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The Development and Evaluation of a Job Aid to Support Mobile Subscriber Radio-Telephone Terminal

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U.S. Army Research Institute

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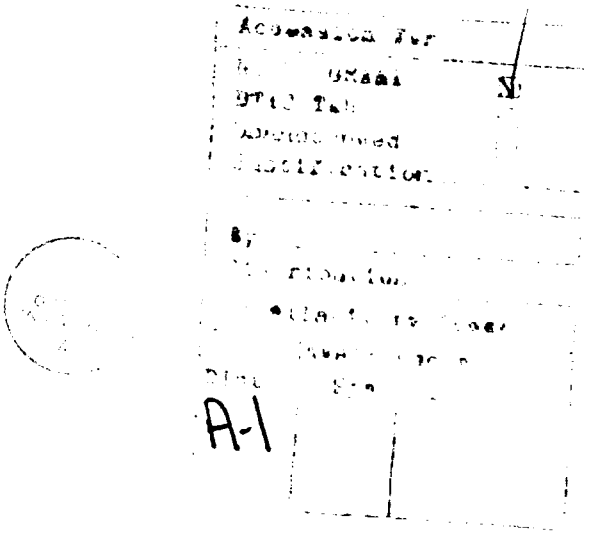

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Training Simulation

FOREWORD

The Intelligent Training Systems Technologies Team of the Fort Gordon Field Unit of the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) performs research on and develops new and innovative training technology. This work is an essential part of ARI's mission, which is to conduct research to improve the Army's capability to effectively and efficiently train personnel.

The job performance aid described in this report was developed to fulfill a military need for assistance in training and sustaining skills for operating the Mobile Subscriber Radio-Telephone Terminal (MSRT). The job aid was developed at the request of Brigadier General Alfred J. Mallette, Deputy Commanding General, USASC&FG.

This research was guided by a Memorandum of Agreement between ARI and the United States Army Signal School, Fort Gordon, for the establishment of an ARI Training Research Element at Fort Gordon, Georgia, dated 1987. The research was conducted by the Intelligent Training Systems Technologies Team at ARI Fort Gordon Field Unit under the ARI program task entitled "Acquisition and Retention of Communication and Electronics Skills."

The development and evaluation efforts were reviewed and approved by the Training and Doctrine Command (TRADOC) System Manager for Mobile Subscriber Equipment (TSM-MSE) Unit at Fort Gordon. The TSM-MSE will distribute the job aid to non-Signal MSRT users. The job aid effort was also presented in a poster session to the Military Psychology Division of the 98th Annual Convention of the American Psychological Association, Boston, Massachusetts, August, 1990.

EDGAR M. JOHNSON
Technical Director

THE DEVELOPMENT AND EVALUATION OF A JOB AID TO SUPPORT MOBILE SUBSCRIBER RADIO-TELEPHONE TERMINAL

EXECUTIVE SUMMARY

Requirement:

Operators of the Mobile Subscriber Radio-Telephone Terminal (MSRT) require support to learn and retain the skills necessary to operate the equipment. Because the MSRT, a piece of Signal equipment, will be fielded to non-Signal soldiers, the need for training support is greater than it would be for other equally complex and critical tasks. These non-Signal soldiers will receive limited formal training in operation of the MSRT, and the amount and type of informal training received will vary from company to company. To offer standard assistance in this task, the MSRT job aid was developed for the non-Signal soldier.

Procedure:

Twenty-nine non-Signal soldiers from Fort Gordon attempted to operate the MSRT under three experimental conditions. One group operated the MSRT using the ARI-developed job aid only (JA ONLY group). A second group used the job aid and received a short demonstration of the operating procedures (JA + DEMO group). A third group operated the MSRT using the Army Technical Manual (TM) for the task and received the same short demonstration (TM + DEMO). Before operation of the MSRT, subjects were given the Test of Adult Basic Education (TABE) Vocabulary and Comprehension subtests as covariate measures. Rank and Armed Services Vocational Aptitude Battery (ASVAB) Electronic (EL) and Surveillance Communication (SC) scores were also used as covariates. Procedure completion time, fatal errors, and nonfatal errors were collected on each subject during operation. Responses to a satisfaction/confidence survey were collected from each subject after operation.

Findings:

Significant results were found between all groups on the time to complete variable. The JA + DEMO group performed the procedures faster than the other two groups and the JA ONLY group performed faster than the TM + DEMO group. Significant results were also found on the satisfaction/confidence survey: both JA groups claimed more overall satisfaction and confidence with the task than the TM + DEMO group. Significant results were not

found across the two error variables; this was explained by the power analysis.

Utilization of Findings:

The job aid has been transferred to the Fort Gordon Training and Doctrine Command System Manager for Mobile Subscriber Equipment for approval and distribution. It is being distributed to MSRT users. It is the expectation that the job aid will be used to improve non-Signal soldiers' ability to communicate efficiently in tactical environments.

THE DEVELOPMENT AND EVALUATION OF A JOB AID TO SUPPORT MOBILE SUBSCRIBER RADIO-TELEPHONE TERMINAL

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Introduction

In an effort to keep pace with evolving technologies and a limited economy, the U.S. Army has initiated programs to streamline training procedures. The end result of this effort will be more cost-effective training methods and practices. One area of recent change in both technology and training requirements is the addition of Mobile Subscriber Equipment (MSE) to the repertoire of the Signal soldier. Advances in the development of MSE have generated complex communications devices that require the human operator to recall greater amounts of information than required for earlier equipment.

The extremely complex MSE system offers secure voice, data, and facsimile communications to soldiers at the corps and division levels throughout the tactical area. Soldiers communicate within the MSE network primarily through the Mobile Subscriber Radio-Telephone Terminal (MSRT), which consists of the Digital Subscriber Voice Terminal (DSVT) and the RT 1539 radio. When the MSE system has been fully fielded, over 13,000 MSRTs will be in use throughout the Army. Approximately 9,500 of these will be used by soldiers occupying non-Signal Military Occupational Specialties (MOS).

The complexity and criticality of efficient MSRT operation, as well as the problem of training non-Signal users on a Signal task, has provided the impetus for the U.S. Army Research Institute (ARI) to analyze the need for a job performance aid for this task. A job aid has been defined as a physical memory aid that provides information that guides or facilitates on-the-job performance (Winn & Evensen, 1988). Several types of job performance aids are in common use in the U.S. Army; they include check lists, work sheets, and note pads (Evensen, Winn, and Salter, 1988). Such job aids have been developed for use by Combat Leaders (Winn & Evensen, 1988), and M60A3 tank crews (Morrison, 1985; Kraemer, Anderson, Kristiansen, & Jobe, 1985).

Based on the User's Manual for Predicting Military Task Retention, (Rose, Radtke, Shettel, & Hagman, 1985), 30 percent of Signal soldiers attempting to operate the MSRT after a two month period of nonuse can be expected to fail. Factors that contribute to this prediction, and therefore contribute to the difficulty of skill maintenance for MSRT operation, include: task length and difficulty, skill requirements, and the quality of the job aid, if any, for the task. The model predicts that high quality job aids can reduce the rate of skill decay.

This skill decay prediction indicates a serious need for some type of assistance for soldiers performing MSRT tasks. This requirement is compounded by the fact that the MSRT will be operated by non-Signal soldiers while the predictions were based on the assumption that the equipment would be operated by well-trained Signal soldiers.

Many guidelines exist to help determine whether a job aid is appropriate (Lenzychi and Finley, 1980). Written job aids are advocated for use with tasks that are so critical and complex that they should not be attempted from memory alone, such as MSRT operation. The magnitude of the impact of criticality and complexity on performance increases exponentially when performed by equipment-naive non-Signal soldiers. Furthermore, non-Signal soldiers may not need to use MSRT equipment for long periods of time, and job aids are also advocated when information must be retained during periods of long disuse.

Among the most difficult types of procedures to recall in proper sequence are those that are not cued by prior steps or by equipment indications (Farr, 1986). The MSRT procedures require many actions that are not clearly cued. Although retention is improved by practice or continued training, the trainee may become dependent on specific contextual cues causing performance to suffer (Lane, 1986). One role of the written job aid is to shorten training programs by providing specific retrieval cues on paper, so that overlearning is not necessary. Thus, an effective job aid for MSRT operation could reduce training time and costs, while enabling soldiers to maintain a suitable level of performance.

In order to ensure that the infrequent non-Signal user of the MSRT can maintain full operational effectiveness, in the face of all the presented problems, ARI has developed a job aid for equipment operation. The development of written job aids begins with the process of task analysis (Foley, Joyce, Mallory & Thomas, 1971). Task level data is converted to the proper job performance aid format. The TM for MSRT operation (Technical Manual 11-5820-1021-10, 1989) was studied carefully and a checklist was formulated and converted to a military format suggested by the Signal Leadership Department (SLD), Ft. Gordon. Subject Matter Experts (SMEs) were consulted extensively in troubleshooting the job aid content and format.

The content of the checklist was intended to cover all information necessary to operate the MSRT under normal circumstances. That is, the job aid was intended to be sufficient for use by an untrained soldier. The job aid was piloted several times to ensure that it was readable and simple to follow. SMEs also helped identify procedures to include in the job aid. Six critical operating procedures are represented: Power Up, RT1539 Cryptovariable Load, DSVT Cryptovariable Load,

Manual Frequency Plan Load, Affiliation and Make a Call. (See Appendix A for a copy of the job aid.) This list does not include all possible procedures for MSRT operation, but rather is intended to represent the critical tasks. A detailed description of the task can be found in the Technical Manual (TM 11-5820-1021-10, 1989).

Method

Subjects

Twenty nine non-Signal soldiers stationed at Fort Gordon participated in the evaluation. The rank of the subjects ranged from PVT to SSG. Nineteen were male and ten were female.

Material and Equipment

Paper-based material included the ASVAB scores, TABE scores, (described under "covariates), the questionnaire developed by ARI (described under "dependent variables", or see appendix B), the Army Technical manual and the job aid itself.

A typical vehicle mounted MSRT was used to collect performance data. It was not connected to the communications network.

Covariates

Variables used to covary within cell error variance included rank, the Test of Adult Basic Education (TABE) Vocabulary and Comprehension subscores, and the ASVAB EL and SC subscores. The ASVAB subscores were obtained from the Army and reflect scores on aptitude tests administered when the soldiers entered the Army. These scores were five to ten years old.

Dependent Variables

Three dependent measures were collected to quantify the performance of the subjects on each of the six procedures. One of the dependent variables was the amount of time taken by the subject to complete each procedure. The other two dependent variables estimated the number of fatal and nonfatal errors committed while performing a procedure. To quantify performance on the entire task, time and errors were collapsed across the 6 procedures.

A fatal error was defined as an error that, if uncorrected, would prevent successive MSRT operations, for example, failure to turn the "Remote Power Switch" on. Nonfatal errors were defined as either an omission or an incorrect action that did not

adversely affect the rest of the operations. For instance, forgetting to check the Loaded Frequency Plan indicator after a correct load was defined as a nonfatal error; it does not halt the operation, but is still an important oversight.

Finally, a satisfaction/confidence survey was devised to assess the impact of the different job aid conditions on the attitudes and confidence of the subjects. Each question was answered on a 5-point scale. (See Appendix B for a full questionnaire). Question 1 asked the subjects to rate the quality of the demonstration and was given only to the subjects in the two demonstration conditions. Questions 2 through 4 required all of the subjects to rate: the effectiveness of the paper-based aid that they used, whether TM or the ARI job aid; the difficulty of the task; and their confidence in their ability to perform MSRT operating procedures in the future. Responses to questions 2 through 4 were combined to estimate the subjects' overall satisfaction with the experience.

Independent Variables

In order to evaluate the effectiveness of the ARI developed job aid, three experimental conditions were compared. The conditions differed in the type of paper-based aid that was offered, and whether the aid was accompanied by a short demonstration. The three conditions were: ARI developed job aid + demonstration (Job Aid + Demo), ARI developed job aid without demonstration (Job Aid Only), and Army Technical Manual with demonstration (TM + Demo).

The decision was made, based on pilot data, to include a short demonstration with the job aid in this evaluation. Pilot subjects experienced difficulty in discriminating between components, and with small manipulation details that proved easier to demonstrate quickly than to describe with text. Thus the purpose of this study is not only to evaluate the effectiveness of the ARI developed job aid, but also the effect of adding a short demonstration to augment performance. This addition partially addresses a question of how much training support is required when a job aid is present. It is possible that a short demonstration, to get the subjects physically familiar with the equipment, is sufficient to smooth minor problems in using the job aid.

The Job Aid Only group was included in the evaluation to assess the impact of the demonstration on MSRT performance by comparing the performance of this group to that of the Job Aid + Demo group. A finding of a minor difference would indicate that a demonstration does not amplify the effect of the Job Aid on performance of MSRT procedures.

The two demonstration conditions, i.e. Job Aid + Demo, and TM + Demo, were included in the evaluation to compare the effectiveness of the job aid to the effectiveness of a standard military Technical Manual. The demonstration was included with the TM to avoid unfair support in favor of the job aid. This is an important comparison because the TM is the only job aid available to operate most Army equipment. This comparison assumes that the two demonstrations were equivalent.

The performance of individuals in the TM + Demo condition and Job Aid Only condition were compared to determine if soldiers could more effectively operate the equipment with only the job aid. A finding of a difference between these two groups eliminates the possibility that the Job Aid + Demo condition outperforms the TM + Demo condition because of a difference between the effectiveness of the two demonstrations.

Procedure

Groups of five or six subjects were evaluated per day for five days, for a total of approximately 30 subjects.

Orientation. Each day the subjects arrived at ARI at 8:00 a.m. and were given a fifteen minute orientation, which explained the purpose of the evaluation, and presented an outline of the day's activities. After the general outline, the purpose of collecting the TABE subscores was explained and a more specific description of the test was given. Then, the subjects were asked to sign a form indicating their understanding that all the scores would be kept confidential.

TABE Test. Next, the day's subject group was escorted to a learning center on post to take the TABE subtests. Learning center staff administered and scored the tests. After the subjects were given the maximum time to take these subtests, 40 minutes, they were given another orientation, which explained in more detail the activities for the rest of the day. Subjects were scheduled at 45 minute intervals to return to ARI to operate the MSRT.

MSRT Operation. At the appointed time, each subject received the paper-based aid (TM or ARI job aid) for the assigned condition to study for 15 minutes. The subject was told to use the time to familiarize themselves with the organization of the material, rather than attempting to memorize procedures. At the end of the 15 minute study period, the subject was taken outside and asked to operate a vehicle-mounted MSRT.

Before MSRT operation began, subjects in both demo conditions were given a short (average time-4 minutes) demonstration consisting of an introduction to the major components of the MSRT, and a step-by-step operation of the equipment. Also,

subjects in the TM + Demo group were told that some actions listed in the TM were not necessary and that the experimenters would give instructions when a step should be skipped. All subjects were notified that the equipment would not be fully operational because the MSRT was not connected to the MSE network, and that the experimenters would intercede if the disconnect status interfered with MSRT operations.

After all the information was imparted, the subject was asked to attempt to operate the MSRT, one procedure at a time. The subject was instructed to begin when asked to do so, but to stop when finished. However, any subject who did not finish a procedure in ten minutes was stopped by the experimenters. Two experimenters recorded the time and the number of errors for each procedure and the two sets of values were averaged to better estimate these performance values.

Satisfaction/Confidence Questionnaire. Finally, after operating the MSRT, each subject was asked to complete the satisfaction/confidence survey, thanked for their time, and dismissed.

Results

Descriptive Statistics

Summary statistics for the dependent measures and covariates are contained in Table 1. The data were analyzed by the Statistical Package for the Social Sciences (SPSS) program, MANOVA. The independent variable was the three-level grouping variable. The ASVAB EL and SC scores, the TABE Comprehension and Vocabulary scores, and rank were entered as covariates in the MANOVA design.

Table 1

Group Means and Standard Deviations across Variables

Variable	JA+Demo		JA Only		TM+Demo	
	Mean	SD	Mean	SD	Mean	SD
Time	10.22	5.47	15.75	4.50	23.04	5.27
Combined Survey	13.60	1.96	13.56	1.33	9.50	3.78
Individual Survey Questions:						
1. Rate Demo	4.60	.52	--	--	4.00	.87
2. Rate TM/JA	4.80	.42	4.56	.53	3.50	1.43
3. Rate Task	4.30	1.06	4.56	.73	2.90	1.10
4. Confidence	4.50	.71	4.44	.53	3.10	1.37
Fatal errors	3.20	3.43	3.33	2.00	5.90	5.00
Nonfatal errors	3.50	1.58	2.00	2.24	4.10	2.69
Army Rank	4.70	1.34	4.89	1.05	5.00	.82
TABE Voc	11.77	1.83	12.28	1.25	11.71	2.15
TABE Comp	10.62	2.16	11.36	1.14	11.16	2.07
ASVAB EL	93.75	6.60	93.50	13.54	99.88	14.71
ASVAB SC	91.25	10.44	93.25	11.56	100.87	14.88

Inferential Statistics

None of the covariates accounted for a significant proportion of the within cell variance; Wilks Lambda = .16, approximate $F(20, 27.5)=1.03$, $p.>.05$. Unfortunately, complete covariate data were only available for 19 subjects; EL and SC scores were missing in 10 cases. Therefore, EL and SC scores were dropped from all further analyses.

The MANOVA was reexecuted with the three remaining covariates. The covariates did account for a significant proportion of the within cell variance. This is demonstrated by the MANOVA statistics: Wilks Lambda= .35, approximate $F(12,50.6)= 2.07$, $p.<.05$. This finding is explained by the within cell regression analyses, which indicated a multiple R of .56, and an adjusted R of .22 between nonfatal errors and the covariates, $F (3,22)=3.28$, $p.<.05$. The regression analyses between the other dependent variables and the covariates were not significant.

The only covariate to account for a significant proportion of the within cell variance for nonfatal errors was the TABE Vocabulary scores, $t(3,22)= 2.54$, $p.<.02$. However, there was no main effect for condition on the nonfatal error variable. Thus, the covariates were not considered in any succeeding analyses.

The MANOVA indicated that the independent variable, job aid condition, accounted for a significant proportion of the variance. A Wilks Lambda value of .22 was obtained with an approximate $F(8,38)=5.33$, $p.<.0001$. The follow-up univariate F tests indicated that the groups differed significantly across time, $F(2,22)= 23.90$, $p.<.0001$, and condensed survey responses, $F(2,22)= 5.19$, $p.<.02$. According to the univariate F tests the groups did not differ significantly across fatal and nonfatal errors.

Post hoc tests were used to determine the nature of the group differences for the time and survey variables. The SPSS oneway procedure was used to identify differences between the three groups. The Sheffe procedure indicated that all three groups differed from each other at the $p=.05$ level, see Table 2. Both job aid groups produced faster performance than the TM + Demo group. Also, the Job Aid + Demo group performed faster than the Job Aid Only group.

Table 2

Post Hoc Comparison of Groups across the Time Variable

Comparison	F-obtained
JA Only, JA+Demo	7.15*
JA Only, TM+Demo	13.66**
JA+Demo, TM+Demo	41.81***

Note. Critical Value-Scheffe (Ferguson,1976).
* p<.05 ** p<.01 *** p<.001

For the condensed survey variable, both job aid groups indicated greater satisfaction/confidence than the TM + Demo group. The difference between the Job Aid + Demo and Job Aid Only groups failed to reach significance according to the Scheffe procedure. See Table 3.

Table 3

Post Hoc Comparison of Groups across the Combined Survey Question

Comparison	F-obtained
JA Only, JA+Demo	.00
JA Only, TM+Demo	11.43**
JA+Demo, TM+Demo	12.34**

Note. Critical Value-Scheffe (Ferguson, 1976).
** p<.01

The two demo groups were compared on the survey question that requested subjects to rate the effectiveness of their demo. A significant group difference was not demonstrated for this question, $F(1,14)=1.99$, $p>.05$.

Parameter Estimates

The group means and variances were used to estimate the size of the effect of the Job Aid Only group and the Job Aid + Demo group. Due to unequal variances, effect sizes were reported with respect to the variance of the TM + Demo group according to the formula: Effect Size= (mean experimental-mean control) / sd control (Bloom, 1984). Comparisons between the JA + Demo and the Job Aid Only group were made with respect to the variance of the Job Aid Only group. Refer to Table 4 for effect size estimates.

Table 4

Effect Size Estimates

Groups compared	Time	Survey	Nonfatal	Fatal
JA+Demo, TM+Demo	2.44	1.09	.22	.54
JA Only, TM+Demo	1.38	1.07	.78	.51
JA+Demo, JA Only	1.23	.03	-.66	.07

For the time variable, large effect size estimates were demonstrated for the Job Aid + Demo and Job Aid Only groups relative to TM + Demo group, 2.44, 1.38, respectively. A large effect size was also demonstrated between the Job Aid + Demo and the Job Aid Only group, 1.23.

For the condensed survey question, large effect size estimates were demonstrated between the Job Aid + Demo and Job Aid Only groups relative to TM + Demo group, 1.09 and 1.07. A small effect size was observed between the Job Aid + Demo and the Job Aid Only group, .03.

Although significant differences were not demonstrated, effect size estimates were calculated for the fatal and nonfatal error variables. Medium to small effect sizes were found for Job Aid+ Demo and Job Aid Only groups relative to TM + Demo group for the nonfatal error variable, .22, and .78, respectively. Medium effect sizes were also found for Job Aid + Demo and Job Aid Only groups relative to TM + Demo group for fatal errors .54, and .51, respectively.

Because significant effects were not demonstrated for fatal and nonfatal errors, power analyses were performed to estimate the power of the research design given the mean differences and the variances that were obtained for these variables. Effect size was estimated via a formula for three or more groups given in Cohen (1977):

Effect Size= sd - mean/sd within cell.

Effect sizes of .33 and .40 were estimated for the fatal and nonfatal error variables, respectively, on the basis of the mean differences of the three groups . Given sample sizes of ten, the probability of obtaining significant effects at the .05 level (one-tail) was estimated to be 31 and 45 percent for the two means.

Discussion

Effect of the Job Aid

The first major hypothesis was that soldiers using the ARI job aid would display faster and more accurate performance than soldiers using the Army TM. This expectation is confirmed by the finding that both job aid groups performed the MSRT procedures faster than the TM + Demo group. Effect size estimates are consistent with the view that using the Job Aid resulted in a large effect on the time required to complete the MSRT procedures. A two standard deviation group difference was observed between the TM + Demo and the Job Aid + Demo groups. This indicates that the average subject in the Job Aid + Demo group performed at a level equivalent to the ninety-eighth percentile of the TM + Demo group.

The survey data are consistent with the time data and indicate that the use of the Job Aid led to greater satisfaction/ confidence with the MSRT task than use of the TM. The two job aid groups rated the task as easier, and claimed more confidence in their future ability to perform the procedures than did the TM group. Also, the job aid was rated more effective than the TM. Large effect sizes were observed between the both job aid conditions and the TM + Demo group on the survey questions.

It was also expected that use of the job aid would lead to fewer errors in performing MSRT procedures than use of the TM. Mean differences between the three groups are consistent with this expectation, although the sample size was not large enough to demonstrate statistical significance. Moderate effect sizes were demonstrated between the Job Aid + Demo and TM + Demo groups on both error variables. The power analysis indicates that effect sizes in this range have a low probability of being successfully demonstrated with a sample size of 29. It should be noted that the ratio of the difference between perfect performance and the performance of the TM + Demo group to the standard deviation of the TM + Demo group is equal to 1.18 (5.90/5.00) and 1.52 (4.10/2.69) for fatal and nonfatal error variables. Given that the job aid can not be expected to lead to perfect performance, it is not surprising that the data failed to indicate a statistically significant improvement in error rates due to the job aid. This pattern of results across four dependent variables indicates that the job aid had a large positive effect on MSRT operations.

Effect of the Demonstration

The second major hypothesis, that the demonstration would result in an improvement in performance was also supported by the inferential statistics collected for the time data. Of the soldiers who used the job aid, those who received a demonstration

soldiers who used the job aid, those who received a demonstration performed faster than those who did not. It should be mentioned that the Job Aid Only group still performed faster than the TM + Demo group, so it can be predicted that even when a demonstration is not possible the Job Aid is preferable as a performance aid to the TM. The fact that the demonstration did not result in a significant effect in terms of the number of nonfatal and fatal errors, is explained by the power analysis.

Future research recommendations include use of larger samples and different subject types. These data are consistent with the expectation that larger sample sizes would have revealed effects for the fatal and nonfatal error variables. In the future, a similar evaluation using Signal MOS soldiers would be of some benefit, because of course they will be charged with operation of the MSRT. Also, the User's Manual for Predicting Military Task Retention (Rose, et al., 1985) suggests that job aids are beneficial when performance of the task is infrequent, such as is usually the case for the non-Signal soldier operating the MSRT. Although the data show that the job aid benefits an untrained soldier, a study of the job aid's effect on skill decay would provide additional information.

The Job Aid developed by ARI with assistance from SLD, both with and without a demonstration, has proven effective in diminishing the time needed to complete MSRT operating procedures, when compared with the traditional Army TM. It has also been shown that soldiers generally are more satisfied with, and confident about, their performance on the MSRT when using the Job Aid, than when using the TM. In addition, the short demonstration has been shown to significantly augment the effect of the Job Aid. These findings indicate that the Job Aid, especially when accompanied by a short demonstration, would be a beneficial addition to the training and supplementation regimen of the non-Signal MOS user of the MSRT.

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APPENDIX A

MSRT JOB PERFORMANCE AID

INSTRUCTIONS

1. This Job Aid covers six common operating procedures for the Mobile Subscriber Radio-Telephone Terminal (MSRT). The name of each procedure is presented in all capitals and is underlined.

2. Page 2 contains the INDEX. Before performing a procedure you should check the INDEX for its page number and any other important information.

3. Page 3 contains pictorial representations of the components of the MSRT. Refer to this page when you are uncertain which component is the "RADIO", etc., and to locate dials and switches on the components.

4. When you locate the Procedure that you wish to perform, you will see that it is divided into three columns: ACTION, INDICATIONS, and CORRECTIVE ACTION.

For each numbered ACTION (1,2,3...) or subACTION (a,b,c...):

a. Read the ACTION column first.

b. Then read the INDICATIONS column that corresponds to it.

c. Next, perform the ACTION.

d. Check for the INDICATIONS. If you observed the proper INDICATION, then you are ready to read and perform the next numbered ACTION.

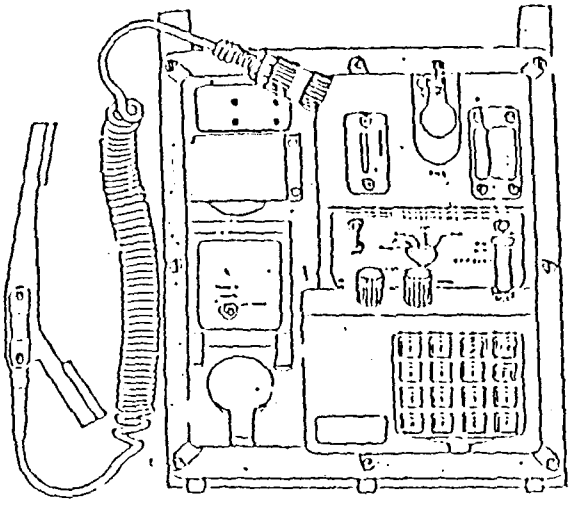
e. Whenever the proper INDICATION is not observed, or an improper indication is observed, the CORRECTIVE ACTION must be taken. When CORRECTIVE ACTION is taken, proper INDICATION should appear and you can go on to the next ACTION.

f. If you run into a problem, read the CORRECTIVE ACTIONS carefully and perform them thoroughly. Some CORRECTIVE ACTIONS require that you repeat several ACTIONS in sequence.

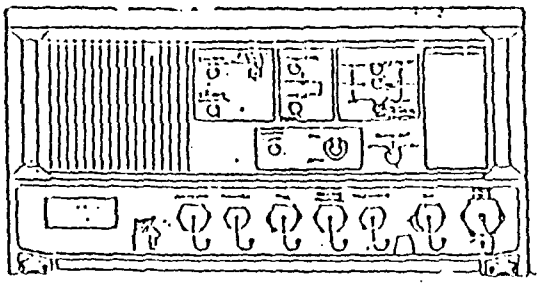
g. Some ACTIONS do not have INDICATIONS corresponding to them. Simply go on to the next ACTION.

MSRT JOB PERFORMANCE AID

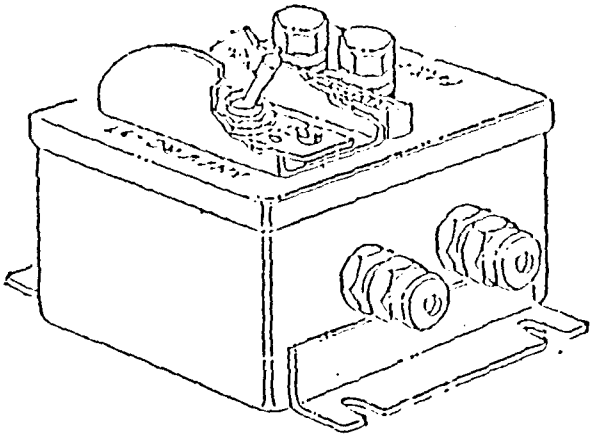
INDEX



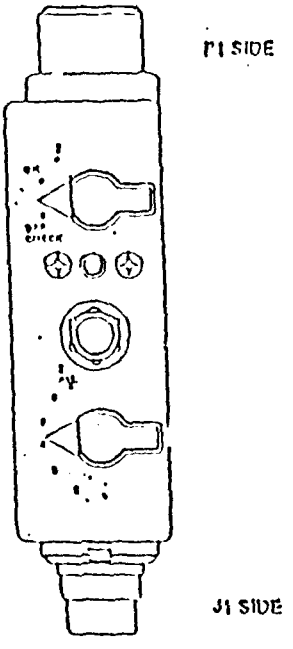
DSVT TELEPHONE



RT 1539 RADIO



Remote Power Switch (in Vehicle)



KYK 13

ACTION	INDICATIONS	CORRECTIVE ACTION
POWER UP		
1. Ensure FREQ PLAN dial on RADIO is in NETWORK position.	1. Dial is in NETWORK position.	1. If not in position, DO NOT ATTEMPT TO CHANGE POSITION. Call BSO/Maintenance.
2. Ensure RAU/MSRT/ Remote Control Dial is in upright (12 O'Clock) position.	2. Dial is in upright position.	2. If not in an upright position, change position with flathead screwdriver.
3. Turn POWER switch to ON (located above TELEPHONE in vehicle, or below RADIO in standalone).	3. Switch stays on.	3. If switch trips off, call BSO/Maintenance.
4. Turn RADIO Dial labeled OFF/BLACKOUT/ ON to ON.	a. If cryptovariables have not been loaded, indicators are off, except for the RADIO's CRYPTO ALARM, which is on.	a. Zero RADIO by moving ZERO/FILL Switch to ZERO, then return to center position.
	b. If cryptovariables have been loaded, all indicators are off.	b. Same corrective action as 4a above.
	c. If CRYPTO ALARM is flashing, take corrective action.	c. If cables are connected call BSO/Maintenance.
LOAD CRYPTO M KEY IN RADIO		
1. Ensure FILL/ZERO Switch on RADIO is in center position (To change position, pull switch out to move).		
2. Turn KYK13 Z/ON/OFF Dial to OFF.		
3. Set KYK13 Z/ALL/ 654321 Dial to number of M key (number of M key is written on side of KYK13).		
4. Push gray button KYK13 to check that key is inside.	4. Parity indicator above gray button will flash (red light).	4. If parity indicator does not flash, notify supervisor that KYK13 is not loaded.

ACTION	INDICATIONS	CORRECTION ACTION
5. Connect KYK13 to J3 fill connector on RADIO (push KYK13 in and to the right).		
6. Turn KYK13 Z/ON/OFF Dial to ON.		
7. To load M Key: indicator goes off.	7. CRYPTO ALARM call BSO/Maintenance.	7. If indicator stays on,
Push FILL/ZERO Switch on RADIO up 4 times.		
8. Turn KYK13 Z/ON/OFF Dial to OFF.		
9. Remove KYK13 from fill connector.		
LOAD CRYPTO KEYS IN TELEPHONE		
1. Ensure VAR STOR Switch on TELEPHONE is in center position (to change position, pull up to move).		
2. To Load U Key:		
a. Turn KYK13 Z/ON/OFF Dial to OFF.		
b. Set KYK13 Z/ALL/654321 Dial to number of U key.	b. Number of U and M keys are written on back of KYK13, or ask supervisor.	
c. Push gray button on KYK13 to check that key is inside.	c. Parity indicator above gray button will flash (red light).	c. If parity indicator does not flash, notify supervisor that KYK13 is not loaded.
d. Connect KYK13 to fill connector on TELEPHONE (KYK13 upside down, but facing back seat).		
e. Turn KYK13 Z/ON/OFF CHECK Dial to ON.		

ACTION	INDICATIONS	CORRECTIVE ACTION
f. Set FUNCTION SEL switch on TELEPHONE to LDU.	f. RING/BUSY indicator is on and NSW is flashing.	f. If indicators are off, move FUNCTION SEL dial(on TELEPHONE) to DSBL, move VAR STOR Switch to ZERO, then back to center. Repeat action 2f; if problem still exists, call BSO/Maintenance.
g. VAR STOR Switch on TELEPHONE to LOAD and release it.	g. Two tons will be heard; one at the LOAD position and one at the center position.	g. If two tones are not heard, take some corrective action as 2f above.
3. To Load M Key:		
a. Set KYK13 Z/ALL/654321 Dial to number of M key.		
b. Set FUNCTION SEL Switch on TELEPHONE TO LDX.	b. RING/BUSY and NSW indicators on TELEPHONE are both on.	
c. Move VAR STOR Switch on TELEPHONE to LOAD and release it.	c. Two tones will be heard; one at the one at the center position.	c. If two tones are not heard, Zero DSVT by moving FUNCTION SEL Switch to DSBL. Move VAR STOR Switch to ZERO and then back to center. Repeat Action 3.
d. Move FUNCTION SEL Switch on TELEPHONE to OP.	d. RING/BUSY indicator is on and NSW indicator is flashing.	d. If both indicators are off, take corrective action 3c above.
e. Turn KYK13 Z/ON/OFF Dial to OFF.		
f. Remove KYK13 from fill connector.		

ACTION	INDICATION	CORRECTIVE ACTION
LOAD FREQUENCY PLAN (MANUAL)		
1. Lift handset of TELEPHONE.		
2. On TELEPHONE, enter: 8F + Freq Plan No. (2 digit no.) + all Freq. Plan Pairs in sequence + R		2. If misdial occurs, hang up and redial.
3. Hang Up		
4. Inspect LOADED FREQ PLAN indicator on RADIO.	a. LOADED FREQ PLAN indicator is on. If indicator is flashing, corrective action.	a. Repeat actions 1 & 2.
	b. LOADED FREQ PLAN indicator is off.	b. Notify supervisor, or BSO/Maintenance.
AFFILIATION		
1. Lift handset on TELEPHONE.	1. Error tone is heard.	1. Check phone connections. If wires are connected correctly, check hook switch. Make sure it is unlocked--if so, call BSO/Maintenance.
2. Enter on TELEPHONE: 8R + Personal Code + 7 digit number of MSRT you are operating		
3. Listen for error tone.	3. Tone is heard in handset as each digit is entered. Error tone is heard when dialing is completed.	3. Go on, then off hook. Reenter 8R + PC + 7 digit number. If the problem still exists call BSO/ Maintenance.
4. HANG UP IMMEDIATELY	a. LOADED DIR NO. indicator on RADIO is on.	a. Same as 3 above

ACTION	INDICATION	CORRECTIVE ACTION
	b. TRAFFIC/SCANN indicator on RADIO Flashes--searching for RAU marker.	b. Same as 3 above.
	c. When RAU marker is found, TRAFFIC/SCANN indicator is on solid.	
	d. When Node Center verifies numbers, MARKER/AFFILIATION on RADIO is on solid.	
MAKE A CALL		
1. Lift handset on TELEPHONE.	1. Dial tone is heard in handset.	1. Check status of network. Check alarm indicator on RADIO; if flashing or on, call BSO/Maintenance.
2. On TELEPHONE, enter 7 digit number of desired party.	a. Call is completed. (Waiting tone is heard while network searches for number--make take several seconds).	a. If dial tone is heard while trying to place call, hang up and redial. If problem still exists call BSO/ Maintenance.
	b. Busy tone is heard (Subscriber called is busy or network is saturated).	

Appendix B

Satisfaction/Confidence Questionnaire

A. Have you operated or affiliated a voice secure telephone before? If yes, list your experience.

1. Rate the effectiveness of the demo. (For 2 demonstration groups only)

____ Exceptionally good
____ Reasonably good
____ So-So
____ Reasonably poor
____ Exceptionally poor

Can you suggest any improvements to the demo?

2. Rate the effectiveness of the job aid/TM. (depending upon group assignment)

____ Exceptionally good
____ Reasonably good
____ So-So
____ Reasonably poor
____ Exceptionally poor

Can you suggest any improvements to the job aid/TM?

3. Rate the task.

____ Very easy
____ Easy
____ Neither easy nor difficult
____ Difficult
____ Very difficult

What was the most difficult part of the task?

4. How confident are you that you could successfully affiliate and complete a call using this job aid/TM?

____ Very confident
____ Confident
____ Neither confident nor unsure
____ Unsure
____ Very unsure