

select the appropriate exercise to meet a specific need of a team, or he can allow the simulator's computer to present the next exercise on the basis of a team's earlier performance. The U-COFT has many features that allow the I/O to provide meaningful feedback to the team both during and after a training exercise.

The U.S. Army Europe (USAREUR) received its first M1 and M2/M3 U-COFTs in 1985 and located them at the 7th Army Combined Arms Training Center for use in new equipment and transitional training. These devices were fielded incrementally during the next few years on the basis of one per battalion. Unit commanders received guidance concerning minimum usage rates and some suggested training procedures.

Post-fielding training effectiveness analyses of the M1 U-COFT (1986) and the M2/M3 U-COFT (1988-89) provided answers to certain basic questions raised by Army leaders and field commanders concerning the benefits of U-COFT training and how a unit could best use the device as part of its overall gunnery training strategy. *(AUTHOR'S NOTE: The primary sources for this article are the briefings and test reports for the M1 and M2/M3 U-COFT Post Fielding Training Effectiveness Analyses. Both studies were conducted by the Grafenwohr Field Office of the TRADOC Analysis Command, White Sands Missile Range. Mr. Charles R. Hughes was the primary analyst for both studies.)* The M1 study involved 357 crews from six tank battalions while the M2/M3 study used 452 crews from five mechanized infantry battalions and three armored cavalry squadrons.

The studies used the live fire crew qualification exercise (Table VIII) as the test of effectiveness. Table VIII consists of ten single or multiple target engagements, each of which is worth up to 100 points, depending on how quickly a crew hits all of the targets. Each crew normally fires Table VIII twice a year.

While Table VIII may not address all areas of U-COFT training, it is the Army's standard for determining crew gunnery proficiency. It also has an

obvious relationship to the combat requirements for engaging enemy systems as well as to many of the skills that can be trained by the U-COFT. The studies showed that the U-COFTs are effective trainers that can provide general indications of expected performance on live fire exercises and can compensate for some reduction in the availability of training ammunition.

Crews that trained on the M1 U-COFT exhibited better crew coordination than those that trained using conventional methods only. When performance on Table VIII was compared for the two groups, the U-COFT-trained crews averaged significantly faster opening times (time to fire the first round) while obtaining the same first round hit percentage (see accompanying table).

Particularly telling were the results of a second (Special) Table VIII fired by M1 crews selected from the test battalions. The main criterion for selecting a crew to fire the second Table VIII was for the commander and gunner to have fired the previous Table VIII together. This second Table VIII firing, which occurred approximately 90 days after the first, was conducted in the same manner except that the crews received no preliminary live fire training (Tables VI and VII).

An analysis of the change in performance between the two exercises indicates the effectiveness of the training the crews received during the 90-day period between firings. For the crews selected from the U-COFT battalions, this training was conducted primarily on the U-COFT.

The crews that had progressed

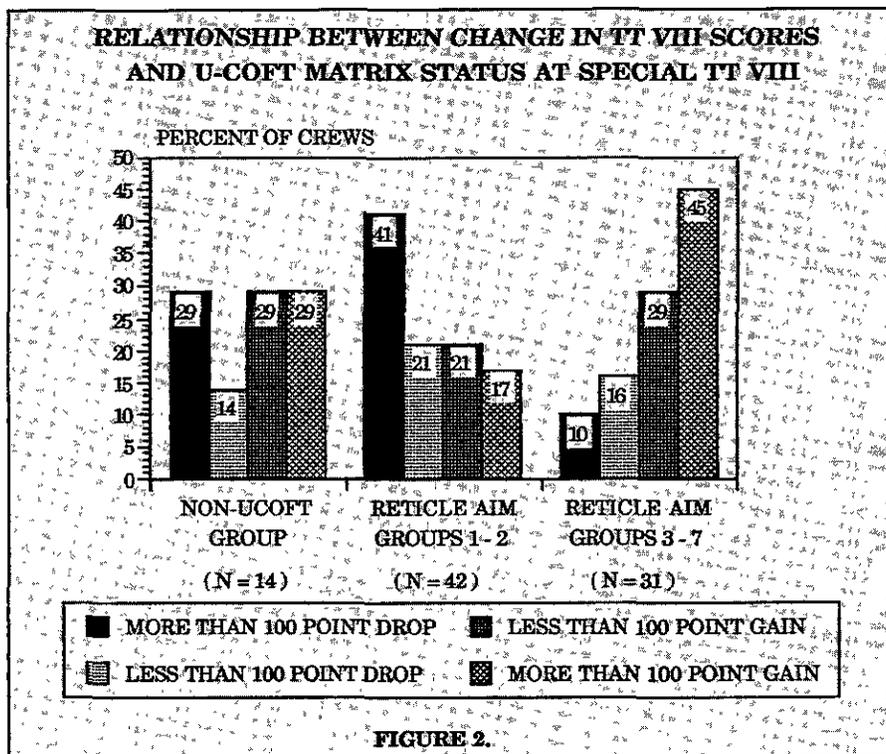
through the U-COFT matrix to at least reticle aim group 3 tended to improve their scores from the previous Table VIII (45 percent gained 100 points or more). By contrast, the crews that were still in reticle aim group 1 or 2 tended to lose points (41 percent lost at least 100 points). Gains and losses were fairly evenly spread across the categories for the crews that had not trained on the U-COFT (Figure 2). These results indicate that the U-COFT can provide effective sustainment training to crews that use it often enough, or well enough, to progress beyond the lower regions of the training matrix.

A similar analysis of the performance of 70 M2/M3 crews provided more insight. These crews fired a second Table VIII, with no preliminary live fire training, from five to nine months after a regular Table VIII. In this case, 67 percent of the crews had lower scores than before with 34 percent scoring at least 100 points less. These crews had an average score of 910 on the first Table VIII and of 82 points less on the second.

If one could assume that the performance of these crews would be similar to that of the M1 crews after 90 days, then it appears that unit training (including U-COFT but excluding live fire) cannot be expected to sustain an extremely high level of gunnery performance over long periods of time. Still, these crews did average a superior performance rating with 828 points on Table VIII with no live fire training over five to nine months. For 55 crews that formed after the first Table VIII and fired the second with no live fire training, the average score was 738, which is above the minimum score of 700 for

COMPARISON OF TANK TABLE VIII RESULTS FOR U-COFT AND NON U-COFT GROUPS						
TEST GROUP	NUMBER OF CREWS	TOTAL SCORE	PERCENTAGE OF FIRST ROUND HIT	OPENING TIMES		
				OFFENSIVE*	DEFENSIVE*	OVERALL*
NON U-COFT	58	763	80	7.3	4.1	5.7
U-COFT	291	792	79	5.9	3.4	4.7

* STATISTICALLY SIGNIFICANT DIFFERENCE, P<.01, T-TEST



qualification. The sustainment training program using the U-COFT did maintain an acceptable level of gunnery proficiency. Crew stability and especially gunner experience on Table VIII were important contributing factors.

The results from the second M2/M3 Table VIII led to some important observations. The 70 crews, at least the commander and gunner, who fired both Table VIIIs together also trained together during the intervening five to nine months. The average score of these "stabilized" crews was 90 points higher

(828-738) than the crews formed during the interim period. An even more interesting contrast occurred between 91 crews in which the gunners reported having fired at least one prior table VIII and 27 crews in which the gunners reported no prior Table VIII firings (Figure 3).

The crews with experienced gunners averaged an impressive score of 152 points higher (820-668). The average score for crews with inexperienced gunners was below the minimum qualification score, while there was little

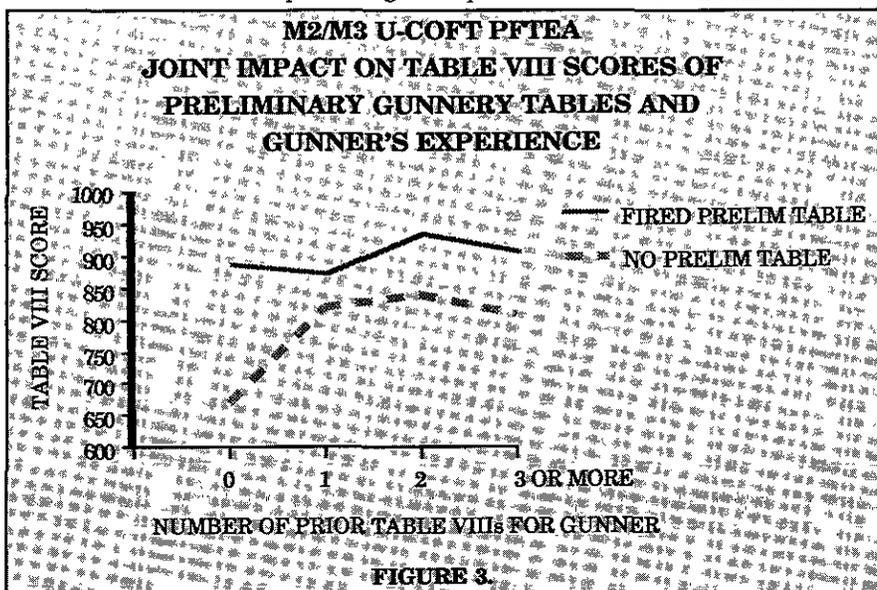
difference between experience levels after the first Table VIII.

This is strong evidence for the value of providing live fire experience for a new gunner, particularly from a deployability standpoint. Of course, the 70 "stabilized" crews were among the 91 crews with experienced gunners. This leaves 21 crews for which the gunner had Table VIII experience but was paired with a different commander from before. The difference in average scores for these two groups was only 32 points (828-796). Having an experienced gunner overcame about two-thirds of the difference in average Table VIII scores between the stabilized and unstabilized crews.

The effect of U-COFT on these observations is unknown, because no control group was available that had not trained on the U-COFT. The indication here, however, is that in a unit training environment that includes U-COFT, stabilized crews generally perform better than unstabilized crews, but the gunners' prior Table VIII experience had a greater overall effect. If live fire opportunities are reduced, unit commanders can consider giving priority to the crews with gunners who have *not* fired a recent Table VIII. Neither crew stabilization nor gunner experience had much effect when crews were allowed to train on the live fire prequalification tables before Table VIII—all groups averaged more than 870 points.

The studies provide valuable information to commanders and trainers concerning ways of using a U-COFT to improve performance on Table VIII without training specifically for it and thereby sacrificing the device's combat training value. There was no payoff in having crews "crash" on the U-COFT to try to get into the higher region of the training matrix. On the second Table VIII for the M2/M3 study, the 74 crews in reticle aim groups 5 and 6 had an average score of 803 while the 36 crews in groups 3 and 4 averaged 811.

While progress through the matrix was generally associated with better performance on Table VIII, the relationship is built on skills learned, practiced, and reinforced on the U-COFT instead



RELATIONSHIP BETWEEN RATE OF PROGRESS THROUGH THE MATRIX AND PERFORMANCE ON SPECIAL TABLE VIII

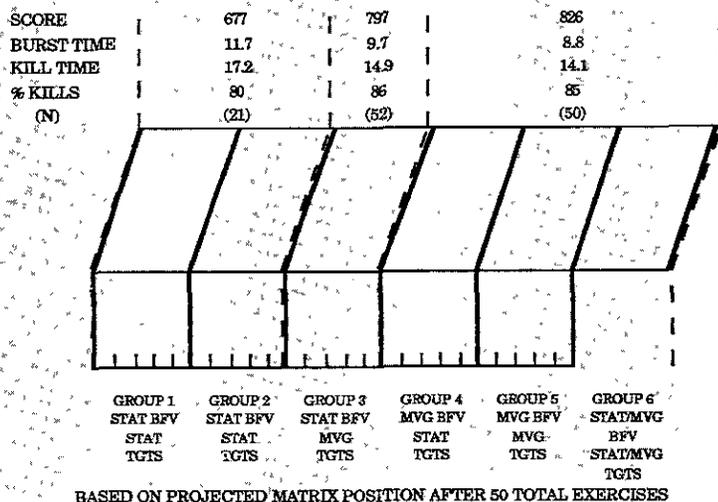


FIGURE 4.

of simply an ability to get through the matrix as an end in itself. In this sense, U-COFT training that is administered in regularly occurring sessions of reasonable length is probably the most beneficial.

From a crew's performance on the U-COFT, commanders can gain insight into how that crew might be expected to perform on a Table VIII exercise without firing the preliminary live fire tables. Results from both studies indicate that reticle aim group 3 is an important factor in determining expected gunnery performance. The M2/M3 study specifically examined the relationship between a crew's rate of progress through the matrix and its subsequent performance on Table VIII.

The findings in Figure 4 indicate that the commander should examine the matrix progress of a crew when it has completed 50 U-COFT exercises. (A crew that receives two hours of U-

COFT training per month should reach 50 exercises in four to five months.) If the crew has not yet reached reticle aim group 3, its expected Table VIII score, on the basis of the performance of similar crews during the study, would be 677; if it is in group 3, its expected score would be 797; if it has reached group 4 or beyond, its expected score would be 826.

Of course, these relationships, though statistically significant, are not perfect. There was much variation among the crews, and any external events that may be slowing a crew's rate of matrix progress deserves consideration. But the commander can use these general guidelines to determine when remedial training may be necessary and, if ammunition is restricted, which crews may not need to fire the preliminary tables before firing Table VIII.

The Army used reductions in training ammunition to offset part of the cost

of the U-COFT program. After an M1 battalion received its U-COFT, for example, each crew's annual allocation of main gun rounds was reduced by 24 the first year and by 10 more the following year. As a result, the armor community gave up 34 rounds per crew per year to pay for the U-COFT. The results from the M1 U-COFT study indicate that the device compensated for this reduction in terms of performance on Table VIII. Three U-COFT battalions were restricted from firing Table VI in preparation for the first Table VIII. This reduced each of the affected crews' live fire practices by about 15 rounds. Their performance was better than that of crews trained without the U-COFT and only slightly worse than that of the other U-COFT-trained crews, even though the two latter groups fired more practice rounds.

The U-COFT provides effective training to M1 and M2/M3 vehicle commanders and gunners. Unit commanders and their training staffs can use the U-COFT to monitor the proficiency of their soldiers and to better prepare them for conducting target engagements under both Table VIII and combat conditions.

U-COFT training allows commanders to shift some of their scarce ammunition resources from crew-oriented events to exercises that incorporate sections, platoons, or higher echelons. The U-COFT devices themselves are an important part of today's combat training.

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