT&E's assessment added that "The operational impacts of [training and other deficiencies] include less robust and less effective defense of critical assets, an increased probability that operator error will lead to not engaging hostile targets, and/or erroneously engaging friendly targets." The gist of the problem alluded to here is that technical and operational complexities introduced by successive software upgrades coupled with mission changes for Patriot have increased the requirement for operator expertise. However, training for Patriot fire control crews has not been upgraded to match this increase in system and operational complexity. Enhanced training for Patriot fire control crews clearly is a critical issue in overall system effectiveness.

The convergence of evidence cited above supported an emerging consensus that modifications to current air defense training practices were required. Moreover, these modifications would require not simply more "traditional" training, but performance-oriented methods focused on deliberate practice. HRED advocated this position strongly in a report prepared in the aftermath of the training inadequacies leading up to the PDB-6 operational test (Hawley & Mares, 2007). This report also laid out a blueprint for how air defense training had to be modified to achieve the necessary ends. In current usage, deliberate practice denotes a hands-on instructional regimen focused on specific instructional objectives accompanied by immediate and expert feedback.

The Reconfigurable Tactical Operations Simulator Operational Demonstration

As noted, the ADA School concurred that a reexamination of Patriot training strategies and practices was in order. In addition to general agreement that a change in training rigor and instructional methods was necessary, the school identified an additional training capability gap. This gap concerned the organic simulation capability available to air defense units. The school concluded that units might benefit from a capability to train fire control crews that supplemented their organic embedded training capability and would better support performance-oriented instructional methods focused on deliberate practice. An additional consideration involves limits and restrictions on the use of embedded trainers during long deployments and extended wartime

operations. The current Patriot embedded training capability requires the use of tactical equipment in training mode, which is not often feasible while deployed. Moreover, embedded training in the Patriot control vans does not provide a setting conducive to job-relevant practice with feedback. A stand-alone training device at the unit level would better support training and proficiency maintenance under these conditions.

Toward this end, the school identified an existing device, the Reconfigurable Tactical Operations Simulator (RTOS), as potentially fulfilling the need for a simulation capability to supplement units' organic embedded training capability. The RTOS is a part-task, less-than-full-fidelity Patriot simulator and has been used since the late 1970s to support air defense exercises as well as experimentation and analysis. However, it had not been used previously as a training device in Patriot institutional or unit training. To begin exploring these issues, the school organized what was termed the RTOS Operational Demonstration (OpDemo). The demonstration was structured as a joint project involving the ADA School and an operational Patriot unit, 5-52 ADA. Its objectives were to: (1) demonstrate and evaluate modified instructional methods for use in unit training, and (2) assess the potential utility of the RTOS to supplement unit training assets. HRED personnel participated in a technical advisory capacity.

Results from the demonstration indicated that (1) the RTOS, as an exemplar for a part-task, less-than-full fidelity training device, has potential utility to support Patriot unit training; (2) a training method centered on deliberate practice was effective for the trial modules used; and (3) the overall training package was well received by participants. Beyond these specific conclusions, the results indicated that the ADA School had a "green light" to pursue further applications of an RTOS-like training device and modified instructional methods. Demonstration results also helped to forge a consensus among decision makers and opinion leaders in the air defense community that the exercise was a success, and that HRED's view of the way forward for training reform was both potentially useful and feasible. As an added benefit, the training set-up used during the demonstration—the part-task device coupled with modified instructional methods—represented a partial prototype for a solution to the training deficiencies that contributed to the Patriot fratricides during OIF and that showed up again during the run-up to the PDB-6 operational test. Hawley, Mares, Fallin, and Wallet (2007) provides a description of the RTOS OpDemo.

The Current Project

The current version of the RTOS operates with an emulation of a predecessor to the software version now being deployed to operational Patriot units (i.e., PDB-5.5.2 versus PDB-6). Selected enhancements to the RTOS by its developer have resulted in what might be termed a PDB-6 "like" version, but the current device cannot be considered fully functionally equivalent to Patriot PDB-6. Selected physical aspects of the data displayed to operators on the situation display also are different. Given the favorable results from the earlier RTOS Operational Demonstration and a perceived need to augment Patriot unit training capabilities, the ADA

School organized a follow up to the initial OpDemo to examine the potential training impact of physical and functional differences between the current RTOS and the Patriot PDB-6 tactical system. Once again, HRED personnel participated in an advisory capacity. The specific objectives of the Follow Up were to:

1. Determine whether the RTOS operating first with a PDB-5.5.2 emulation and then a PDB-6-like model could be used to train PDB-6 fire control crews (both Information and Coordination Central [ICC] and Engagement Control Station [ECS]) on selected tasks.
2. Begin formulating a list of changes that would be required for the RTOS to adequately support PDB-6 fire control crew training.

Method

General Approach: The Backward Transfer Simulator Validation Paradigm

The primary purpose of the Follow Up was to determine whether skills acquired using the RTOS would transfer to Patriot PDB-6. In essence, this problem is termed simulator validation. For a simulator to be judged valid, it must be demonstrated that there is some reasonable level of skill transfer from the simulator to the target performance setting. The usual approach to simulator validation is termed forward transfer. Test subjects are trained to criterion using the simulator and then brought into the target performance setting where their performance is assessed. The level of transfer of training from simulator to target setting is a function of their performance on the tactical system.

In the present situation, this pairing of simulator and tactical system was reversed. With Patriot, there are no trainees who have been trained to standard using the RTOS. There is, however, a limited pool of Soldiers who have been trained to Table VIII standard on the Patriot PDB-6 tactical system. Table VIII is one of a set of gunnery qualification tables that serve as a criterion in the Army, for example, artillery, tank (Armor), and aerial (Aviation) gunnery. (See appendix C for a description of Patriot operator tasks and the gunnery tables to which they are linked.) Under the backward transfer procedure, operators trained to standard on the tactical system are asked to perform a range of tasks on the simulator in question. Successful performance of the tasks thus used can be taken as evidence of backward transfer from tactical system to the simulator. If backward transfer is demonstrated, one can also assume that forward transfer from simulator to tactical system would occur. On the other hand, if experienced operators perform poorly on the simulator, it can be assumed that essential cues in the tactical system are not present in the simulator and the simulator is not valid for training skills essential for tactical operations. The backward transfer paradigm was developed in the aviation community and has been used to validate aviation simulators after-the-fact. That is, in situations where a simulator is

developed after the tactical system has been deployed (cf. Adams & McAbee, 1961; Stewart, 1985; Stewart, 1994).

The present procedure could also be termed a utility (for training) assessment in which participants are asked to perform specific tasks in the training device and rate the usability of the device for performing those tasks. For example, to address a question similar to that asked in the present study, Johnson and Stewart (2005) performed a utility assessment of a low-cost, PC-based helicopter flight training device, running Microsoft Flight Simulator™ Professional Edition, for training a total of 71 primary visual and instrument flight tasks from the Army Aircrew Training Manual. The main conclusion of the assessment was that the PC-based aviation training device was not suitable for training visual flight maneuver tasks, especially those requiring hovering, though it could be useful for training instrument flight tasks, especially those involving radio navigation.

Participants

Three Patriot crews from 5-52 ADA participated in the Follow Up assessment: one ICC crew and two ECS crews. The criteria for selection of Follow Up participants were: (1) participation in the initial RTOS OpDemo, (2) training and certification to Table VIII standard on PDB-6, and (3) participation in subsequent live air events such as the Weapons and Tactics Instructor (WTI) assessment of Patriot PDB-6 conducted in October 2007. All of the participants (eight in total) indicated that they had received training on PDB-6; PDB-6 Tactical Standard Operating Procedures (TSOP); and new doctrine and tactics, techniques, and procedures (TTP) required for PDB-6. In addition, five of the eight participants rated their knowledge of Patriot PDB-6 as "expert," and three rated their knowledge level as "intermediate." These proficiency self-assessments were made relative to their peers in 5-52 ADA and do not suggest any absolute or empirically-assessed level of proficiency on Patriot PDB-6.

RTOS Layout

The RTOS stations used in the Follow Up were set up as a suite of six consoles representing two ECS stations and one ICC. Two additional workstations were available for use as a backup in the event one or more of the workstations became inoperative. The physical layout of the RTOS consoles was similar to that used in the initial OpDemo, and is shown in figure 1 of Hawley et al., (2007). Again, the site for the Follow Up was 5-52 ADA's Fire Direction Facility located at the Tobin Wells range area on Ft. Bliss.

Patriot Air Battle Operations Tasks

Seventy (70) Patriot air battle operations tasks were selected for evaluation during the Follow Up training utility assessment. These tasks were selected by DOTD-LD subject matter experts (SMEs) from the Critical Task Lists (CTLs) for the three Patriot fire control Military Occupational Specialties (MOSs)—14A, 140E, and 14E. For purposes of evaluation, these tasks

were further broken down into four tasks sets for each position and each MOS. The tasks and task sets used in the Follow Up training utility assessment are listed in appendix A.

Procedure

The RTOS PDB-6 Follow Up assessment took place on 16 January and the afternoon of 17 January 2008. The assessment was initially planned as a two-full-day event with morning and afternoon sessions both days. However, the event was reduced to a day and a half because of a unit scheduling conflict. Two of the four task sets were evaluated on the morning of 16 January, and the two remaining task sets were evaluated the afternoon of 17 January. The approach used was to have the participating fire control crew members perform each task following the performance measures outlined in the CTL for their MOS. Using a worksheet provided by DOTD-LD, participants determined (Yes or No) whether the performance measures listed in the CTL could be performed on the RTOS using the PDB-5.5.2 software model. They were then asked to provide an overall assessment (Yes or No) of whether it was possible to use the RTOS PDB-5.5.2 model to train the complete task. Following each task set evaluation session, an after-action review (AAR) was conducted during which open-ended HotWash comments were solicited. The final group of Follow Up participants represented only two of the three previously listed Patriot fire control MOSs—14A and 140E. Consequently, only 45 of the 70 tasks initially proposed for review ended up being evaluated during the Follow Up session.

In addition to the task-by-task assessment against the performance measures cited in the Patriot CTLs, two Reticule Aim Level (RAL) 9 air battle scenarios were run the afternoon of 16 January 2008. One air battle scenario was run using the RTOS PDB-5.5.2 model, and the second scenario was run using the PDB-6-like model prepared by the RTOS developer. Following each air battle scenario, an AAR was conducted and HotWash comments were solicited. In addition, following the completion of both RAL scenarios, a summary exercise survey was administered. The intent of the summary survey was to obtain specific comments on differences between PDBs 5.5.2 and 6.0 that might affect using the RTOS as a training device in PDB-6-equipped Patriot units. The summary survey also provided for open-ended participant comments on any and all aspects of the Follow Up. Appendix B contains all of the data collection forms used during the RTOS OpDemo Follow Up.

Results

DOTD-LD's Task Survey

Of the 45 tasks evaluated using DOTD-LD's task survey, 36 (80%) were judged by 5-52 ADA participants to be trainable using the RTOS PDB-5.5.2. Nine tasks (20%) were judged not to be supported by the device. The nine tasks judged not to be supported by the current RTOS along with their associated job positions are:

1. Activate Fire Unit (ECS Tactical Control Assistant [TCA])
2. Perform Fire Platoon to Fire Platoon Operations at the ECS (ECS TCA)
3. Engage Jammers on the ECS (ECS TCA)
4. Perform Remote Launch Operations at the ECS (ECS TCA)
5. Supervise Patriot Remote Launcher Operations at the ECS (140E ECS Tactical Control Officer [TCO])
6. Perform Electronic Counter Counter (ECCM) Operations (14A ECS TCO)
7. Activate the ICC (ICC Tactical Director Assistant [TDA])
8. Deactivate the ICC (ICC TDA)
9. Perform Master Battalion Operations (14E Tactical Director [TD])

These nine tasks involve either PDB-6-specific cues or features that RTOS PDB-5.5.2 does not currently support or the requirement for physical equipment that the RTOS does not simulate. In HotWash comments, the overwhelming response from Follow Up participants was that the RTOS could be used for fire unit control crew training from entry level up through Table IV. However, this training must be focused on tasks and functions common to both PDB-5.5.2 and PDB-6. It is not possible to use RTOS PDB-5.5.2 to support training specific to PDB-6.

From the survey responses, the primary changes for the current RTOS to fully support PDB-6 fire control crew training include the following:

1, Tabs 1, 2, 15, 16, 44, 56, and 80 were identified as requiring changes to accommodate PDB-6 training.
2. Tabs should be as interactive as possible and at least allow entries to be made and saved by the system.
3. ICC Command Plan functionality should be supported during tactical operations.
4. Force Class capability needs to be added.
5. Mapping functionality during Tactical Initialization needs to be added.

Summary Survey

Eight post-RAL-scenario summary surveys were completed by 5-52 ADA participants during the Follow Up exercise. As discussed, items in the summary survey concerned the participants' reactions to specific differences between RTOS PDB-5.5.2 and Patriot PDB-6 during a simulated air battle. Participant responses are shown in table 1. Due to the small number of participants, responses were collapsed into three categories: (1) Don't Know/Not Applicable/No Response, (2) Different, or (3) Similar. The items referenced in table 1 are listed below:

1. In general, how similar were air battle operations with the simulator as compared to the Patriot PDB-6 system?
2. In particular, how well did the RTOS simulator emulate the Patriot PDB-6 system initialization?
3. I was able to emulate the Patriot PDB-6 software with the RTOS when I placed the launchers in Operate and engaged manually?
4. I was able to emulate the Patriot PDB-6 regarding functions required of "Unknown pending" tracks by the ICC if "pending" tracks are filtered at upper echelons?
5. I was able to perform the software workarounds required for Patriot PDB-6 using the RTOS simulator?
6. Do the Tab 78 functions in the RTOS emulate the Tab 78 functions seen while using Patriot PDB-6?
7. Do the modifiable settings for self defense criteria within the RTOS match the settings and functions of Patriot PDB-6?
8. Does the Tab 15 Correlate ABT Tracks option provided with Patriot PDB-6 resemble the function available in the RTOS?
9. Are you able to change the classification of a target with the RTOS as you would with the Patriot PDB-6 configuration?
10. PDB-6 implemented new threat specific search sector tailoring. Are these settings and functions similar in the RTOS?

Table 1. Tabulated summary survey results.

Item	DK/NA/NR	Different	Similar	Total
1	0	0	8	8
2	3	1	4	8
3	4	0	4	8
4	4	1	3	8
5	3	0	5	8
6	1	2	5	8
7	2	4	2	8
8	7	0	1	8
9	3	2	3	8
10	1	6	1	8

From table 1, summary survey (i.e., post-RAL-scenario) results from the RTOS OpDemo Follow Up show no particular pattern and are inconclusive. The only exception to this general observation is Item 1, where respondents judged that air battle operations using the RTOS are similar to the Patriot PDB-6 system. Whenever a specific comparison between the RTOS PDB-

5.5.2 and Patriot PDB-6 is at issue, the response pattern becomes inconclusive. It should be noted that with the exception of Item 1, the items on the summary survey address specific differences between PDB-5.5.2 and PDB-6. This conclusion reinforces the earlier conclusion that the current RTOS should not be used to training PDB-6-specific functions or tasks. However, there is a considerable amount of generic functional overlap between the RTOS and Patriot PDB-6. So it is not unreasonable to conclude that participant responses reflect this functional commonality. It is possible that the participants' overall conclusion that the RTOS can be used to train tasks encountered early in the Patriot training sequence (e.g., from entry through Table IV) reflects this generic comparability between the simulator and the tactical system.

Open Ended and HotWash Comments

As noted, the RTOS Follow Up permitted participants to provide open-ended HotWash comments following each of the four task-set sessions, each of the two RAL scenarios, and on the post-RAL-scenario summary survey. In each of these situations, participant responses generally concerned specific features that would have to be added to the RTOS to make it suitable for use as a training device for PDB-6. Most of these feature additions and modifications have been listed previously. The remainder of the participants' open-ended comments reflected a general view that RTOS PDB-5.5.2 has utility to support unit collective training, even in PDB-6-equipped units. These latter results concerning the RTOS' utility for unit training also were found during the initial OpDemo (see Hawley et al., 2007).

Discussion

Based on results from the OpDemo Follow Up, it is clear that the current RTOS (including the so-called PDB-6-like version) has limited PDB-6 functionality. Further, the dividing line between PDB-6 functional and non-functional is quite clear. Many of the cues required for PDB-6 operations simply are not present in the current RTOS. Hence, it is not advisable to use the RTOS, as it currently exists, to support PDB-6-*specific* training in Patriot units.

This conclusion does not mean, however, that the current RTOS does not have training value for PDB-6 equipped units. Follow Up participants generally expressed a view that the RTOS does have training value in PDB-6 units in spite of its limited PDB-6 functionality. Moreover, there is considerable support in the simulation literature for the use of less-than-full-up simulators for skill building and skills integration, particularly during the early and middle stages of the learning sequence (see Stewart, Johnson, & Howse, 2008). For example, pilot trainees do not go immediately from the street to flight training in an F-22. The standard training progression is through several simpler aircraft and simulators, and finally to the F-22 itself and its associated simulators. Key skills are built up along the way, and these are capitalized upon when reaching

the F-22 stage of training. In the authors' view, a similar logic is applicable in the case of air defense in general and Patriot in particular. This topic is addressed in additional detail in Hawley et al., (2007). Interested readers are referred to that report for additional background discussion on the utility of less-than-full-fidelity, part-task simulators in preparing trainees for more complex training or operational settings.

Recall that Follow Up participants expressed a view that the current RTOS could be used within PDB-6 equipped units to train fire control personnel from entry through Table IV. The current assessment addressed individual fire control tasks and not fire unit gunnery tables (the so-called "86" Field Manual, FM 3-01.86). Moreover, there is no current cross-walk between Patriot critical tasks and the gunnery tables used for individual and crew certification in operational Patriot units. That being the case, DOTD-LD Patriot SMEs extended the current results and rated the components of the gunnery tables as to whether they could be evaluated using an RTOS-like training device. Tasks were loosely mapped to tables and then rated as "Can be Performed," "Cannot be Performed," or "Has Limitations." The results of this SME-generated cross-walk between Patriot tasks and the gunnery tables are presented in appendix C. The results shown in appendix C generally support the view expressed by Follow Up participants—that the RTOS has utility for training and evaluating early and mid-range operator skills, even in PDB-6 equipped Patriot units. These initial results should be viewed as exploratory, however, and additional analysis is suggested before using an RTOS-like device for table certification.

Effective use of a less-than-full fidelity simulator like the RTOS—particularly one that lacks much PDB-6 functionality—will require a review of Patriot instructional strategies, methods, and standards. More than 50 years of training research has shown that instructional design issues generally trump issues pertaining to simulator fidelity (Salas, Bowers, & Rhodenizer, 1998). Even relatively low fidelity simulators can have value in a properly designed instructional sequence and in the hands of a competent instructor. However, merely shifting training hours from the tactical system to the RTOS or a comparable device might actually make things worse in the sense that trainees would receive less PDB-6 specific training than they currently do. Stewart, Johnson, and Howse (2008) discuss a range of studies supporting the notion that a simulator should not be viewed as a replacement for the tactical system. Rather it should be considered an adjunct to it. The simulator extends and complements training using the tactical system. It should be used to prepare trainees for the more complex tactical setting and make them better able to take advantage of limited time on more expensive full-task simulators or the tactical system itself. Less time is spent using expensive and limited training resources for remediation as opposed to advanced performance objectives.

In current context, the term instructional strategy refers to the overall approach used to progress from individual proficiency to crew proficiency and finally to unit proficiency. An instructional strategy generally addresses the instructional media used during this sequence to develop competent performance (e.g., classroom presentation, simulators and simulations, tactical equipment, embedded training, live field exercises, etc.). Instructional method refers to how the

instruction actually is conducted using the various media. For example, the "chunk and simulate" approach used during the initial OpDemo is an example of an instructional approach emphasizing a deliberate practice instructional model and using platform instruction along with practical exercises on the RTOS to implement this model. Standards refer to the proficiency "gates" that individual trainees and collectives must go through to progress from one stage of the instructional sequence to the next. Integrating these types of issues into a comprehensive and effective instructional approach for Patriot is the next big task for the ADA School and for Patriot units. Such integration is the key to making the RTOS or a comparable device productive. It will also be necessary to revisit the issue of "what must be trained" so that current training reflects Patriot technical upgrades and a more complex operating environment. Based on results obtained during the initial OpDemo and observations in other venues such as the PDB-6 operational test and the WTI follow-up assessment, it is clear that many skills essential to successful job performance in the contemporary Patriot operational environment are not addressed in the official job and task analysis materials for Patriot MOSs (see Hawley et al., 2007).

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Appendix A. Tasks and Task Sets

TCA Task Set

Task Number	Task Set	Task Title
441-083-1471	1	Activate Fire Unit
441-083-1485	1	Perform Fire Platoon (FP) to Fire Platoon Operations at the Engagement Control Station (ECS)
441-083-1492	1	Perform System Reorientation and Clutter Map Update on the Engagement Control Station (ECS)
441-083-1474	1	Deactivate Fire Unit (FU)
441-083-1486	2	Perform Friendly Protect at the Engagement Control Station (ECS)
441-083-1476	2	Engage Jammers On the Engagement Control Station (ECS)
441-083-1489	2	Perform Mode Transition Procedures-Engagement Control
441-083-1491	2	Perform Saturation Alleviation Procedures
441-084-1407	3	Perform ECS Initialization
441-083-1493	4	Verify Identification, Friend or Foe (IFF) Operability on the Engagement Control Station (ECS)
441-083-1500	4	Perform Remote Launch Operations at the Engagement Control Station (ECS)
441-083-1478	4	Engage Targets on the Engagement Control Station (ECS)
441-083-1479	4	Evaluate Pre-engagement Data at the Engagement Control Station

140E TCO Task Set

Task Number	Task Set	Task Title
441-EW1-1087	1	Direct Firing Battery System Reorientation
441-EW1-1088	1	Perform Tactical Ballistic Missile (TBM) Engagement Operations
441-EW1-1089	1	Perform Air Defense Mission in all Modes of Control for Engagement Control Station (ECS)
441-EW1-1123	1	Perform Duties and Responsibilities as the Tactical Control Officer (TCO)
441-EW1-1090	2	Identify Targets at Engagement Control Station (ECS)
441-EW1-1091	2	Supervise Engagement of Targets
441-EW1-1093	2	Implement Firing Doctrine Changes
441-EW1-1102	2	Direct Saturation Alleviation
441-EW1-1084	3	Perform Engagement Control Station(ECS) Initialization
441-EW1-1094	4	Define Engagement Control Station (ECS) Tabular Displays
441-EW1-1095	4	Implement (ABT) and Tactical Ballistic Missile (TBM) Search using Expanded Search Sectors
441-EW1-1121	4	Analyze the Process of Evaluation, Decision, and Weapons Assignment (EDWA)
441-EW1-1122	4	Perform Friendly Protection

14A TCO Task Set

Task Number	Task Set	Task Title
441-041-2038	1	Perform ECCM Operations
441-041-2004	1	Direct Firing Battery System Reorientation
441-041-2032	1	Identify Targets at Engagement Control Station
441-041-2009	1	Employ Active Identification Measures at the ECS
441-041-1035	2	Evaluate Air Threat for Friendly Protection
441-041-1041	2	Supervise Saturation Alleviation at the Fire Unit
441-041-2013	2	Implement Firing Doctrine Changes (as TD or TCO)
441-041-6011	2	Direct Saturation Alleviation at the Fire Unit
441-041-2001	3	Perform Engagement Control Station (ECS) Initialization
441-041-2002	3	Perform Engagement Control Station (ECS) Re-Initialization
441-041-1046	4	Engage Targets Manually in Enhanced EMCON
441-041-2017	4	Implement Air Breathing Threat and Tactical Ballistic Missile Search Using Expanded Search Sectors
441-041-2039	4	Supervise Patriot Remote Launcher Operations at the ECS
441-047-7002	4	Perform Engagement Overrides at ECS

TDA Task Set

Task Number	Task Set	Task Title
441-083-1472	1	Activate the ICC
441-083-1480	1	Evaluate Pre-Engagement Data at the ICC
441-083-1482	1	Initiate Target Engagement at the ICC
441-083-1475	1	Deactivate the ICC
441-083-1487	2	Perform Friendly Protect at the ICC
441-084-1409	3	Perform ICC Initialization
441-083-1480	4	Evaluate Pre-Engagement Data at the ICC
441-083-1482	4	Initiate Target Engagement at the ICC
441-083-1487	4	Perform Friendly Protect at the ICC

14A TD Task Set

Task Number	Task Set	Task Title
441-041-1035	1	Evaluate Air Threat for Friendly Protect
441-041-1044	1	Direct Battalion Air Defense Battle in the Patriot ICC
441-041-1052	1	Deconflict Track Data
441-041-1053	1	Correlate Track Data
441-041-2013	2	Implement Firing Doctrine Changes (as TD or TCO)
441-041-1038	2	Employ Active Identification Measures at the Patriot ICC
441-041-1046	2	Engage Targets Manually in Enhanced EMCON
441-041-3007	2	Resolve Identification Conflicts
441-041-1037	3	Perform Patriot ICC Initialization
441-041-1040	4	Perform AMD EMCON Procedures
441-041-1039	4	Assign Patriot Engagements to Subordinate Units
441-041-1042	4	Employ Engagement Overrides at the Patriot ICC
441-041-1050	4	Direct AMD Engagements to Subordinate Units

140E TD Task Set

Task Number	Task Set	Task Title
441-EW3-1021	1	Perform Friendly Protect at the ICC
441-EW3-1025	1	Perform Master Battalion Operations
441-EW3-1022	2	Define ICC Tabular Displays
441-EW3-1026	2	Implement Firing Doctrine Changes
441-EW3-1028	2	Employ Active ID Measures at the Patriot ICC
441-EW3-1016	3	Perform ICC Initialization
441-EW3-1024	4	Perform Track Downtell
441-EW3-1027	4	Assign Engagements to subordinate units

Appendix B. Example of Data Collection Forms

I. Background Information

1. What is your MOS?
2. What is your current Job/Position (ex: TD, TCO etc)?
3. How many years have you been working in your current job/position?
4. What was your previous job/position?
5. How long were you in this position?
6. How many years have you been in the Army?
7. Approximately how many hands on hours have you trained for your current position?
8. How would you rate your knowledge of your current position (ex: novice, intermediate or expert)?
9. Have you received training on the PDB6 software?
10. Have you received training on the new PDB6 TSOP?
11. Have you received training on the new doctrine and TTP required for PDB6?

II. Evaluation of Simulation Exercise

1. In General, how SIMILAR were Air Battle Operations with the simulator as compared to the Patriot PDB6 system?

Don't Know	Very Different	Different	Somewhat Different	Somewhat Similar	Similar	Very Similar

Additional Comment:

_____
_____
_____

2. In Particular, how well did the RTOS simulator emulate the Patriot PDB6 system initialization?

Don't Know	Very Different	Different	Somewhat Different	Somewhat Similar	Similar	Very Similar

Additional Comment:

_____
_____
_____

3. I was able to emulate the Patriot PDB6 software with the RTOS when I placed the launchers in Operate and engaged manually?

Don't Know	Very Different	Different	Somewhat Different	Somewhat Similar	Similar	Very Similar

Additional Comment:
_____
_____
_____

4. I was able to emulate the Patriot PDB6 regarding functions required of "Unknown Pending" tracks by the ICC if "Pending" tracks are filtered at upper echelons.

Don't Know	Very Different	Different	Somewhat Different	Somewhat Similar	Similar	Very Similar

Additional Comment:
_____
_____
_____

5. I was able to perform the software workarounds required for Patriot PDB6 with the RTOS?

Don't Know	Very Different	Different	Somewhat Different	Somewhat Similar	Similar	Very Similar

Additional Comment:
_____
_____
_____

6. Do the TAB 78 functions in the RTOS emulate the TAB 78 functions seen while using Patriot PDB6?

Don't Know	Very Different	Different	Somewhat Different	Somewhat Similar	Similar	Very Similar

Additional Comment:
_____
_____
_____

7. Do the modifiable settings for self defense criteria within the RTOS match the settings and functions of Patriot PDB6?

Don't Know	Very Different	Different	Somewhat Different	Somewhat Similar	Similar	Very Similar

Additional Comment:
_____
_____
_____

8. Does the TAB 15 Correlate ABT Tracks option provided with Patriot PDB6 resemble and function available in the RTOS?

Don't Know	Very Different	Different	Somewhat Different	Somewhat Similar	Similar	Very Similar

Additional Comment:
_____
_____
_____

9. Are you able to change the classification of a target with the RTOS as you would with the Patriot PDB6 configuration?

Don't Know	Very Different	Different	Somewhat Different	Somewhat Similar	Similar	Very Similar

Additional Comment:

_____
_____
_____

10. PDB6 implemented new threat specific search sector tailoring. Are these settings and functions similar in the RTOS?

Don't Know	Very Different	Different	Somewhat Different	Somewhat Similar	Similar	Very Similar

Additional Comment:

_____
_____
_____

11. We would be interested in any additional impressions that you may have of the simulation in which you have just participated. We are especially interested in the ways that you found the RTOS LIKE and UNLIKE Patriot PDB6.

140E

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2

Define ICC Tabular Displays

441-EW3-1022

Conditions: Performing duties as a tactical director (TD) during initialization, input data into keyboard selectable tabular displays to build a tactical database. Analyze information on the switch indicator selectable tabular displays for tactical significance, system capabilities, and fault data information.

Standards: Performs data analysis of the selectable and keyboard tabular entries in accordance with TM 9 -1430-1602-10-1, FM 3-01.87, and within the time limits prescribed by local SOP, with no personnel injuries or damage to equipment.

Performance Measures	GO	NO-GO
1. Evaluated tactical situation plan.	✓	
2. Evaluated switch selectable tabular displays.	✓	
3. Evaluated keyboard selectable tabular displays.	✓	
4. Analyzed data entries in key board selectable tabular displays.	✓	

RTOS CAN BE USED TO TRAIN THIS TASK.

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PERFORM FRIENDLY PROTECT-INFORMATION AND COORDINATION CENTRAL (ICC)
441-083-1487

Conditions: You are directed to perform friendly protect functions at the ICC. The battalion is conducting air defense operations. The battalion has been directed to use the manual identification mode. Tracks are in the system and situations may occur requiring engagement override. The following console conditions exist:

1. ENGAGE CONTR--ON.
2. FRNDLY PROT--ON.
3. ID AREAS--ON.
4. FRNDS--ON.
5. UNKS--ON.
6. ATDL NOS--ON.
7. SOURCE/ADDRS--TO SOURCE.
8. ALL FP--ON.
9. HEU--ON.

Standards: Assigns the proper ID to unknown tracks and performs engagement override (if required) per TM 9-1430-602-10-1, FM 3-01.87, and unit SOP(s). Performs all steps without causing injury to self or other personnel, with no damage to the equipment, and with minimal damage to the environment.

Evaluation Preparation:

Setup: Use TPT or LAT under training conditions.

NOTE: This task summary provides practical criteria to successfully perform friendly protect in the ICC. Your local TSOP and other SOPs may supplement or differ slightly from the performance measures listed below.

NOTE: In the event conflicts exist between this task summary and local command directives, the local command directives should be used in accomplishing the mission.

Performance Measures	GO	NO GO
1. Pressed SEL TAB, typed 01, pressed SEL TAB. Entered M into ID mode data field. Pressed ENTR TAB.	X	
2. Hooked highest probable threat target.	X	
3. Entered M into ID mode data field. Pressed ENTR TAB.	X	
4. Pressed TRK AMPL DATA switch-indicator. TRK AMPL DATA TAB appeared. Evaluated data.	X	
5. Initiated IFF interrogation of target.	X	
6. Evaluated IFF response.	X	

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Yes

4

Evaluate Air Threat for Friendly Protection
441-041-1035

Conditions: You are directed to evaluate Air Threat for friendly protection. Assistance and a battalion setup are available.

Standards: Performs friendly protection to reduce the chance of fratricide in accordance with TM 9-1430-1600-10-1, FM 3-01.13 (S/NF), FM 3-01.85, FM 3-01.87, and ST 44-85-3.

Performance Measures	GO	NO-GO
1. Ensured MS3 console conditioned properly.	✓	
2. Ensured tabs are initialized properly.		
3. Hooked track.	✓	
4. Pressed TRACK AMP DATA.	✓	
5. Evaluated track in accordance with ROE. a. IFF. b. Altitude. c. Speed. d. Origin. e. Verified track was in safety corrider.	✓	
6. Assigned ID to target.	✓	

Evaluation Guidance: Score the Soldier GO if all steps are passed (P). Score the Soldier No-GO if any step is failed (F). If the Soldier fails any step, show what was done wrong and how to do it correctly.

References

Required

Related
FM 3-01.13
FM 3-01.85
FM 3-01.87
ST 44-85-3
TM 9-1430-1600-10-1
TM 9-1430-600-10-1

YES

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Supervise Saturation Alleviation at the Fire Unit (FU)
441-041-1041

Conditions: The unit is conducting AMD operations in a theatre with densely populated airspace. As the TCO, you are required to supervise the manual saturation alleviation procedure. The following equipment is available:

1. ECS
2. EPP
3. RS

Standards: Uses proper procedures to reduce sector volumes being searched during heavy load conditions, and enters correct tabular entries in accordance with unit TSOP.

Performance Measures	**GO**	**NO-GO**
1. Select the proper load reducing option. Ensure that WPN CONTR switch indicator is on, and that the RADAR/IFF & LAUNCHER CONTROL group enable indicator comes on. a. Ensured TCA pressed DROP LONG RANGE if target density is short to medium range. b. Ensured TCA pressed DROP SHORT RANGE and DROP LONG RANGE if target density is medium range. c. Ensured TCA pressed DROP SHORT RANGE if target density is medium to long range. Note: Alternate limits for sectors 1 and 2 must be entered in Tab #55 during original ECS initialization. d. Ensured TCA pressed ALTER SECTOR 1 to change sector 1 angular search limits. e. Ensured TCA pressed ALTER SECTOR 2 to change sector 2 angular search limits.	✓	—
2. Verified the proper load reducing option was completed.	✓	—

Evaluation Guidance: Score the Soldier GO if all steps are passed (P). Score the Soldier NO-GO if any step is failed (F). If the Soldier fails any step, show what was done wrong and how to do it correctly.

References

Required

Related
FM 3-01.85
FM 3-01.87
TM 9-1430-1600-10-1

YES

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Appendix C. Cross-walk between Patriot Tasks and the Gunnery Tables

As per FM 3-01.86, the following lists are the Patriot training requirements and fire unit gunnery tables. Many of these tasks can be completed on the RTOS.

Level	TABLE	SUBJECT MATTER
Basic Gunnery Tables	I II III IV	System Skills Ready for Action Drills Battle Drills System Capabilities / Tactics Certification
Intermediate Gunnery Tables	V VI VII VIII	Air Defense Operations / Missile Reload Day & NBC March Order/Emplacement Practice Table V and VI Certification
Advanced Gunnery Tables	IX X XI XII	Air Defense Operations / Missile Reload Night & NBC March Order/Emplacement Practice Table IX and X Certification

Below are the tasks required for Air Battle Operations which can be trained and evaluated on a "RTOS like" simulator.

TABLE I (Basic System Skills)

This table is used to train the crew member on the basic fundamentals of Patriot system operation. Table I consists of march order and emplacement drills, PMCS, fault recognition, missile reload, and UHF communication procedures.

1. **TASK**: Operate and maintain A Patriot System

2. **SUB-TASKS**:

	Task can be Performed	Task Cannot be Performed	Task has limitations
a. Perform initialization drills per ARTEP 44-635-11-Drill, ARTEP 44-635-13 Drill, ARTEP 44-635-14-Drill, TM 9-1430-600-10-1, and applicable SOPs.			X

TABLE II (Ready For Action Drills)

This table is used to train the fire control and launcher crew members to configure their equipment for missile launch and verify the systems operational readiness. The focus of Table II is on performing "Ready For Action" portions of the Battle Drills and verifying emplacement and initialization criteria.

1. **TASK**: Prepare the Patriot system for missile launch.

2**. SUB-TASKS:**

	Task can be Performed	Task Cannot be Performed	Task has limitations
a. Discuss the function of all tabs per FM 3-01.85, TM 9-1430-600-10-1, and TM 9-1630-602-10.			X
b. Discuss the functions of all switches/indicators per FM 3-01.85, TM 9-1430-600-10-1, and TM 9-1630-602-10.	X		
.			
c. Recognize Patriot symbols per applicable TMs and FMs (TM 9-1430-600-10-1, TM 9-1630-602-10, and FM 3-01.85).			X Neutral not available
d. Discuss situational display per TM 9-1430-600-10-1, and TM 9-1630-602-10.	X		
e. Discuss the alert states, STO, and ACO per SOPs.	X		

f. Perform “Ready For Action” drills per ARTEP 44-635-13-Drill, ARTEP 44-635-14-Drill, and applicable SOPs.			X PDB6 Tab limits

TABLE III (Basic Air Battle Management)

This table trains fire control crew members on applicable national and other contingency command directives, emergency action cell (EMAC) procedures, and basic air battle management. Training will prepare fire control crew members to receive, decode, disseminate, and implement alert messages. Use of the PCOFT, TPT, OTM or FMS-D will prepare the crew member to perform basic air battle management.
1. **TASK**: Acquire A Basic Knowledge And Understanding Of Tactics And Air Battle Management.

2. **SUB-TASK**:

	Task can be Performed	Task cannot be Performed	Task has limitations
a. Learn the applicable SOPs.	X		
b: Learn the Patriot Evaluation Decision and Weapon Assignment (EDWA) process and Fire Unit capabilities per FM 3-01.85.	X		
c. Learn basic TBM/ABT defense design per FM 3-01.85 and applicable SOPs.	X		
d.: Conduct air defense operations per ARTEP 44-637-30-MTP (collective task 44-1-9002.44-P20P), using FM 3-01.85, and the applicable SOPs, and using RALs 1 through 4.			X
e Learn reporting requirements per applicable SOPs.	X		
f. Learn how to read and process a simple USMTF /NATO formatted ATO/ACO and prepares it for input into the Patriot system.	X		

TABLE IV (Basic Gunnery Certification)

Table IV evaluates a soldier's ability to maintain equipment, operate the equipment and function within a crew. ECS crew members will also be evaluated on their ability to perform "Ready For Action" drills, conduct a low intensity centralized air battle, and demonstrate their knowledge of the Patriot system and unit tactical directives.

ECS crew members:

1. **TASK**: Demonstrate knowledge of the Patriot system, air defense tactics, air battle management and system capability. Perform system initialization with mapping as required by terrain. Conduct low intensity air battle operations. Conduct "Ready For Action" drills (Scud alert/launch and ABT) per ARTEP 44-635-13-Drill and the applicable SOPs.

2. **SUB-TASKS**:

	Task can be Performed	Task cannot be Performed	Task has limitations
a Initialize the Patriot system with mapping, as required by terrain. Conduct "Ready For Action" drills correctly configuring system for directed alert state (Scud Alert/Launch and ABT) per ARTEP 44-635-14-Drill and the applicable SOPs.			X
b Conduct air defense operations per ARTEP 44-637-30-MTP (collective task 44-1-9002.44-P20P), using RAL 5.			X
c Demonstrate reporting requirements per applicable SOPs.	X		
d TCOs and TCAs demonstrate knowledge of Patriot system and unit tactical directives per TM 9-1430-600-1, FM 3-01.85, and applicable SOPs.	X		

TABLE V (Air Battle Management/Missile Reload)

Trains ECS crews on intermediate level Air Battle skills and LS crews on GMT/forklift missile reload and missile hazard/misfire procedures. ECS crews will configure the system to engage aircraft and TBMs under different tactical situations under varying conditions to include daylight, NBC environment, and changing communications status. Launcher crews will demonstrate the ability to conduct missile reload and perform missile hazard/misfire procedures.

1. **TASK**: Conduct Air Defense Operations:

.2. **SUB-TASKS**:

	Task can be Performed	Task cannot be Performed	Task has limitations
a Create an ABT/TBM defense design for Table V, RAL scenario. Design will be based upon the threat and DAL provided in the Battalion OPORD and the Defense Design will be per FM44-85-1, and applicable SOPs.		X Only do this with TCS/ TACOW. Don't use an ICC anymore	
b. Process Air Space Control Order (ACO) and MEZ information per applicable SOP.			X Can input in BATI and TACI but not in K7
c. Create Site Data Books and System Data Book for Table V scenario per applicable SOP.			X Can't do PDB6
d. Conduct air defense operations per ARTEP 44-637-30-MTP (collective task 44-1-9002.44-P20P) using RALs 6 through 9 and applicable SOPs.			X Can't do PDB6
e Perform missile misfire procedures per TM 9-1430-600-1 and applicable SOPs.			X Cant do full LS EMERG OFF

TABLE VI (Daytime March Order and Emplacement)

Trains licensed equipment crews (assisted by other crews per ARTEP) to march-order and emplace the Patriot System and prepare it for tactical operations. Conduct of RSOP operations. Establishing and operating the Battery CP. Emphasis in this table will be on equipment crew performance and include supervision of the process by the Battery trainers. All equipment crews will be battle rostered and crew integrity will be strictly adhered to. Initial focus will be on the correct performance of individual equipment march order and emplacement. After equipment crews have demonstrated the ability to conduct MO&E on their assigned equipment, the unit will practice MO&E on the system as a whole. The final goal of this table is to create a unit that is capable of march order, emplacement and configuring the Patriot missile system per a directed alert state.

1. **TASK**: March Order, Emplace, And Configure The Equipment For Action Per A Directed Alert State.

ECS: Crews will be required to perform mapping. The current terrain will determine type of mapping. Crew members will demonstrate the ability to install at least one corner reflector and the MCPE. The ECS crew will install the MCPE and Corner Reflector after mission assumption and system verification. The MCPE and Corner Reflector portion of the drill will not be timed.

2. Sub-Tasks

	Task can be Performed	Task cannot be Performed	Task has limitations
a. Air Defense Operations: The RAL will be a Battalion netted scenario that meets all the criteria as outlined in the RAL generation guide. The evaluated unit will be required to demonstrate the ability to operate under varying conditions in a high stress environment to include the following:			X PDB6 Limitations
(1) NBC environment. At a minimum 20 minutes of the air battle will be conducted in MOPP IV.	X		
(2) One console operations.	X		

(3) Various equipment outages		X	
(4) Centralized, decentralized, independent, FU to FU operations, and autonomous Operations			X Cannot do FU-FU Ops

TABLE VII (Practice Tables V and VI)

This table combines tasks from Tables V and VI. The goal of this table is to develop crews that can receive a movement warning order, perform RSOP, conduct an air battle, receive a movement execution order, march order, emplace, initialize and rejoin the air battle, performs a missile reload.Table VII must be performed before the crew advances to Table VIII. Upon successful completion of Table VII commanders will submit a memorandum to BN S-3 with battle rostered crews to schedule a Table VIII evaluation.

1. **TASK**: Move the Patriot system and engage the enemy air or missile threat employing skills mastered in Table V through VI.

2. **SUB-TASKS**:

	Task can be Performed	Task cannot be Performed	Task has limitations
a. Conduct RSOP per ARTEP 44-637-30-MTP (collective task 44-1-9046.44-P20P), using FM 44-63-5, and applicable SOPs.		X Not done with a "system" but with a team	
b. Conduct air defense operations per ARTEP 44-637-30-MTP, (collective task 44-1-9002.44-P20P) and using applicable SOPs.			X

TABLE VIII (Intermediate Level Gunnery Certification)

Table VIII evaluates a battery's ability to conduct RSOP, march order, emplace, initialize, conduct Air Defense operations, establish/operate a CP, maintain the Patriot system and conduct missile reload. Table VIII evaluations will take place during Battery or Battalion field training exercises.

1. **TASK**: Move The Patriot System And Engage The Enemy Air Threat.
a. Command Post
b. Guided Missile Transporter or 10-K Forklift (if available).
c. Four (4) missile round trainers and 2 empty missile canisters.
d. PADS team and required survey equipment. (if available)
e. ICC to support the Air Battle
f. One additional fire unit to support the Air Battle.
g. Battalion scenario OPORD for the Tables V through VIII has been received. The ACO is broken and plotted. Site Data Book, System Data Book, and defense design are available for inspection. All data developed by the TCO and TCA is based upon the scenario OPORD issued during Table 5 training.
h. Battalion netted Table VIII certification, (RAL 11), scenario to include all required tabular data, communications plans, asset locations, unit locations, ACM(s), STO(s), and ACO(s) as required throughout the evaluation.
i. Battalion tactics exam.
j. Battalion communications exam.

2. **SUB-TASKS**:

	Task can be Performed	Task cannot be Performed	Task has limitations
a. Conduct RSOP per ARTEP 44-637-30-MTP (collective task 44-1-9046.44-P20P) using FM 44-63-5 and applicable SOPs.		X Not done with a "system" but with a team	
b. Conduct air defense operations per ARTEP 44-637-30-MTP (collective task 44-1-9002.44-P20P) and using the applicable SOPs.			X
c. Submit required tactical reports per applicable SOPs.	X		

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