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19. ABSTRACT (Continue on reverse if necessary and identify by block number)

Employed a step-wise multiple regression procedure to determine what multiple combination of eleven (ASVAB) Area Composite scores did the best job of predicting soldier performance (defined by SQT scores) in ten different accession (MOS) (CMF 74) at Soldier Support Center. The study provided estimates of content validity and internal reliability (using the coefficient alpha and Kuder-Richardson procedures) of the criterion measure; used analysis of variance and the t-test to determine whether significant differences existed between SQT means across different mental categories; determined percentages of SQT passes and failures across different mental categories; determined FY89 recruiting accession requirements using a statistical procedure provided by Soldier Support Center-National Capital Region; and provided multiple regression equations which predicted how well new recruits would do on SQT scores for each MOS based on a combination of ASVAB Area Aptitude scores. Recommendations included the suggestion that further research be conducted to configure better predictors of CMF 74 MOS-because the Clerical score, which is often used for these

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19 ~~Abstract~~ continued.

MOS, was considerably less predictive of MOS performance than others such as Field Artillery.

Keywords:

←  
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DEPARTMENT OF THE ARMY  
US ARMY SOLDIER SUPPORT CENTER  
FORT BENJAMIN HARRISON, INDIANA



REPLY TO  
ATTENTION OF

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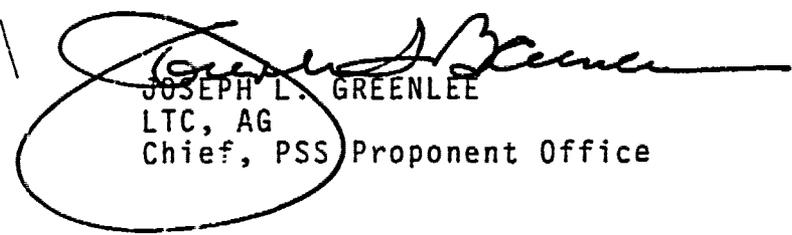
8 Oct 87

MEMORANDUM FOR: Commander, USASSC-National Capital Region,  
ATTN: ATNC-NMF-A, 200 Stovall St., Alexandria, VA 22332-0400

SUBJECT: FY 89 Proponent Distribution of Quality (DQ) Program  
Submission

1. Attached as Enclosures 1 thru 10 are DQ requirements for MOSs 71L, 71Q, 71R, 73C, 73D, 75B, 75C, 75D, 75E, and 75F respectively.
2. All requirements were derived by following the guidance contained in the June 1987 SSC-NCR Distribution of Quality Program Handbook. Follow up reports for FY 90 requirements will be submitted during May 1988.
3. Soldier Support Center POC is SFC Mahoney, AUTOVON 699-4584.

Encls  
as

  
JOSEPH L. GREENLEE  
LTC, AG  
Chief, PSS Proponent Office

29 Sep 87

DISTRIBUTION OF QUALITY (DQ) REPORT  
FOR 71Q\*

a. Summary

(1). The Public Affairs Proponent Activity believes the Required Recruit Accession Quality Mix currently in effect represents a satisfactory level: Category I-III A represents 98%, and Category II B represents the remaining 2%. These levels are required to maintain the integrity of the Career Management Field. To establish or accept a lesser standard would jeopardize the credibility of the entire United States Army.

(2). These quality accession standards are needed because of the following:

How many Skill Level 1 soldiers from any CMF can you imagine asking sensitive questions for a print interview concerning issues that might be seen on the Six O'clock news?

When Defense Information School graduates arrive at their first assignments, they are immediately subject to the scrutiny and criticism of their audience. In print journalism, this audience may encompass twenty thousand or more members each week; in broadcasting--both radio and television--the Skill Level 1 soldier is exposed daily to an audience of thousands of American soldiers and foreign nationals. Foreign media consider any soldier an official spokesman for the entire military, and for the U.S. government.

Most career fields can train, prepare, and further polish Skill Level 1 soldiers because they work in environments with medium-to-heavy concentrations of soldiers in the same MOS and skill level. But the opposite is true for the Public Affairs soldier.

Young, often inexperienced Public Affairs practitioners are highly visible both within and outside a command. These soldiers perform three types of functions for any Public Affairs shop: They disseminate Command Information (via newsprint, etc.) and Public Information, and perform Community Relations work. The latter two--Public Information and Community Relations--bring the Skill Level 1 soldier routinely in touch with civilian media and dignitaries to an extent unequalled by any other MOS in the Army.

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\*POC for statistical methodology is Dr. Phillip L. Vandivier (AV-699-3821).

b. Target Skill Level

(1). Skill level (SL) 1 (E-1 TO E-4) was used. SL 1 was selected because:

The SL 1 soldier from the Public Affairs field must be the kind of individual who can function independently in a stressful environment, publicly using speaking or writing skills on behalf of the command or his commander.

Consider, for example, the light division: Out of the 74 enlisted positions in the HHC G-staff, there are three Public Affairs slots. By comparison, there are three times as many stenographers as Public Affairs assets. The finance support unit has 42 and the personnel service company has 45 SL 1 soldiers-- compared to two SL 1 soldiers in the Public Affairs shop.

Granted, mission differences do exist, but the point here is that the Public Affairs soldier at SL 1 often operates independently, with little professional guidance immediately available. The Public Affairs soldier in search of a story may interview a field grade or flag rank officer; or may be covering a group of U.S. or foreign soldiers and local civilians. For this reason, performance of SL 1 soldiers is critical for mission success.

c. Performance Measure

(1). The Skill Qualification Test (SQT) was used to evaluate proficiency in the MOS. The selection of the SQT is based on the assumption that this measurement provides an acceptable estimate of performance of critical MOS tasks. Furthermore, the SQT was used because it provides a reliable, valid means of estimating the ability to perform critical tasks at SL 1.

(2). Content Validity

Content validity is the extent to which a test measures job performance in the MOS. The SQT was systematically validated for content by the Public Affairs Proponent Activity using a series of rigorous checks and reviews outlined in TRADOC Regulation 351-2, Skill Qualitification Test (SQT) and Common Task Test (CTT) Development, Policies, and Procedures. These procedures included a review of the SQT task list, peer/psychometric review of each task test, expert/murder board review, editorial review, untrained tryout, soldier tryout, setting task training standards, assigning final administration time limit, setting minimum passing score, and final review of camera ready materials.

(2.). Reliability

An estimate of the internal reliability of the test is important to determine the extent to which the instrument is



A-1

consistent (within itself) in measuring performance. The Coefficient Alpha procedure was used to estimate internal reliability of the SL 1 SQT. Coefficient Alpha provides an estimate of the extent to which all test items intercorrelate with one another. A coefficient of .791 was obtained, which indicates the SL 1 SQT has moderate internal reliability.

#### d. Research Design and Implementation

##### (1). Test Administration and Data Collection Procedures

SQTs were administered IAW procedures outlined in TRADOC Reg 351-2. Also, the Armed Services Vocational Aptitude Battery (ASVAB) was administered upon soldier entry into the Army IAW routine procedures.

Data was extracted from official test results obtained from the Military Personnel Center with the help of the SSC-NCR Liaison. All 245 available cases (the entire population of SL 1 71Qs) were used for data analyses.

(2). Analyses were conducted with the use of the Statistical Package For the Social Sciences--Personal Computer Plus package. Results are as follows:

(a). A stepwise multiple regression procedure was conducted to determine what combination of ASVAB Aptitude Areas [Armed Forces Qualification Test (AFQT), General Technical (GT), Clerical (CL), Combat (CO), Electronics Repair (EL), Field Artillery (FA), General Maintenance (GM), Mechanical Maintenance (MM), Operators/Food (OF), Surveillance/Communications (SC), and Skilled Technician (ST) scores] did the best job of predicting SL 1 SQT scores. Multiple regression is the preferred procedure used in the behavioral sciences when the object is to determine which of several combinations of predictors does the best job of predicting a single criterion; and to determine how much weight each predictor has in the prediction of the criterion. Results indicated EL significantly ( $r=+.39$ ;  $F=38.96$ ;  $p<.001$ ) predicted SQT. A total of 15 per cent of the variance in SQT scores was explained by EL. No other variable made a significant or unique contribution to the prediction of SQTs above and beyond that provided by EL. For this reason, the multiple regression procedure was reduced to a simple Pearson  $r$  between EL and SL 1 SQTs.

Although statistically significant, the strength of the predictive relationship between EL, on the one hand, and SL 1 SQT scores, on the other, can best be described as mild: Although 15 per cent of the variance in SQT scores was explained, a total of 85 per cent of SQT variance remains unexplained by ASVAB results.

Please note: Mild but statistically significant Pearson  $r$  correlations were found for all other Aptitude Area predictors including GT ( $r=+.34$ ;  $p<.001$ ), ST ( $r=+.35$ ;  $p<.001$ ), AFQT ( $r=+.32$ ;

$p < .001$ ), and FA ( $r = +.33$ ;  $p < .001$ ). (The large sample size undoubtedly contributed to the finding of numerous positive correlations with SQTs. Nevertheless, none of these variables significantly added to the prediction of SQT scores above and beyond what was provided by EL results. (Technically, none of these variables made significant contributions to the prediction of SQTs after EL results were already entered into the regression equation.)

(b). A breakdown of SL 1 SQT averages by mental category (determined by AFQT results) follows. A visual inspection indicates that SQTs increase with mental category. Nevertheless, a one-way analysis of variance was performed to determine whether mean differences are significant.

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SL 1 SQT Averages By Mental Category

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Mental Category	SQT Averages
I	85.15
II	81.34
IIIA	79.62
IIIB	74.00

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Overall analysis of variance results indicated significant differences ( $F = 5.85$ ;  $p < .001$ ) exist between some of the means. A subsequent post hoc analysis--the Tukey procedure--was applied to all possible mean combinations to determine exactly which comparisons were significant. Tukey results disclosed that mental category I soldiers perform significantly ( $p < .05$ ) better than soldiers in II, IIIA, and IIIB. No other possible mean comparisons (II vs. IIIA, IIIA vs. IIIB, etc.) resulted in significant differences. As indicated above, a Pearson  $r$  analysis indicated a mild but significant positive correlation between AFQT results and SQTs ( $r = .32$ ;  $p < .001$ ). These analyses provide evidence that SQT results do tend to increase with mental category--BUT ESPECIALLY AT THE UPPER END OF THE MENTAL SCALE.

(c). A minimum passing SQT score of 60 was used in accordance with guidance from TRADOC. A frequency distribution was made of the percentages of SL 1 71Qs who passed and failed (using the minimum passing SQT score) across different mental categories. Results were as follows:

PERCENTAGE OF PASS/FAILS BY MENTAL CATEGORY

		M E N T A L   C A T E G O R Y		
		I-III A	IIIB	IV
S Q T	FAIL (59 and below)	.8% n=2	0% n=0	0% n=0
	<hr/>			
S C D R	PASS (60 and above)	99.2% n=236	100% n=6	0% n=0
	<hr/>			

The very low failure rate for 71Qs (less than 1%) precluded much variation of frequencies of passes and failures across mental categories. For this reason, these results fail to support the contention that higher mental category soldiers perform better on the SL 1 71Q SQT than their lower mental functioning counterparts.

(d). A simple frequency distribution was run to determine the breakdown of soldiers by AFQT mental categories in our sample. Results indicated the following:

SAMPLE PERCENTAGES BY AFQT MENTAL CATEGORY				
I	II	III A	IIIB	IV
18.9%	66.8%	11.9%	2.4%	0%
n=46	n=163	n=29	n=6	n=0

Please note that 97.6% of the soldiers in this study were in mental categories I to IIIA, which comprise the upper 50 per cent of the soldier population; and that NEARLY ONE IN FIVE ARE IN CATEGORY I--THE UPPER 7 PERCENT OF THE ARMY POPULATION. These percentages provide an approximate estimate of the present mental category breakdown for 71Qs at SL 1.

(e). To determine future 71Q accession requirements, the following steps were taken [NOTE: These steps are outlined in Appendix G of the Distribution of Quality Program Handbook]:

(1). A frequency distribution was made of ST scores. ST results were used because a minimum ST score is required for entry into the MOS. (GT was not used because information necessary to transform GT frequencies into an accession mix was not available in the Distribution of Quality Handbook.)

(2). The frequency distribution of ST scores was

converted to an approximate mental category distribution using tables and procedures outlined in the Distribution of Quality Program Handbook. [NOTE: The frequencies of soldiers which fell within each 5-point ST score category were multiplied by separate factors for each mental category which converted ST results into an estimated frequency distribution of soldiers by mental category. Please refer to Appendix G of the Distribution of Quality Program Handbook for further clarification and examples of this procedure.]

(3). Percentages for each mental category were determined by dividing the frequencies of sums for each category by the overall total for all categories. (Percentages were 88.3 for category I-III A; 10.5 for IIIB; and 1.2 for IV.)

(4). Mental category percentages were not divided by historical continuation/survival rate factors because the SL 1 soldiers are presently available and performing the critical 71Q tasks. Continuation/survival factors are used to control for the fact that only a portion of all soldiers entering the Army will continue to serve beyond the first or second enlistment; however, with the 71Q the critical level is SL 1: Because 100% of these soldiers are already in the Army, there is no reason to control for attrition which results at reenlistment time.

#### e. Conclusions and recommendations

(1). In conclusion, this study found that:

(a). Electronics Repair did the best job of predicting soldier performance on the 71Q SL 1 SQT. No other predictor variables added anything unique to the prediction of SQTs after Electronics Repair had been taken into account.

(b). Overall results generally suggest SL 1 71Qs in higher mental categories tend to perform better on the SL 1 SQT than those in lower mental categories. This finding is especially apparent at the upper end of the mental category scale (mental category I soldiers). A distribution of passes and failures broken down by mental category failed to show a relationship between mental category and SQTs. However, these results are misleading because the very small failure rate precluded the variability in data needed for the establishment of such a relationship.

(c). Of particular significance is the fact that 71Q PRESENTLY IS VERY TOP HEAVY ON THE MENTAL CATEGORY SCALE: Approximately 98 per cent of SL 1 71Qs presently are in mental categories I-III A; and 2 per cent are from IIIB. None are from IV.

(d). According to statistical analysis results, 88 per cent of future 71Qs should come from mental category I-III A; 11 per cent should come from IIIB; and 1 per cent should come from

IV. However, it is important to note that these standards are significantly below the existent quality mix of 98 per cent from I-IIIA. (A full 19 per cent are from mental category I!).

(e). RECOMMEND the use of the following multiple regression equation which uses Skilled Technician results to predict success of future 71Q recruits on the SL 1 SQT:

$$(.2903) \times (ST) + (47.12) = \text{Predicted SQT Score}$$

EXAMPLE:

$$(.2903) \times (85) + (47.12) = 71.80$$

Any score which falls within 8 points of the SQT cutoff (60) indicates an individual who is at high risk for failing the SL 1 SQT. For example, a recruit who scores 85 on ST obtains a predicted SL 1 SQT score of 71.80--which is not within 8 points of the cutoff (60); therefore, this soldier is not high risk for failure on the 71Q SQT. Please note: High-risk individuals who are motivated and interested in a 71Q career might try hard and be fully successful on the SL 1 SQT; nevertheless, in the long run more high-risk soldiers will have trouble with SQTs than nonhigh-risk individuals.

(9). RECOMMEND further studies be conducted to determine whether GT or ST results as presently configured should continue to be used as prerequisites for accession into the 71Q MOS. This recommendation is based on the finding that EL did a better job of predicting SL 1 SQT performance than did either ST or GT. Part of the reason for this finding is that Aptitude Area Composite scores often include overlapping ASVAB subtest scores. For example, EL includes two of the four subtest scores which are summed to derive ST results. This fact partially explains the seemingly illogical finding that EL scores do a better job of predicting 71Q SL 1 SQTs than ST scores. Nevertheless, one would expect that ST should be the best predictor if it is to be used as a standard for accession into 71Q. For this reason, studies should be conducted to determine whether and how other ASVAB subtest score combinations should be used to do a better job of predicting success on the 71Q SQT.

(2). The need for requiring Category I-IIIA soldiers for accession to CMF 46 has never been more critical. In an environment where everything is automated and we have "fast food" news reporting, today's new public affairs soldier must be able to think logically and act precisely with common sense and sensitivity with minimal supervision. How does one put mathematical value on the ability to use mature judgment, professional ethics, or showing the ability to react responsibly in a crisis situation. The societal pool from which we have to deraw does not reflect any common denominator that can be used to predict any large amount of success. The most important factor missing from mathematical formulas is the "human" factor. We must continue with a nealthy posture and a high quality mix so that the public affairs field may maintain an acceptable standard of

success.

(3). Once again, statistical analysis results showed that 88% of 71Qs should come from I-IIIA, 11% should come from IIIB, and 1% should come from IV. The Public Affairs Proponent Activity feels these accession figures are not adequate due to aforementioned reasons: The SL 1 mix cannot fall below 98% from mental categories I-IIIA and 2% from IIIB without creating a critical loss of skilled manpower for the future.

29 Sep 87

DISTRIBUTION OF QUALITY (DQ) REPORT  
FOR 71R\*

a. Summary

(1). The Public Affairs Proponent Activity believes the Required Recruit Accession Quality Mix currently in effect represents a satisfactory level. Category I-III A represents 98%, and Category IIIB represents the remaining 2%. These levels are required to maintain the integrity of the Career Management Field. (The current operating strength is less than 50 per cent of what is authorized at Skill Level 1.) To establish or accept a lesser standard would jeopardize the credibility of the entire United States Army.

(2). These quality accession standards are needed because of the following:

How many Skill Level 1 soldiers from any CMF can you imagine on the Six O'clock news, or asking sensitive questions for an on-camera interview?

When Defense Information School graduates arrive at their first assignments, they are immediately subject to the scrutiny and criticism of their audience. In broadcast journalism--both radio and television--the Skill Level 1 soldier is exposed daily to an audience of thousands of American soldiers and foreign nationals. Foreign media consider any soldier an official spokesman for the entire military, and for the U.S. Government.

Most career fields can train, prepare, and further polish Skill Level 1 soldiers because they work in environments with medium-to-heavy concentrations of soldiers in the same MOS and skill level. But the opposite is true for the Public Affairs soldier. There are only 58 Skill Level 1 broadcast journalists Army-wide.

Young Public Affairs practitioners are highly visible both within and outside a command, and these soldiers perform three types of functions for any Public Affairs shop: They disseminate Command Information (via newscasts, etc.) and Public Information, and perform Community Relations work. This work often entails remote locations, operating independently, or even assigned as station manager and having to conduct business with no immediate supervision available. How does one prepare young Skill Level 1 soldiers to show poise, composure, agility, maturity, ethics, and honor? The Skill Level 1 broadcast journalist routinely communicates with civilian media and dignitaries to an extent unequalled by any other MOS in the Army.

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\*POC for statistical/research portions of this report is Dr. Phillip Vandivier, AV 699-3821.

## b. Target Skill Level

(1). Skill level (SL) 1 (E-1 TO E-4) was used. SL 1 was selected because:

The SL 1 soldier from the Public Affairs field must be the kind of individual who can function independently in a stressful environment, publicly using speaking skills on behalf of the command or his commander to an unlimited audience.

Consider, for example, the light division: Out of the 74 enlisted positions in the HHC G-staff, there are three Public Affairs slots. By comparison, there are three times as many stenographers as Public Affairs assets. The finance support unit has 42 and the personnel service company has 45 SL 1 soldiers-- compared to one SL 1 broadcast journalist in the Public Affairs shop.

Granted, mission circumstances do exist; but the point here is that the Public Affairs soldier at SL 1 often operates independently, with little professional guidance available. The Public Affairs soldier in Search of a story may interview a field grade or flag rank officer; or he may be covering a group of U.S. or foreign soldiers and local civilians. For this reason, performance of the SL 1 soldier is critical for mission success. The only occasion when there may be more than one skill level in the same facility is through the Army Broadcast Service, at an Armed Forces Radio and Television affiliate.

## c. Performance measure

(1). The Skill Qualification Test (SQT) was used to evaluate proficiency in the MOS. The selection of the SQT is based on the assumption that this measurement provides an acceptable estimate of performance of critical MOS tasks. Furthermore, the SQT was used because it provides a reliable, valid means of estimating the ability to perform critical tasks at SL 1.

### (2). Content Validity

Content validity is the extent to which a test measures job performance in the MOS. The SQT was systematically validated for content by the Public Affairs Department using a series of rigorous checks and reviews outlined in TRADOC Regulation 351-2, Skill Qualification Test (SQT) and Common Task Test (CTT) Development, Policies, and Procedures. These procedures included a review of the SQT task list, peer/psychometric review of each task test, expert/murder board review, editorial review, untrained tryout, soldier tryout, setting task training standards, assigning final administration time limit, setting minimum passing score, and final review of camera ready materials.

## (2.). Reliability

An estimate of the internal reliability of the test is important to determine the extent to which the instrument is consistent (within itself) in measuring performance. The Coefficient Alpha procedure was used to estimate internal reliability of the SL 1 SQT. Coefficient Alpha provides an estimate of the extent to which all test items intercorrelate with one another. A coefficient of .524 was obtained, which indicates the SL 1 SQT has a moderate (acceptable) amount of internal reliability.

### d. Research Design and Implementation

#### (1). Test Administration and Data Collection Procedures

SQTs were administered IAW procedures outlined in TRADOC Reg 351-2. Also, the Armed Services Vocational Aptitude Battery (ASVAB) was administered upon soldier entry into the Army IAW routine procedures.

Data was extracted from official test results obtained from MILPERCEN with the help of the SSC-NCR Liaison. All 67 available cases (the entire population of SL 1 71Rs) were used for data analyses.

(2). Data analyses were conducted with the use of the Statistical Package For the Social Sciences--Personal Computer Plus package. Results are as follows:

(a). A stepwise multiple regression procedure was conducted to determine what combination of ASVAB Aptitude Areas [Armed Forces Qualification Test (AFQT), General Technical (GT), Clerical (CL), Combat (CO), Electronics Repair (EL), Field Artillery (FA), General Maintenance (GM), Mechanical Maintenance (MM), Operators/Food (OF), Surveillance/Communications (SC), and Skilled Technician (ST) scores] did the best job of predicting SL 1 SQT scores. Multiple regression is the preferred procedure used in the behavioral sciences when the object is to determine which of several combinations of predictors does the best job of predicting a single criterion; and to determine how much weight each predictor has in the prediction of the criterion.

Multiple regression results must be interpreted with extreme caution due to the relatively low number of cases available for use in this study. Results indicated GM and FA in combination significantly ( $R = .552$ ;  $F = 7.21$ ;  $p < .01$ ) predicted SL 1 71R SQTs: A total of 30.4 per cent of the variance in SL 1 SQT scores was explained by GM and FA. No other variable or variables made a significant or unique contribution to the prediction of SQTs above and beyond that provided by GM and FA. GM accounted for approximately 11.8% of the variance in SL 1 SQTs ( $R = .3437$ ;  $F = 4.55$ ;  $p < .05$ ), followed by FA ( $F = 8.83$ ;  $p < .01$ ), which accounted for the remaining 18.6 per cent of the variance in SQT scores. Of particular significance is the fact that GM and FA are positively (when predictor goes up, so does criterion) and negatively

(predictor and criterion tend to move in opposite directions) related to SL 1 SQTs, respectively. The strength of the predictive relationship between GM and FA, on the one hand, and SL 1 SQT scores, on the other, can best be described as moderate: Although 30.4 per cent of the variance in SQT scores was explained, a total of 69.6 per cent of SQT variance remains unexplained by ASVAB results.

Please note: No statistically significant Pearson r correlations with SL 1 71R SQTs were found for any of the other Aptitude Area ASVAB predictors, including ST ( $r = +.1215$ ;  $F = .51$ ;  $p > .05$ ) and GT ( $r = -.002$ ;  $F = .0348$ ;  $p > .05$ ), both of which are used as standards for accession into this MOS.

(b). A breakdown of SL 1 SQT averages by mental category (determined by AFQT results) follows. Very small sample sizes of 1, 5, and 7 for three of the groups precludes the establishment of firm conclusions regarding variation of SQTs by mental category. Nevertheless, a one-way analysis of variance was performed to determine whether mean differences are significant.

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SL 1 SQT Averages By Mental Category

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Mental Category	SQT Averages	N
I	76.43	7
II	73.89	27
IIIA	77.80	5
IIIB	88.00	1
TOTALS	75.18	40

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Overall analysis of variance results indicated no significant differences ( $F = 1.89$ ;  $p > .05$ ) exist among any possible mean combinations. However, once again the small number of cases in at least three of the groups precluded the establishment of firm conclusions. Nevertheless, a Pearson r analysis indicated no relationship whatsoever between AFQT and SL 1 SQTs ( $r = -.18$ ;  $F = 1.20$ ;  $p > .05$ ).

(c). A minimum passing SQT score of 60 was determined by subject matter experts at the school. A frequency distribution was made of the percentages of SL 1 71Rs who passed and failed (using the minimum passing SQT score) across different mental categories. Results were as follows:

PERCENTAGE OF PASS/FAILS BY MENTAL CATEGORY

		M E N T A L   C A T E G O R Y		
		I-III A	IIIB	IV
S Q T	FAIL (59 and below)	0% n=0	0% n=0	0% n=0
	<hr/>			
S C D R	PASS (60 and above)	100% n=39	100% n=1	100% n=0

The zero level failure rate for 71Rs precluded determination of differences in passes and failures as a function of mental category.

(d). A simple frequency distribution was run to determine the breakdown of soldiers by AFQT mental categories in our sample. Results indicated the following:

SAMPLE PERCENTAGES BY AFQT MENTAL CATEGORY				
I	II	III A	IIIB	IV
17.5%	67.5%	12.5%	2.5%	0%
n=7	n=27	n=5	n=1	n=0

Please note that 97.5% of the soldiers in this study were in mental categories I to IIIA, which comprise the upper 50 per cent of the soldier population; and that NEARLY ONE IN FIVE ARE IN CATEGORY I--THE UPPER 7 PERCENT OF THE ARMY POPULATION. Only 2.5% of the 71R SL 1 soldiers come from category IIIB, which is below the 50th percentile. Not a single soldier came from category IV. These percentages provide an approximate estimate of the present mental category breakdown for 71Rs at SL 1.

(e). In order to determine future 71R accession requirements, the following steps were taken [NOTE: These steps are outlined in Appendix G of the Distribution of Quality Program Handbook]:

(1). A frequency distribution was made of ST scores. ST results were used because a minimum ST score is required for entry into the MOS.

(2). The frequency distribution of ST scores was converted to an approximate mental category distribution using tables and procedures outlined in the Distribution of Quality Program Handbook. [NOTE: The frequencies of soldiers which fell

within each 5-point ST score category were multiplied by separate factors for each mental category which converted ST results into an estimated frequency distribution of soldiers by mental category. Please refer to Appendix G of the Distribution of Quality Program Handbook for further clarification and examples of this procedure.]

(3). Percentages for each mental category were determined by dividing the frequencies of sums for each category by the overall total for all categories. (Percentages were 86.3 for category I-III A; 13.7 for II B; and 0 for IV.)

(4). Mental category percentages were not divided by historical continuation/survival rate factors because the SL 1 soldiers are presently available and performing the critical 71R tasks. Continuation/survival factors are used to control for the fact that only a portion of all soldiers entering the Army will continue to serve beyond the first or second enlistment; however, with the 71R the critical level is SL 1: Because 100% of these soldiers are already in the Army, there is no reason to control for attrition which results at reenlistment time.

#### e. Conclusions and recommendations

(1). In conclusion, this study found that:

(a). Because of the small number of cases used in this study, results should be interpreted with extreme caution. With this fact in mind, General Maintenance and Field Artillery did the best job, in combination, of predicting soldier performance on the 71R SL 1 SQT. No other predictor variables added anything unique to the prediction of SQTs after these two predictors had been taken into account. [Please note: Because of the small number of cases for this MOS, no attempt was made to construct a regression equation which would predict future success on SQTs based on past performance.]

(b). Very little additional support was found for the contention that higher mental category soldiers perform better on the SL 1 SQT than their lower mental functioning counterparts. Part of the explanation for this lack of support might be the small number of cases in different mental category groups as well as in the overall study. Nevertheless, even Pearson  $r$  correlations between ASVAB predictor variables (such as ST and GT) and SQTs were not significant.

(c). Of particular significance is the fact that 71R PRESENTLY IS VERY TOP HEAVY ON THE MENTAL CATEGORY SCALE: Approximately 98 per cent of SL 1 71Rs presently are in mental categories I-III A; and the remainder comes from II B. None come from IV.

(d). According to statistical analysis results, 86 per cent of future 71Qs should come from mental category I-III A; 14 per cent should come from II B; and 0 per cent should come from

IV. However, it is important to note that these standards are significantly below the existing quality mix of 48 per cent from I-III A. (Nearly 18 per cent are from mental category I!).

(e). RECOMMEND further studies be conducted to determine whether GT or ST results as presently configured should continue to be used as prerequisites for accession into the 71R MOS. This recommendation is based on the finding that GM and FA did a better job of predicting SL 1 SQT performance than did either ST or GT. Part of the reason for this finding is that Aptitude Area Composite scores often include overlapping ASVAB subtest scores. For example, GM includes two of the four subtest scores which are summed to derive ST results. This fact partially explains the seemingly illogical finding that GM scores do a better job of predicting 71R SL 1 SQTs than ST scores. Nevertheless, one would expect that ST should be the best predictor if it is to be used as a standard for accession into 71R. For this reason, studies should be conducted to determine whether and how other ASVAB subtest score combinations should be used to do a better job of predicting success on the 71R SQT.

(2). The need for requiring Category I-III A soldiers for accession to CMF 46 has never been more critical. The nature of Public Affairs business precludes establishing a clear-cut mathematical formula which would justify such accession requirements. In an environment where everything is automated and we have "fast food" news reporting, today's new public affairs soldier must be able to think logically and act precisely with common sense and sensitivity with minimal supervision. How does one put mathematical value on the ability to use mature judgment, professional ethics, or showing the ability to react responsibly in a crisis situation? The societal pool from which we have to draw does not reflect any common denominator that can be used to predict any large amount of success. The most important factor missing from mathematical formulas is the "human" factor. We must continue with a healthy posture and a high quality mix so that the public affairs field may maintain an acceptable standard of success. The broadcast journalist is commonly known as the voice of the command: He must be well informed, be able to think on his feet, be able to talk articulately with a fair level of intelligence, and must have good eye and hand coordination to operate various pieces of equipment.

(3). Once again, statistical analysis results showed that 86% of 71Rs should come from I-III A, 14% should come from IIIB, and 0% should come from IV. The Public Affairs Proponent Activity feels these accession figures are not adequate due to aforementioned reasons: The SL 1 mix cannot fall below the present rate of 98% from mental categories I-III A and 2% from IIIB without creating a critical loss of skilled manpower for the future.

29 Sep 87

DISTRIBUTION OF QUALITY (DQ) REPORT  
FOR 73C\*

a. Summary

(1). The required recruit accession quality mix for 73C is 85% for I-IIIA, 15% for IIIB, and 0% for IV.

(2). These quality accession standards are needed for the Finance Corps to accomplish its CSS mission on the AirLand Battlefield. Changes in structure, increased training requirements, increasing automation of functions, and doctrinal changes demanding greater decision-making, technical, and leadership responsibilities are the primary reasons for these requirements. The Finance Corps will provide support to the soldier and Commander on the battlefield with a totally restructured TOE, downsized to meet the Army's AOE requirements. This smaller structure and the increased use of automation will require finance soldiers to be mentally capable of being trained to become technically and tactically proficient soldiers who support combat operations as small independent teams on the battlefield.

b. Target Skill Level

(1). Skill level (SL) 2 (E-5) was used. SL 2 was selected because this is the most critical level for mission success or failure in the MOS. SL 2 becomes the first major "quality cut" of the accession soldier. SL 2 soldiers are knowledgeable in SL 1 tasks and are a close representation of the accession soldier. Additionally, they are the first line supervisors in finance units and the lowest echelon trainers. The quality mix of SL 2 will determine if the skill requirements of SLs 3, 4, and 5 can be met. Finally, SL 2 best represents the most demanding performance requirements of the MOS.

c. Performance measure

(1). The Skill Qualification Test (SQT) was used to evaluate proficiency in the MOS. The selection of the SQT is based on the assumption that this measurement provides an acceptable estimate of performance of critical MOS tasks. Furthermore, the SQT was used because it provides a reliable, valid means of estimating the ability to perform critical tasks at SL 2.

(2). Content Validity

Content validity is the extent to which a test measures job performance in the MOS. The SQT was systematically validated for content by the SQT Branch of DOTD using a series of rigorous checks and reviews outlined in TRADOC Regulation 351-2, Skill Qualification Test (SQT) and Common Task Test (CTT) Development, Policies, and Procedures. These procedures included

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\*POC for statistical/research methodology is Dr. Phillip Vandivier (AV 699-3821).

a review of the SQT task list, peer/psychometric review of each task test, expert/murder board review, editorial review, untrained tryout, soldier tryout, setting task training standards, assigning final administration time limit, setting minimum passing score, and final review of camera ready materials.

## (2.). Reliability

An estimate of the internal reliability of the test is important to determine the extent to which the instrument is consistent (within itself) in measuring performance. Two separate procedures, the Coefficient Alpha and Kuder-Richardson method, were used to estimate internal reliability of the SL 2 SQT:

Coefficient Alpha provides an estimate of the extent to which all test items intercorrelate with one another. A coefficient of .758 was obtained.

The Kuder-Richardson procedure also provides an estimate of the extent to which all SQT items measure the same abilities. A coefficient of .812 was obtained.

These results in combination indicate the SL 2 73C SQT has a moderate degree of internal reliability.

## d. Research Design and Implementation

### (1). Test Administration and Data Collection Procedures

SQTs were administered IAW procedures outlined in TRADOC Reg 351-2. Also, the Armed Services Vocational Aptitude Battery (ASVAB) was administered upon soldier entry into the Army IAW routine procedures.

Data was extracted from official test results obtained from MILPERCEN with the help of the SSC-NCR Liaison. Memory constraints on available hardware precluded the use of all 775 cases available. Final data analyses included 509 cases, or approximately 66% of the available cases.

(2). Data analyses were conducted with the use of the Statistical Package For the Social Sciences--Personal Computer Plus package. Results are as follows:

(a). A stepwise multiple regression procedure was conducted to determine what combination of ASVAB Aptitude Areas [Armed Forces Qualification Test (AFQT), Clerical (CL), Combat (CO), Electronics Repair (EL), Field Artillery (FA), General Maintenance (GM), Mechanical Maintenance (MM), Operators/Food (OF), Surveillance/Communications (SC), and Skilled Technical (SL) scores] did the best job of predicting SQT scores. Multiple regression is the preferred procedure used in the behavioral sciences when the object is to determine which of several combinations of predictors does the best job of predicting a

single criterion; and to determine how much weight each predictor has in the prediction of the criterion. Results indicated FA, OF, and AFQT results together significantly ( $R=.47$ ;  $F=34.01$ ;  $p<.01$ ) predicted SQT. A total of 21.7 per cent of the variance in SQT scores was explained by FA, OF, and AFQT results. FA accounted for approximately 19 per cent of the variance in SQT scores ( $F=86.85$ ;  $p<.001$ ), followed by OF ( $F=7.47$ ;  $p<.01$ ), and AFQT results ( $F=5.11$ ;  $p<.05$ ) which accounted for additional increases of 1.6 and 1.1 per cent in the variance of SQT scores, respectively. After these three no other variable or variables contributed anything unique or significant to the prediction of SQT.

Although statistically significant, the strength of the predictive relationship between FA, OF, and AFQT, on the one hand, and SQT scores, on the other, can best be described as mild: Although 21.7 per cent of the variance in SQT scores was explained, a total of 78.3 per cent of SQT variance remains unexplained by ASVAB results.

Please note: Mild but statistically significant Pearson  $r$  correlations were found for all other Aptitude Area predictors including ST ( $r=+.40$ ;  $p<.001$ ), SC ( $r=+.38$ ;  $p<.001$ ), CL ( $r=+.35$ ;  $p<.001$ ), and EL ( $r=+.35$ ;  $p<.001$ ). (The large sample size undoubtedly contributed to the finding of numerous positive correlations among Aptitude Areas.) Nevertheless, none of these variables significantly added to the prediction of SQT scores above and beyond what was provided by FA, OF, and AFQT results. (Technically, none of these variables made significant contributions to the prediction of SQTs after FA, OF, and AFQT results were already entered into the regression equation.) FA, OF, and AFQT results had Pearson correlation coefficients of  $r=+.44$ ,  $+.22$ , and  $+.34$  (all  $p<.001$ ), respectively.

(b). A  $t$  test was computed to determine whether significant differences exist between the SQT averages of soldiers in mental category I-III A (upper 50th percent) vs. IIIB-IV (10 to 49th percent) on AFQT results--which are calculated from ASVAB subtest results. The difference between the average of 77.74 for category I-III A soldiers and the mean of 70.58 for category IIIB-IV personnel is statistically significant ( $t=6.47$ ;  $p<.001$ ). Nevertheless, the difference of 7.16 points between the two in practical terms is less than overwhelming. A followup Pearson  $r$  analysis indicated a mild but significant positive correlation between the two variables ( $r=.34$ ;  $p<.001$ ). These analyses provide evidence that SQT results do tend to increase with mental category.

(c). A minimum passing SQT score of 60 was determined by subject matter experts at the school. Approximately 9% of the 73C sample failed to meet this performance standard.

Next, a frequency distribution was made of the percentages of 73Cs who passed and failed (using the minimum passing SQT

score) across different mental categories. Results were as follows:

PERCENTAGE OF PASS/FAILS BY MENTAL CATEGORY

		M E N T A L C A T E G O R Y		
		I-III A	IIIB	IV
S Q T	FAIL (59 and below)	5.8% n=18	15.6% n=19	9.5% n=6
	<hr/>			
S C D R E S	PASS (60 and above)	94.2% n=295	84.4% n=103	90.5% n=57

Results indicate the failure rate of 6% for I-IIIA is less than that for IIIBs, at 16%, and IVs, at 10%. Conversely, the pass rate of 94% for I-IIIA is greater than that for IIIBs, at 84%, and IVs, at 91%. Nevertheless, the trend for higher mental category individuals to perform better than lower functioning soldiers did not hold up at the lower intellectual levels: IVs had both a higher frequency of passes and lower frequency of failures than IIIBs.

(d). A simple frequency distribution was run to determine the breakdown of soldiers by AFQT mental categories in our sample. Results indicated the following:

SAMPLE PERCENTAGES BY AFQT MENTAL CATEGORY		
I-III A	IIIB	IV
62.9% n=313	24.5% n=122	12.6% n=63

These percentages provide an approximate estimate of the present mental category breakdown for 73Cs at SL 2.

(e). In order to determine future 73C accession requirements, the following steps were taken [NOTE: These steps are outlined in Appendix G of the Distribution of Quality Program Handbook]:

(1). A frequency distribution was made of CL scores. CL results were used because a minimum CL score is required for entry into the MOS.

(2). The frequency distribution of CL scores was converted to an approximate mental category distribution using tables and procedures outlined in the Distribution of Quality Program Handbook. [NOTE: The frequencies of soldiers which fell within each 5-point CL score category were multiplied by separate factors for each mental category which converted CL results into

an estimated frequency distribution of soldiers by mental category. Please refer to Appendix G of the Distribution of Quality Program Handbook for further clarification and examples of this procedure.]

(3). Percentages for each mental category were determined by dividing the frequencies of sums for each category by the overall total for all categories. (Percentages were 79.5 for category I-IIIA; 19.0 for IIIB; and 1.5 for IV.)

(4). Each mental category percentage was divided by a factor which controls for historical continuation/survival rates:

I-IIIA:	80/.1589 =	503.46
IIIB :	19/.2203 =	86.25
IV :	1/.2252 =	4.44
Total =		<u>594.15</u>

(5). Final future accession rates were determined by dividing each of these results by the total:

I-IIIA:	503.46/594.15 =	84.7%
IIIB:	86.25/594.15 =	14.5%
IV:	4.44/594.15 =	.8%

#### e. Conclusions and recommendations

(1). In conclusion, this study found that:

(a). Field Artillery, Operators/Food, and Armed Forces Qualification Test Results did the best job, in that order, of predicting soldier performance on the 73C SL 2 SQT.

(b). Overall results suggest SL 2 73Cs in higher mental categories tend to score higher on the SQT than those in lower mental categories; however, at least some of the data suggest that mental category IV soldiers did slightly better than IIIBs.

(c). Approximately 62.9 per cent of 73Cs presently are in mental categories I-IIIA; 24.5 per cent are from IIIB; and 12.6 per cent are from IV.

(d). According to statistical analysis results, 85 per cent of future 73Cs should come from mental category I-IIIA; 15 per cent should come from IIIB; and 0 per cent should come from IV.

(e). RECOMMEND the use of the following multiple regression equation which uses Field Artillery, Foods/Operators, and Armed Forces Qualification Test results to predict success of future 73C recruits on the SQT:

$$(.3678) \times (FA) + (-.1304) \times (FO) + (.0617) \times (AFQT) + 45.47 = \text{Predicted SQT Score}$$

EXAMPLE:

$$(.3678) \times (85) + (-.1304) \times (80) + (.0617) \times (82) + 45.47 = 71.36$$

Any score which falls within 10 points of the SQT cutoff (60)

indicates an individual who is at high risk for failing the SL 2 SQT. For example, a recruit who scores 85, 80, and 82 on the FA, FO, and AFQT, respectively, obtains a predicted SQT score of 71.36--which is not within 10 points of the cutoff (60); therefore, this soldier is not high risk for failure on the 73C SQT. Please note: High-risk individuals who are motivated and interested in a 73C career might try hard and be fully successful on the SL 2 SQT; nevertheless, in the long run more high-risk soldiers will have trouble with SQTs than nonhigh-risk individuals.

(9). RECOMMEND that further studies be conducted to determine the extent to which CL scores as presently configured should continue to be used as a standard for accession into the 73C MOS. This recommendation is based on the finding that other Aptitude Areas--but especially FA--did a better job of predicting SL 2 73C SQTs than did CL scores. Part of the reason for this finding is that the Aptitude Area Composite scores include overlapping ASVAB subtest scores. For example, FA includes two of the three subtest scores which are summed to derive CL results. This fact--plus the fact that FA contains two subtests which measure arithmetic knowledge and reasoning--largely explains the seemingly illogical finding that FA scores do a better job of predicting SL 2 73C SQTs than CL scores. Nevertheless, one would expect that CL should be the best predictor if it is to be used as a standard for accession into 73C. For this reason, studies should be conducted to determine whether and how the CL Aptitude Area score needs to be reconfigured so it will do a better job of predicting success on the SL 73C SQT.

(2). The required recruit accession quality mix for 73C is needed for the Finance Corps to accomplish its combat service support mission on the AirLand Battlefield. Doctrinal changes, increased training requirements for technical and battlefield skills, and the fielding of more and more automation equipment drive the need for high quality soldiers. Finance units are structured leaner in terms of the number of authorized personnel than ever before. But the CSS mission makes greater demands on these personnel than in the past. While automation advances and enhancements reduce "stubby pencil" work, the decision-making responsibilities and leadership requirements demand a higher quality soldier than might be otherwise supposed. Additionally, when battlefield conditions make the automation equipment nonoperational, the quality soldier will be able to continue with the successful completion of the mission.

(3). Because of the above drivers, the quality accession SL 2 mix cannot be less than the results of statistical analysis in para e(1)(d) above: 85% for I-IIIA; 15% for IIIB; and 0% for IV. Any reduction from this standard will seriously degrade the Finance Corps' ability to support the soldier and Commander on the battlefield.

29 Sep 87

DISTRIBUTION OF QUALITY (DQ) REPORT  
FOR 73D\*

a. Summary

(1). The required recruit accession quality mix for 73D is 89% for I-IIIA, 10% for IIIB, and 1% for IV.

(2). These quality accession standards are needed for the Finance Corps to accomplish its CSS mission on the AirLand Battlefield. Changes in structure, increased training requirements, increasing automation of functions, and doctrinal changes demanding greater decision-making, technical, and leadership responsibilities are the primary reasons for these requirements. The Finance Corps will provide support to the soldier and Commander on the battlefield with a totally restructured TOE, downsized to meet the Army's AOE requirements. This smaller structure and the increased use of automation will require finance soldiers to be mentally capable of being trained to become technically and tactically proficient soldiers who support combat operations as small independent teams on the battlefield.

b. Target Skill Level

(1). Skill level (SL) 2 (E-5) was used. SL 2 was selected because this is the most critical level for mission success or failure in the MOS. SL 2 becomes the first major "quality cut" of the accession soldier. SL 2 soldiers are knowledgeable in SL 1 tasks and are a close representation of the accession soldier. Additionally, they are the first line supervisors in finance units and the lowest echelon trainers. The quality mix of SL 2 will determine if the skill requirements of SLs 3, 4, and 5 can be met. Finally, SL 2 best represents the most demanding performance requirements of the MOS.

c. Performance measure

(1). The Skill Qualification Test (SQT) was used to evaluate proficiency in the MOS. The selection of the SQT is based on the assumption that this measurement provides an acceptable estimate of performance of critical MOS tasks. Furthermore, the SQT was used because it provides a reliable, valid means of estimating the ability to perform critical tasks at SL 2.

(2). Content Validity

Content validity is the extent to which a test measures job performance in the MOS. The SQT was systematically validated for content by the SQT Branch of DOTD using a series of rigorous checks and reviews outlined in TRADOC Regulation 351-2, Skill Qualification Test (SQT) and Common Task Test (CTT) Development, Policies, and Procedures. These procedures included

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\*POC for statistical/research methodology is Dr. Phillip Vandivier (AV 699-3821).

a review of the SQT task list, peer/psychometric review of each task test, expert/murder board review, editorial review, untrained tryout, soldier tryout, setting task training standards, assigning final administration time limit, setting minimum passing score, and final review of camera ready materials.

## (2.). Reliability

An estimate of the internal reliability of the test is important to determine the extent to which the instrument is consistent (within itself) in measuring performance. Both the Coefficient Alpha and Kuder-Richardson techniques were used to estimate the reliability of the SL 2 73D SQT.

Coefficient Alpha provides an estimate of the extent to which all test items intercorrelate with one another. A coefficient of .844 was obtained.

The Kuder-Richardson procedure also provides an estimate of the extent to which test items are measuring the same thing. A coefficient of .797 was obtained.

These results together suggest the SL 2 73D SQT has a moderate to high amount of internal consistency or reliability.

## d. Research Design and Implementation

### (1). Test Administration and Data Collection Procedures

SQTs were administered IAW procedures outlined in TRADOC Reg 351-2. Also, the Armed Services Vocational Aptitude Battery (ASVAB) was administered upon soldier entry into the Army IAW routine procedures.

Data was extracted from official test results obtained from MILPERCEN with the help of the SSC-NCR Liaison. All 126 cases available (the entire population of SL 2 73Ds) were used for data analyses.

(2). Data analyses were conducted with the use of the Statistical Package For the Social Sciences--Personal Computer Plus package. Results are as follows:

(a). A stepwise multiple regression procedure was conducted to determine what combination of ASVAB Aptitude Areas [Armed Forces Qualification Test (AFQT), Clerical (CL), Combat (CO), Electronics Repair (EL), Field Artillery (FA), General Maintenance (GM), Mechanical Maintenance (MM), Operators/Food (OF), Surveillance/Communications (SC), and Skilled Technical (ST) scores] did the best job of predicting SQT scores. Multiple regression is the preferred procedure used in the behavioral sciences when the object is to determine which of several

combinations of predictors does the best job of predicting a single criterion; and to determine how much weight each predictor has in the prediction of the criterion. Results indicated SC significantly ( $r=+.36$ ;  $p<.001$ ) predicted SQT. Although the relationship was statistically significant, the magnitude or strength of the relationship could best be described as weak: SC explained 12.9 per cent of the variance in SQTs--but 87.1 per cent remains unexplained by ASVAB results. No other variable or variables contributed significantly to the prediction of SQTs above and beyond that which was provided by SC. (Technically, no other variable provided significant contribution to the prediction of SQTs after SC was already entered in the regression equation.) For this reason, results were reduced to a Pearson  $r$  between SC and SQTs.

Please note: Pearson  $r$  results indicated several other variables significantly predict SL 2 SQTs to a lesser extent than SC, including CL ( $r=+.30$ ;  $p<.01$ ), ST ( $r=+.29$ ;  $p<.01$ ), AFQT ( $r=+.28$ ;  $p<.01$ ), and CO ( $r=+.26$ ;  $p<.01$ ). None of the other intercorrelations were significant.

(b). A  $t$  test was computed to determine whether significant differences exist between the SQT averages of soldiers in mental category I-IIIA (upper 50th percent) vs. IIIB (10 to 49th percent) on AFQT results--which are calculated from ASVAB subtest results. The difference of 9.01 points between the average of 78.40 for category I-IIIA soldiers and the mean of 69.39 for category IIIB personnel is statistically significant ( $t=3.42$ ;  $p<.001$ ). A followup Pearson  $r$  analysis indicated a mild but significant positive correlation between the two variables ( $r=+.28$ ;  $p<.01$ ). These analyses provide evidence that SQT results do tend to increase with mental category.

(c). A minimum passing SQT score of 60 was determined by subject matter experts at the school. Approximately 11% of the 73D sample failed to meet this performance standard.

Next, a frequency distribution was made of the percentages of 73Ds who passed and failed (using the minimum passing SQT score) across different mental categories. Results were as follows:

PERCENTAGE OF PASS/FAILS BY MENTAL CATEGORY

		M E N T A L C A T E G O R Y		
		I-III A	IIIB	IV
S Q T	FAIL (59 and below)	6.6% n=6	21.4% n=6	40.0% n=2
	<hr/>			
S C O R E S	PASS (60 and above)	93.4% n=85	78.6% n=22	60.0% n=3
	<hr/>			

Because of the small number of mental category IV cases (5), these results must be interpreted with caution. With this fact in mind, results indicate that the failure rate increases from 7% for I-IIIA's to 21% for IIIB's to 40% for IV's. Conversely, the pass rates gradually decrease from 93% for I-IIIA's to 79% for IIIB's to 60% for IV's.

(d). A simple frequency distribution was run to determine the breakdown of soldiers by AFQT mental categories in our sample. Results indicated the following:

S A M P L E P E R C E N T A G E S B Y A F Q T M E N T A L C A T E G O R Y		
I-III A	IIIB	IV
73.4%	22.6%	4.0%
<u>n=91</u>	<u>n=28</u>	<u>n=5</u>

These percentages provide an approximate estimate of the present mental category breakdown for 73Ds at SL 2.

(e). In order to determine future 73D accession requirements, the following steps were taken [NOTE: These steps are outlined in Appendix G of the Distribution of Quality Program Handbook]:

(1). A frequency distribution was made of CL scores. CL results were used because a minimum CL score is required for entry into the MOS.

(2). The frequency distribution of CL scores was converted to an approximate mental category distribution using tables and procedures outlined in the Distribution of Quality Program Handbook. [NOTE: The frequencies of soldiers which fell within each 5-point CL score category were multiplied by separate factors for each mental category which converted CL results into an estimated frequency distribution of soldiers by mental category. Please refer to Appendix G of the Distribution of Quality Program Handbook for further clarification and examples of this procedure.]

(3). Percentages for each mental category were

determined by dividing the frequencies of sums for each category by the overall total for all categories. (Percentages were 85.4 for category I-III A; 13.3 for IIIB; and 1.3 for IV.)

(4). Each mental category percentage was divided by a factor which controls for historical continuation/survival rates:

I-III A:	85/.1589 =	534.73
IIIB :	13/.2203 =	59.01
IV :	1/.2252 =	4.44
Total =		<u>598.38</u>

(5). Final future accession rates were determined by dividing each of these results by the total:

I-III A:	534.93/598.38 =	89.4%
IIIB:	59.01/598.38 =	9.9%
IV:	4.44/598.38 =	.7%

#### e. Conclusions and recommendations

(1). In conclusion, this study found that:

(a). Surveillance/Communication results did the best job of predicting soldier performance on the 73D SL 2 SQT. No other variable contributed to the prediction of SQTs above and beyond what was provided by Surveillance/Communication.

(b). Overall results suggest 73Ds in higher mental categories tend to score higher on the SL 2 SQT than those in lower mental categories.

(c). Approximately 73.4 per cent of 73Ds presently are in mental categories I-III A; 22.6 per cent are from IIIB; and 4.0 per cent are from IV.

(d). According to statistical analysis results, 89 per cent of future 73Ds should come from mental category I-III A; 10 per cent should come from IIIB; and 1 per cent should come from IV.

(e). RECOMMEND the use of the following multiple regression equation which uses Surveillance/Communications results to predict success of future 73D recruits on the SL 2 SQT:

$$(.2665) \times (SC) + 48.70 = \text{Predicted SQT Score}$$

#### EXAMPLE:

$$(.2665) \times (85) + 48.70 = 71.35$$

Any predicted SQT score which falls within 10 points of the SQT cutoff (60) indicates an individual with high risk for failure on the SL 2 73D SQT. For example, a recruit who scores 85 on SC obtains a predicted SQT score of 71.35--which is not within 10 points of the cutoff (60); therefore, this soldier is not high risk for failure on the 73D SQT. Please note: High-risk individuals who are motivated and interested in a 73D career might try hard and be fully successful on the SQT; nevertheless,

in the long run more high-risk soldiers will have trouble with SQTs than nonhigh-risk individuals.

(9). RECOMMEND that further studies be conducted to determine the extent to which CL scores as presently configured should continue to be used as a standard for accession into the 73D MOS. This recommendation is based on the finding that SC results did a better job of predicting SL 2 73D SQTs than did CL. Part of the reason for this finding is that the Aptitude Area Composite scores include overlapping ASVAB subtest scores. For example, SC includes two of the three subtest scores which are summed to derive CL results. This fact largely explains the seemingly illogical finding that SC does a better job of predicting SL 2 73D SQTs than CL scores. Nevertheless one would expect that CL scores should be the best predictor if it is to be used as a standard for accession into 73D. For this reason, studies should be conducted to determine whether and how the CL Aptitude Area score needs to be reconfigured so it will do a better job of predicting success on the SL 2 73D SQT.

(2). The required recruit accession quality mix for 73D is needed for the Finance Corps to accomplish its combat service support mission on the AirLand Battlefield. Doctrinal changes, increased training requirements for technical and battlefield skills, and the fielding of more and more automation equipment drive the need for high quality soldiers. Finance units are structured leaner in terms of the number of authorized personnel than ever before. But the CSS mission makes greater demands on these personnel than in the past. While automation advances and enhancements reduce "stubby pencil" work, the decision-making responsibilities and leadership requirements demand a higher quality soldier than might be otherwise supposed. Additionally, when battlefield conditions make the automation equipment nonoperational, the quality soldier will be able to continue with the successful completion of the mission.

(3). Because of the above drivers, the quality accession SL 2 mix cannot be less than that indicated by statistical analysis results in para e(1)(d): 89% for I-IIIA; 10% for IIIB; and 1% for IV. Any reduction from this standard will seriously degrade the Finance Corps' ability to support the soldier and Commander on the battlefield.

29 Sep 87

DISTRIBUTION OF QUALITY (DQ) REPORT  
FOR 71L\*

a. Summary

(1). The Adjutant General School's position on what the required recruit accession quality mix should be for 71Ls is 82.4% from mental categories I-III A; 16.3% from category IIIB; and 1.3% from category IV.

(2). The accession quality mix for 71Ls needs to be upgraded from the present figures of 56% from I-III A, 35% from IIIB, and 9% from IV because higher quality soldiers are needed to be able to meet the future challenge of fully automated (computerized) administrative duties. Until quite recently, 71Ls were trained on the use of basic typewriters; however, present training requires recruits who are capable of learning and operating automated word processors and computers. This trend, which will continue in the future, demands a much higher caliber soldier than in the past.

b. Target Skill Level

(1). Skill level (SL) 3 (E-6) was used. SL 3 was selected because this is the level of most section chiefs in this MOS throughout the Army. For this reason, performance of SL 3 soldiers is critical for mission success.

c. Performance measure

(1). The Skill Qualification Test (SQT) was used to evaluate proficiency in the MOS. The selection of the SQT is based on the assumption that this measurement provides an acceptable estimate of performance of critical MOS tasks. Furthermore, the SQT was used because it provides a reliable, valid means of estimating the ability to perform critical tasks at SL 3.

(2). Content Validity

Content validity is the extent to which a test measures job performance in the MOS. The SQT was systematically validated for content by the SQT Branch of DOTD using a series of rigorous checks and reviews outlined in TRADOC Regulation 351-2, Skill Qualification Test (SQT) and Common Task Test (CTT) Development, Policies, and Procedures. These procedures included a review of the SQT task list, peer/psychometric review of each task test, expert/murder board review, editorial review, untrained tryout, soldier tryout, setting task training standards, assigning final administration time limit, setting minimum passing score, and final review of camera ready materials.

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\*FOC for the empirical portions of this report is Dr. Phillip Vandivier (AV 699-3821).

## (2.). Reliability

An estimate of the internal reliability of the test is important to determine the extent to which the instrument is consistent (within itself) in measuring performance. The Coefficient Alpha procedure was used to estimate the reliability of the 71L SQT. Coefficient Alpha provides an estimate of the extent to which all test items intercorrelate with one another. A coefficient of .8359 was obtained, which indicates the 71L SQT has a moderate, or acceptable amount of internal reliability.

### d. Research Design and Implementation

#### (1). Test Administration and Data Collection Procedures

SQTs were administered IAW procedures outlined in TRADOC Reg 251-2. Also, the Armed Services Vocational Aptitude Battery (ASVAB) was administered upon soldier entry into the Army IAW routine procedures.

Data was extracted from official test results obtained from MILPERCEN with the help of the 3SC-NCR Liaison. The entire population of 3L 3 71Ls was used; however, computation requirements necessitated the elimination of some records because of incomplete data.

(2). Data analyses were conducted with the use of the Statistical Package For the Social Sciences---Personal Computer Plus package. Results are as follows:

(a). A stepwise multiple regression procedure was conducted to determine what combination of ASVAB predictor variables (Armed Forces Qualification Test, Clerical, Army Combat, Electronics, Field Artillery, General Maintenance, Mechanical Maintenance, Operators/Food, Surveillance/Communications, and Skilled Technical scores) did the best job of predicting SQT scores. Multiple regression is the preferred procedure used in the behavioral sciences when the object is to determine which of several combinations of predictors does the best job of predicting a single criterion; and to determine how much weight each predictor has in the prediction of the criterion. Results indicated the Skilled Technician and Field Artillery results together significantly ( $R = .33$ ;  $F = 13.75$ ;  $p < .001$ ) predicted SQT. A total of 10.64 per cent of the variance in SQT scores was explained by Skilled Technician and Field Artillery results. Skilled Technician results accounted for approximately 8.33 per cent of the variance in SQT scores ( $F = 21.10$ ;  $p < .001$ ), followed by Field Artillery ( $F = 5.95$ ;  $p < .05$ ), which accounted for the remaining 2.31 per cent of the variability in SQT scores. After these two no other variable or variables contributed significantly to the prediction of SQT.

Although statistically significant, the strength of the predictive relationship between Skilled Technician and Field

Artillery results, on the one hand, and SQT scores, on the other, can best be described as mild: Although 10.64 per cent of the variance in SQT scores was explained, a total of 89.36 per cent of SQT variance remains unexplained by ASVAB scores.

Please note: Mild but statistically significant Pearson  $r$  correlations with SQTs were found for several other predictor variables, including Surveillance/Communications ( $r = +.25$ ,  $p < .001$ ), Clerical ( $r = +.25$ ,  $p < .001$ ), and Armed Forces Qualification Test results ( $r = +.23$ ,  $p < .001$ ). Nevertheless, none of these variables significantly added to the prediction of SQT scores above and beyond what was provided by Skilled Technical and Field Artillery scores. (Technically, none of these variables made significant contributions to the prediction of SQTs after Skilled Technical and Field Artillery scores were already entered into the regression equation.) Skilled Technical and Field Artillery scores had Pearson  $r$  correlations of  $+ .29$  ( $p < .001$ ) and  $+ .27$  ( $p < .001$ ) with SQTs, respectively.

(b). A  $t$  test was computed to determine whether significant differences exist between the SQT averages of soldiers in mental category I-IIIa (upper 50th percent) vs. IIIB-IV (10 to 49th percent) on Armed Forces Qualification Test results--which are calculated from ASVAB subtest results. The difference between the average of 85.89 for category I-IIIa soldiers and the mean of 82.49 for category IIIB-IV personnel is statistically significant ( $t = 2.25$ ;  $p < .05$ ). Nevertheless, the difference of 3.40 between the two in practical terms is less than overwhelming. A followup Pearson  $r$  analysis indicated a mild but significant positive correlation between the two variables ( $r = .23$ ;  $p < .001$ ). These analyses provide supporting evidence that SQT results do tend to increase with mental category.

(c). A minimum passing SQT score of 60 was determined by subject matter experts at the school. Approximately 3% of the 71L sample failed to meet this performance standard.

Next, a frequency distribution was made of the percentages of 71Ls who passed and failed (using the minimum passing SQT score) across different mental categories. Results were as follows:

PERCENTAGE OF PASS/FAILS BY MENTAL CATEGORY

		M E N T A L C A T E G O R Y		
		I-III A	IIIB	IV
S				
Q	FAIL			
T	(59 and below)	3.1% n=4	2.5% n=2	4.8% n=1
S				
C	PASS			
D	(60 and above)	96.9% n=123	97.5% n=79	95.2% n=20
R				
E				
3				

The small number of failures precluded the emergence of a pattern regarding passes/failures as a function of mental category.

(d). A simple frequency distribution was run to determine the breakdown of soldiers by AFQT mental categories in our sample. Results indicated the following:

SAMPLE PERCENTAGES BY AFQT MENTAL CATEGORY		
I-III A	IIIB	IV
55.5% n=127	35.4% n=81	9.2% n=21

These percentages provide an approximate estimate of the present mental category breakdown for 71Ls.

(e). In order to determine future 71L accession requirements, the following steps were taken [NOTE: These steps are outlined in Appendix G of the Distribution of Quality Program Handbook]:

(1). A frequency distribution was made of Clerical scores. Clerical results were used because a minimum Clerical score is required for entry into the MOS.

(2). The frequency distribution of Clerical scores was converted to an approximate mental category distribution using tables and procedures outlined in the Distribution of Quality Program Handbook. [NOTE: The frequencies of soldiers which fell within each 5-point Skilled Technical score category were multiplied by separate factors for each mental category which converted Clerical results into an estimated frequency distribution of soldiers by mental category. Please refer to Appendix G of the Distribution of Quality Program Handbook for further clarification and examples of this procedure.]

(3). Percentages for each mental category were determined by dividing the frequencies of sums for each category

by the overall total for all categories. (Percentages were 76.0 for category I-III A; 21.9 for IIIB; and 2.1 for IV.)

(4). Each mental category percentage was divided by a factor which controls for historical continuation/survival rates:

I-III A:	76/.1058 =	718.34
IIIB :	22/.1543 =	142.58
IV :	2/.1789 =	11.18

Total = 872.10

(5). Final future accession rates were determined by dividing each of these results by the total:

I-III A:	718.34/872.10 =	82.4%
IIIB:	142.58/872.10 =	16.3%
IV:	11.18/872.10 =	1.3%

#### e. Conclusions and recommendations

(1). In conclusion, this study found that:

(a). Skilled Technical and Field Artillery scores do the best job, in that order, of predicting soldier performance.

(b). 71Ls in higher mental categories tend to score somewhat higher on the SQT than those in lower mental categories.

(c). Approximately 55.5 per cent of 71Ls presently are in mental categories I-III A; 35.4 per cent are from IIIB; and 9.2 per cent are from IV.

(d). According to statistical analysis results, 82.4 per cent of future 71Ls should come from mental category I-III A; 16.3 per cent should come from IIIB; and 1.3 per cent should come from IV.

(e). RECOMMEND the use of the following multiple regression equation which uses Skill Technician and Field Artillery results to predict success of future 71L recruits on the SQT:

$$(.1562) \times (ST) + (.1132) \times (FA) + 56.37 = \text{Predicted SQT Score}$$

#### EXAMPLE:

$$(.1562) \times (85) + (.1132) \times (80) + 56.37 = 78.7$$

Any predicted SQT score which falls within 11 points of the SQT cutoff (73) indicates a high-risk individual. For example, a recruit who scores 85 and 80 on the (ST) and (FA), respectively, obtains a predicted score of 78.7--which is within 11 points of the cutoff; therefore, this soldier is a high risk for failure on the 71L SQT. The high-risk individual who is motivated and interested in a 71L career might try hard and be fully successful on the SQT; nevertheless, in the long run more high-risk soldiers

will have trouble with SQTs than nonhigh-risk individuals.

(9). RECOMMEND that further studies be conducted to determine the extent to which Clerical scores as presently configured should continue to be used as a standard for accession into the 71L MOS. This recommendation is based on the finding that two other Aptitude Areas--Skilled Technician and Field Artillery--did a better job both individually and collectively of predicting SQTs than did Clerical scores. Part of the reason for this finding is that the Aptitude Area Composite scores include overlapping ASVAB subtest scores. For example, both Field Artillery and Skilled Technician areas include two of the three subtest scores which are summed to derive Clerical results. This fact largely explains the seemingly illogical finding that Field Artillery scores do a better job of predicting 71L SQTs than Clerical scores. Nevertheless, one would expect that Clerical scores should be the best predictor if it is to be used as a standard for accession into 71L. For this reason, studies should be conducted to determine how the Clerical Aptitude Area score needs to be reconfigured so it will do a better job of predicting success on the 71L SQT.

(10). Impact of soldier quality requirements from changes in equipment, doctrine, training, and organization during the next five years. No dramatic changes in doctrine or organization are projected for 71Ls over the next five years; however, Fort Jackson (where 71L AIT is trained) has been fully automated with WYSE Personal Computers for technical training in their MOS. This is a recent change from the use of basic typewriters for this training. Also, the Army-wide admin. duties of 71Ls are going to require the ability to use automated word processors and computerized hardware and software of various kinds.

(11). The Adjutant General School concurs with the quality accession mix derived from statistical analysis and reported in para e(1)(d) above.

29 Sep 87

DISTRIBUTION OF QUALITY (DQ) REPORT  
FOR 75B\*

a. Summary

(1). The required recruit accession quality mix for 75B is categories I-III A, 83.2%; category IIIB, 15.6%; and IV, 1.2%.

(2). Deviation in a negative direction from these standards will result in numerically fewer course graduates with a degradation in academic standards, impacting directly on the quality of Personnel Service Support.

b. Target Skill Level

(1). Skill level (SL) 3 (E-6) was used. SL 3 was selected because, as the level of most 75B section chiefs, success or failure of the MOS mission depends on the performance of 75B E-6s.

c. Performance measure

(1). The Skill Qualification Test (SQT) was used to evaluate proficiency in the MOS. The selection of the SQT is based on the assumption that this measurement provides an acceptable estimate of performance of critical MOS tasks. Furthermore, the SQT was used because it provides a reliable, valid means of estimating the ability to perform critical tasks at SL 3.

(2). Content Validity

Content validity is the extent to which a test measures job performance in the MOS. The SQT was systematically validated for content by the SQT Branch of DOTD using a series of rigorous checks and reviews outlined in TRADOC Regulation 351-2, Skill Qualification Test (SQT) and Common Task Test (CTT) Development, Policies, and Procedures. These procedures included a review of the SQT task list, peer/psychometric review of each task test, expert/murder board review, editorial review, untrained tryout, soldier tryout, setting task training standards, assigning final administration time limit, setting minimum passing score, and final review of camera ready materials.

(2.). Reliability

An estimate of the internal reliability of the test is important to determine the extent to which the instrument is consistent (within itself) in measuring performance. The

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\*POC for statistical/research methodology is Dr. Phillip L. Vandivier (AV 699-3821).

Coefficient Alpha procedure was used to estimate the reliability of the 75B SQT. Coefficient Alpha provides an estimate of the extent to which all test items intercorrelate with one another. A coefficient of .77 was obtained, which indicates the 75B SQT has adequate internal reliability for use in this study.

#### d. Research Design and Implementation

##### (1). Test Administration and Data Collection Procedures

SQTs were administered IAW procedures outlined in TRADOC Reg 351-2. Also, the Armed Services Vocational Aptitude Battery (ASVAB) was administered upon soldier entry into the Army IAW routine procedures.

Data was extracted from official test results obtained from MILPERCEN with the help of the SSC-NCR Liaison. Memory constraints on available hardware precluded the use of all 953 cases available. Final data analyses included 484 cases, or approximately 51% of the available cases.

(2). Data analyses were conducted with the use of the Statistical Package For the Social Sciences--Personal Computer Plus package. Results are as follows:

(a). A stepwise multiple regression procedure was conducted to determine what combination of ASVAB Aptitude Areas (Armed Forces Qualification Test (AFQT), Clerical (CL), Combat (CO), Electronics Repair (EL), Field Artillery (FA), General Maintenance (GM), Mechanical Maintenance (MM), Operators/Food (OF), Surveillance/Communications (SC), and Skilled Technician (ST) scores) does the best job of predicting SQT scores. Multiple regression is the preferred procedure used in the behavioral sciences when the object is to determine which of several combinations of predictors does the best job of predicting a single criterion; and to determine how much weight each predictor has in the prediction of the criterion. Results indicated the FA and AFQT results together significantly ( $R=.32$ ;  $F=18.75$ ;  $p<.01$ ) predicted SQT. A total of 10 per cent of the variance in SQT scores was explained by FA and AFQT. FA accounted for approximately 7.5 per cent of the variance in SQT scores ( $F=27.29$ ;  $p<.001$ ), followed by AFQT ( $F=9.52$ ;  $p<.01$ ), which accounted for an additional increase of 2.5 per cent in the variance of SQT scores. After these two no other variable or variables contributed significantly to the prediction of SQT. (Technically, no other variable added anything unique to the prediction of SQTs after FA and AFQT were already in the regression equation.)

Although statistically significant, the strength of the predictive relationship between FA and AFQT, on the one hand, and SQT scores, on the other, can best be described as mild: Although 10 per cent of the variance in SQT scores was explained, a total of 90 per cent of SQT variance remains unexplained by

## ASVAB results.

Please note: Pearson r correlations between all other predictors and SQTs were significant ( $p < .01$ ). These correlations ranged from .17 for OF ( $p < .01$ ) to .25 for CL ( $p < .001$ ). The large sample size undoubtedly contributed to the finding of numerous positive correlations between SQT and various Aptitude Areas. Nevertheless, none of these variables significantly added to the prediction of SQT scores above and beyond what was provided by FA and AFQT.

(b). A t test was computed to determine whether significant differences exist between the SQT averages of soldiers in mental category I-IIIa (upper 50th percent) vs. IIIb-IV (10 to 49th percent) on Armed Forces Qualification Test results--which are calculated from ASVAB subtest results. The difference between the average of 76.28 for category I-IIIa soldiers and the mean of 71.24 for category IIIb-IV personnel is statistically significant ( $t = 3.76$ ;  $p < .001$ ). Nevertheless, in practical terms the difference of 5.04 points between the two is less than overwhelming. A followup Pearson r analysis indicated a mild but significant positive correlation between AFQT and SQTs ( $r = .27$ ;  $p < .001$ ). These analyses provide evidence that SQT results do tend to increase with mental category.

(c). A minimum passing SQT score of 60 was determined by subject matter experts at the school. Approximately 15% of the 758 sample failed to meet this performance standard.

Next, a frequency distribution was made of the percentages of 758s who passed and failed (using the minimum passing SQT score) across different mental categories. Results were as follows:

PERCENTAGE OF PASS/FAILS BY MENTAL CATEGORY

		M E N T A L   C A T E G O R Y		
		I-III A	IIIB	IV
S D T	FAIL (59 and below)	11.9% n=32	18.6% n=33	25.0% n=9
	PASS (60 and above)	88.1% n=238	81.4% n=145	75.0% n=27

Results indicate the failure rate jumps from 12% for I-IIIA's to 19% for IIIB's and 25% for IV's. Conversely, the pass rate of 88% for I-IIIA's is greater than that for either IIIB's, at 81%, or IV's, at 75%. In other words, data regarding passes and failures indicate that 75B's at SL 3 consistently perform better at higher mental categories.

(d). A simple frequency distribution was run to determine the breakdown of soldiers by AFQT mental categories in our sample. Results indicated the following:

SAMPLE PERCENTAGES BY AFQT MENTAL CATEGORY		
I-III A	IIIB	IV
55.8%	36.8%	7.4%
<u>n=270</u>	<u>n=178</u>	<u>n=36</u>

These percentages provide an approximate estimate of the present mental category breakdown for 75B's at SL 3.

(e) In order to determine future 75B accession requirements, the following steps were taken [NOTE: These steps are outlined in Appendix G of the Distribution of Quality Program Handbook]:

(1). A frequency distribution was made of Clerical scores. Clerical results were used because a minimum Clerical score is required for entry into the MOS.

(2). The frequency distribution of Clerical scores was converted to an approximate mental category distribution using tables and procedures outlined in the Distribution of Quality Program Handbook. [NOTE: The frequencies of soldiers which fell within each 5-point Clerical score category were multiplied by separate factors for each mental category which converted Clerical results into an estimated frequency distribution of soldiers by mental category. Please refer to Appendix G of the Distribution of Quality Program Handbook for further clarification and examples of this procedure.]

(3). Percentages for each mental category were determined by dividing the frequencies of sums for each category by the overall total for all categories. (Percentages were 77.2 for category I-III A; 21.2 for IIIB; and 1.6 for IV.)

(4). Each mental category percentage was divided by a factor which controls for historical continuation/survival rates:

I-III A:	77/.1050 =	727.79
IIIB :	21/.1543 =	136.10
IV :	2/.1789 =	11.18
Total =		<u>875.07</u>

(5). Final future accession rates were determined by dividing each of these results by the total:

I-III A:	727.79/875.07 =	83.2%
IIIB:	136.10/875.07 =	15.6%
IV:	11.18/875.07 =	1.2%

#### e. Conclusions and recommendations

(1). In conclusion, this study found that:

(a). Field Artillery and Armed Forces Qualification Test results did the best job, in that order, of predicting soldier performance on the 75B SL 3 SQT.

(b). Overall results suggest 75Bs in higher mental categories tend to score higher on the SQT than those in lower mental categories.

(c). Approximately 55.8 per cent of 75Bs presently are in mental categories I-III A; 36.8 per cent are from IIIB; and 7.4 per cent are from IV.

(d). According to statistical analysis results, 83.2 per cent of future 75Bs should come from mental category I-III A; 15.6 per cent should come from IIIB; and 1.2 per cent should come from IV.

(e). RECOMMEND the use of the following multiple regression equation which uses Field Artillery and Armed Forces Qualification Test results to predict success of future 75B recruits on the SQT:

$$(.1585) \times (FA) + (.1254) \times (AFQT) + 52.95 = \text{Predicted SQT Score}$$

#### EXAMPLE:

$$(.1585) \times (85) + (.1254) \times (80) + 52.95 = 76.46$$

Any score which falls within 13 points of the SQT cutoff (60) indicates a high-risk individual. For example, a recruit who scores 85 on FA and 80 on the AFQT obtains a predicted SQT score of 76.46--which is not within 13 points of the cutoff (60); therefore, this soldier is not high risk for failure on the 75B SQT. Please note: High-risk individuals who are motivated and interested in a 75B career might try hard and be fully successful on the SQT; nevertheless, in the long run more high-

risk soldiers will have trouble with SQTs than nonhigh-risk individuals.

(9). RECOMMEND that further studies be conducted to determine the extent to which Clerical scores as presently configured should continue to be used as a standard for accession into the 75B MOS. This recommendation is based on the seemingly illogical finding that Field Artillery did a better job of predicting 75B SQTs than did Clerical scores. Part of the reason for this finding is that the Aptitude Area Composite score for Field Artillery includes two of the three subtest scores which are summed to derive Clerical results. Nevertheless, one would expect that Clerical scores should be the best predictor if it is to be used as a standard for accession into 75B. For this reason, studies should be conducted to determine whether and how the Clerical Aptitude Area score needs to be reconfigured so it will do a better job of predicting success on the 75B SQT.

(2). Changes in doctrine, training, technical ability, etc. which are expected to impact on the quality of soldiers needed five years from now include the completion of TACCS, which will require computer literacy of all 75Bs. Restructuring of personnel organizations may require an increase in flexibility and perhaps task realignment.

(3). Because of the above drivers, the quality accession 75B mix should be 83.2% for I-III A; 15.6% for IIIB; and 1.2% for IV. Any reduction from this standard will seriously degrade the 75B's ability to support the soldier and Commander on the battlefield.

DISTRIBUTION OF QUALITY (DQ) REPORT  
FOR 75C\*

## a. Summary

(1). The required recruit accession quality mix for MOS 75C should be 84.8% for mental categories I-III A; 14.0% for III B; and 1.2% for IV.

(2). Deviation in a negative direction from these standards will result in numerically fewer course graduates concurrent with a degradation in academic standards, impacting directly on the quality of Personnel Service Support.

## b. Target Skill Level

(1). Skill level (SL) 3 (E-6) was used. SL 3 was selected because this is the level of most section chiefs in this MOS throughout the Army. For this reason, performance of SL 3 soldiers is critical for mission success.

## c. Performance measure

(1). The Skill Qualification Test (SQT) was used to evaluate proficiency in the MOS. The selection of the SQT is based on the assumption that this measurement provides an acceptable estimate of performance of critical MOS tasks. Furthermore, the SQT was used because it provides a reliable, valid means of estimating the ability to perform critical tasks at SL 3.

## (2). Content Validity

Content validity is the extent to which a test measures job performance in the MOS. The SQT was systematically validated for content by the SQT Branch of DOTD using a series of rigorous checks and reviews outlined in TRADOC Regulation 351-2, Skill Qualification Test (SQT) and Common Task Test (CTT) Development, Policies, and Procedures. These procedures included a review of the SQT task list, peer/psychometric review of each task test, expert/membership board review, editorial review, untrained tryout, soldier tryout, setting task training standards, assigning final administration time limit, setting minimum passing score, and final review of camera ready materials.

## (2.). Reliability

An estimate of the internal reliability of the test is important to determine the extent to which the instrument is consistent (within itself) in measuring performance. The Coefficient Alpha procedure was used to estimate the reliability of the 75C SQT. Coefficient Alpha provides an estimate of the

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\*This report format follows the DQ Analysis Report format on page 12 of the Distribution of Quality Program Handbook, dated Jun 87, and published by SSC-NCR. POC for the empirical portions of this report is Dr. Phillip Vandivier, AV 699-3821.

extent to which all test items intercorrelate with one another. A coefficient of .7354 was obtained, which indicates the SL 3 75C SQT has a moderate, or acceptable amount of internal reliability.

#### d. Research Design and Implementation

##### (1). Test Administration and Data Collection Procedures

SQTs were administered IAW procedures outlined in TRADOC Reg 351-2. Also, the Armed Services Vocational Aptitude Battery (ASVAB) was administered upon soldier entry into the Army IAW routine procedures.

Data was extracted from official test results obtained from MILPERCEN with the help of the SSC-NCR Liaison. The entire population of 392 SL 3 75Cs was used; however, computation requirements necessitated the elimination of some records because of incomplete data.

(2). Data analyses were conducted with the use of the Statistical Package For the Social Sciences--Personal Computer Plus package. Results are as follows:

(a). A stepwise multiple regression procedure was conducted to determine what combination of ASVAB predictor variables [Armed Forces Qualification Test (AFQT), Clerical (CL), Army Combat (CO), Electronics (EL), Field Artillery (FA), General Maintenance (GM), Mechanical Maintenance (MM), Operators/Food (OF), Surveillance/Communications (SC) and Skilled Technical (ST) scores] did the best job of predicting SQT scores. Multiple regression is the preferred procedure used in the behavioral sciences when the object is to determine which of several combinations of predictors does the best job of predicting a single criterion; and to determine how much weight each predictor has in the prediction of the criterion. Multiple regression results indicated AFQT, FA, EL, AND GT together significantly ( $R = .429$ ;  $F = 12.89$ ;  $p < .01$ ) predicted SL 3 SQTs. A total of 18.4 per cent of the variance in 75C SQT scores was explained by these four variables in combination. AFQT results accounted for approximately 10.3 per cent of the variance in SQT scores ( $F = 26.60$ ;  $p < .001$ ); followed by FA ( $F = 9.865$ ;  $p < .01$ ), which accounted for an additional 3.7 per cent; followed by EL ( $F = 8.79$ ;  $p < .01$ ), which explained 2.8 per cent of the variability in SQT scores; followed by GT ( $F = 4.45$ ;  $p < .05$ ), which accounted for the final 1.6 per cent of the variance in SQTs. After these four no other variable or variables contributed significantly to the prediction of SQT.

Although statistically significant, the strength of the predictive relationship between AFQT, FA, EL, and GT, on the one hand, and SQT scores, on the other, can best be described as weak: Although 18.4 per cent of the variance in SQT scores was

explained, a total of 81.6 per cent of SQT variance remains unexplained by ASVAB scores.

Please note: Mild but statistically significant Pearson r correlations with SQTs were found for several other predictor variables, including ST ( $r=+.30$ ;  $p<.001$ ); SC ( $r=+.23$ ;  $p<.001$ ); GM ( $r=+.24$ ;  $p<.001$ ); and CL ( $r=+.23$ ;  $p<.001$ ). Nevertheless, none of these variables significantly added to the prediction of SQT scores above and beyond what was provided by AFQT, FA, EL, and GT. (Technically, none of these variables made significant contributions to the prediction of SQTs after AFQT, FA, EL, and GT scores were already entered into the regression equation.) AFQT, FA, EL, and GT scores had Pearson r correlations with SQTs of  $+.32$  ( $p<.001$ ),  $+.31$  ( $p<.001$ ),  $+.15$  ( $p>.05$ ), and  $+.32$  ( $p<.001$ ), respectively. SQTs, respectively.

(b). A t test was computed to determine whether significant differences exist between the SQT averages of soldiers in mental category I-III A (upper 50th percent) vs. IIIB-IV (10 to 49th percent) on Armed Forces Qualification Test results--which are calculated from ASVAB subtest results. The difference between the average of 79.77 for category I-III A soldiers and the mean of 74.65 for category IIIB-IV personnel is statistically significant ( $t=3.89$ ;  $p<.001$ ). Nevertheless, the difference of 5.12 between the two in practical terms is less than overwhelming. A followup Pearson r analysis indicated a mild but significant positive correlation between the two variables ( $r=.32$ ;  $p<.001$ ). These analyses provide convincing evidence that SQT results do tend to increase with mental category.

(c). A minimum passing SQT score of 60 was determined by subject matter experts at the school. Approximately 10% of the 75C sample failed to meet this performance standard.

Next, a frequency distribution was made of the percentages of 75Cs who passed and failed (using the minimum passing SQT score) across different mental categories. Results were as follows:

PERCENTAGE OF PASS/FAILS BY MENTAL CATEGORY

		M E N T A L C A T E G O R Y		
		I-III A	IIIB	IV
S Q T	FAIL (59 and below)	8.7% n=22	7.9% n=8	23.3% n=7
	PASS (60 and above)	91.3% n=230	92.1% n=93	76.7% n=23

Results indicate the failure rate jumped from 8-9% for I-IIIA and IIIBs to 23% for IVs. Conversely, the pass rate dropped from 91-92% for I-IIIA to 77% for IVs.

(d). A simple frequency distribution was run to determine the breakdown of soldiers by AFQT mental categories in our sample. Results indicated the following:

SAMPLE PERCENTAGES BY AFQT MENTAL CATEGORY		
I-IIIA	IIIB	IV
65.8%	26.4%	7.8%
n=252	n=101	n=30

These percentages provide an approximate estimate of the present mental category breakdown for 75Cs.

(e). In order to determine future 75C accession requirements, the following steps were taken [NOTE: These steps are outlined in Appendix G of the Distribution of Quality Program Handbook]:

(1). A frequency distribution was made of CL scores. CL results were used because a minimum CL score is required for entry into the MOS.

(2). The frequency distribution of CL scores was converted to an approximate mental category distribution using tables and procedures outlined in the Distribution of Quality Program Handbook. [NOTE: The frequencies of soldiers which fell within each 5-point CL score category were multiplied by separate factors for each mental category which converted CI results into an estimated frequency distribution of soldiers by mental category. Please refer to Appendix G of the Distribution of Quality Program Handbook for further clarification and examples of this procedure.]

(3). Percentages for each mental category were determined by dividing the frequencies of sums for each category by the overall total for all categories. (Percentages were 79.2 for category I-IIIA; 18.8 for IIIB; and 2.0 for IV.)

(4). Each mental category percentage was divided by a factor which controls for historical continuation/survival rates:

I-IIIA:	79/.1058 =	746.69
IIIB :	19/.1543 =	123.14
IV :	2/.1789 =	11.18
	Total =	<u>881.01</u>

(5). Final future accession rates were determined by dividing each of these results by the total:

I-IIIA: 746.69/881.01 = 84.8%  
 IIIB: 123.14/881.01 = 14.0%  
 IV: 11.18/881.01 = 1.2%

e. Conclusions and recommendations

(1). In conclusion, this study found that:

(a). Armed Forces Qualification Test scores, Field Artillery, Electronics, and General Technical scores do the best job, in that order, of predicting SL 3 75C SQTs.

(b). 75Cs in higher mental categories score somewhat higher on the SL 3 SQT than those in lower mental categories.

(c). Approximately 65.8 per cent of 75Cs presently are in mental categories I-IIIA; 26.4 per cent are from IIIB; and 7.8 per cent are from IV.

(d). According to statistical analysis results, 84.8 per cent of future 75Cs should come from mental category I-IIIA; 14.0 per cent should come from IIIB; and 1.2 per cent should come from IV.

(e). RECOMMEND the use of the following multiple regression equation which uses AFQT, FA, EL, and GT scores to predict success of future 75C recruits on the SQT:

$$(.1165) \times (\text{AFQT}) + (.2252) \times (\text{FA}) + (-.2035) \times \text{EL} + (.1683) \times \text{GT} + 48.61 = \text{Predicted SQT Score}$$

EXAMPLE:

$$(.1165) \times (80) + (.2252) \times (81) + (-.2035) \times 79 + (.1683) \times 75 + 48.61 = 72.72$$

Any predicted SQT score which falls within 11 points of the SQT cutoff (60) indicates a high-risk individual. For example, a recruit who scores 80, 81, 79, and 75 on the AFQT, FA, EL, and GT, respectively, obtains a predicted score of 72.72--which is not within 11 points of the cutoff; therefore, this soldier is not a high risk for failure on the SL 3 75C SQT. The high-risk individual who is motivated and interested in a 75C career might try hard and be fully successful on the SL 3 SQT; nevertheless, in the long run more high-risk soldiers will have trouble with SQTs than nonhigh-risk individuals.

(9). RECOMMEND that further studies be conducted to determine the extent to which Clerical scores as presently configured should continue to be used as a standard for accession into the 75C MOS. This recommendation is based on the finding that other Aptitude Areas--including FA, AFQT, and GT--did a better job of predicting SL 3 SQTs than did Clerical scores. Part of the reason for this finding is that the Aptitude Area Composite scores include overlapping ASVAB subtest scores. For example, both FA and AFQT include two of the three subtest scores which are summed to derive Clerical results. This fact largely explains the seemingly illogical finding that Field Artillery scores do a better job of predicting 75C SQTs than Clerical scores. Nevertheless, one would expect that Clerical

scores should be the best predictor if it is to be used as a standard for accession into 75C. For this reason, studies should be conducted to determine how the Clerical Aptitude Area score needs to be reconfigured so it will do a better job of predicting success on the 75C SQT.

(2). Changes in equipment, doctrine, training and organization during the next five years which will impact on soldier quality requirements for 75C include the completion of fielding of TACCS, which will require computer literacy of all 75Cs. Restructuring of personnel organizations may require an increase in flexibility and perhaps task realignment.

(3). Because of the above drivers, the quality accession SL3 75C should be 84.8% for mental categories I-IIIA; 14% for IIIB; and 1.2% for IV. Any reduction from this standard will seriously degrade the Adjutant General School's ability to provide soldiers capable of providing needed support to the troops and commander on the field.

DISTRIBUTION OF QUALITY (DQ) REPORT  
FOR 75C\*

## a. Summary

(1). The required recruit accession quality mix for MOS 75C should be 84.0% for mental categories I-III A; 14.0% for III B; and 1.2% for IV.

(2). Deviation in a negative direction from these standards will result in numerically fewer course graduates concurrent with a degradation in academic standards, impacting directly on the quality of Personnel Service Support.

## b. Target Skill Level

(1). Skill level (SL) 3 (E-6) was used. SL 3 was selected because this is the level of most section chiefs in this MOS throughout the Army. For this reason, performance of SL 3 soldiers is critical for mission success.

## c. Performance measure

(1). The Skill Qualification Test (SQT) was used to evaluate proficiency in the MOS. The selection of the SQT is based on the assumption that this measurement provides an acceptable estimate of performance of critical MOS tasks. Furthermore, the SQT was used because it provides a reliable, valid means of estimating the ability to perform critical tasks at SL 3.

## (2). Content Validity

Content validity is the extent to which a test measures job performance in the MOS. The SQT was systematically validated for content by the SQT Branch of DOTD using a series of rigorous checks and reviews outlined in TRADOC Regulation 351-2, Skill Qualification Test (SQT) and Common Task Test (CTT) Development, Policies, and Procedures. These procedures included a review of the SQT task list, peer/psychometric review of each task test, expert/murder board review, editorial review, untrained tryout, soldier tryout, setting task training standards, assigning final administration time limit, setting minimum passing score, and final review of camera ready materials.

## (2.). Reliability

An estimate of the internal reliability of the test is important to determine the extent to which the instrument is consistent (within itself) in measuring performance. The Coefficient Alpha procedure was used to estimate the reliability of the 75C SQT. Coefficient Alpha provides an estimate of the

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\*This report format follows the DQ Analysis Report format on page 12 of the Distribution of Quality Program Handbook, dated Jun 87, and published by SSC-NCR. POC for the empirical portions of this report is Dr. Phillip Vandivier, AV 699-3821.

extent to which all test items intercorrelate with one another. A coefficient of .7354 was obtained, which indicates the SL 3 75C SQT has a moderate, or acceptable amount of internal reliability.

#### d. Research Design and Implementation

##### (1). Test Administration and Data Collection Procedures

SQTs were administered IAW procedures outlined in TRADOC Reg 351-2. Also, the Armed Services Vocational Aptitude Battery (ASVAB) was administered upon soldier entry into the Army IAW routine procedures.

Data was extracted from official test results obtained from MILPERCEN with the help of the SSC-NCR Liaison. The entire population of 392 SL 3 75Cs was used; however, computation requirements necessitated the elimination of some records because of incomplete data.

(2). Data analyses were conducted with the use of the Statistical Package For the Social Sciences--Personal Computer Plus package. Results are as follows:

(a). A stepwise multiple regression procedure was conducted to determine what combination of ASVAB predictor variables [Armed Forces Qualification Test (AFQT), Clerical (CL), Army Combat (CO), Electronics (EL), Field Artillery (FA), General Maintenance (GM), Mechanical Maintenance (MM), Operators/Food (OF), Surveillance/Communications (SC), and Skilled Technical (ST) scores] did the best job of predicting SQT scores. Multiple regression is the preferred procedure used in the behavioral sciences when the object is to determine which of several combinations of predictors does the best job of predicting a single criterion; and to determine how much weight each predictor has in the prediction of the criterion. Multiple regression results indicated AFQT, FA, EL, AND GT together significantly ( $R^2$  = 18.4 per cent of the variance in 75C SQT scores was explained by these four variables in combination. AFQT results accounted for approximately 10.3 per cent of the variance in SQT scores ( $F=26.60$ ;  $p<.001$ ); followed by FA ( $F=9.865$ ;  $p<.01$ ), which accounted for an additional 3.7 per cent; followed by EL ( $F=8.79$ ;  $p<.01$ ), which explained 2.8 per cent of the variability in SQT scores; followed by GT ( $F=4.45$ ;  $p<.05$ ), which accounted for the final 1.6 per cent of the variance in SQTs. After these four no other variable or variables contributed significantly to the prediction of SQT.

Although statistically significant, the strength of the predictive relationship between AFQT, FA, EL, and GT, on the one hand, and SQT scores, on the other, can best be described as weak: Although 18.4 per cent of the variance in SQT scores was explained, a total of 81.6 per cent of SQT variance remains

unexplained by ASVAB scores.

Please note: Mild but statistically significant Pearson  $r$  correlations with SQTs were found for several other predictor variables, including ST ( $r=+.30$ ;  $p<.001$ ); SC ( $r=+.23$ ;  $p<.001$ ); GM ( $r=+.24$ ;  $p<.001$ ); and DL ( $r=+.23$ ;  $p<.001$ ). Nevertheless, none of these variables significantly added to the prediction of SQT scores above and beyond what was provided by AFQT, FA, EL, and GT. (Technically, none of these variables made significant contributions to the prediction of SQTs after AFQT, FA, EL, and GT scores were already entered into the regression equation.) AFQT, FA, EL, and GT scores had Pearson  $r$  correlations with SQTs of  $+0.32$  ( $p<.001$ ),  $+0.31$  ( $p<.001$ ),  $+0.15$  ( $p>.05$ ), and  $+0.32$  ( $p<.001$ ), respectively. SQTs, respectively.

(b). A  $t$  test was computed to determine whether significant differences exist between the SQT averages of soldiers in mental category I-III A (lower 50th percent) vs. IIIB-IV (10 to 49th percent) on Armed Forces Qualification Test results--which are calculated from AFQT subtest results. The difference between the average of 72.77 for category I-III A soldiers and the mean of 74.65 for category IIIB-IV personnel is statistically significant ( $t=3.89$ ;  $p<.001$ ). Nevertheless, the difference of 5.12 between the two in practical terms is less than overwhelming. A followup Pearson  $r$  analysis indicated a mild but significant positive correlation between the two variables ( $r=.32$ ;  $p<.001$ ). These analyses provide convincing evidence that SQT results do tend to increase with mental category.

(c). A minimum passing SQT score of 60 was determined by subject matter experts at the school. Approximately 10% of the 750 sample failed to meet this performance standard.

Next, a frequency distribution was made of the percentages of 750s who passed and failed (using the minimum passing SQT score) across different mental categories. Results were as follows:

PERCENTAGE OF PASS/FAILS BY MENTAL CATEGORY

		M E N T A L   C A T E G O R Y		
		I-III A	IIIB	IV
S Q T	FAIL			
	(59 and below)	8.7% n=22	7.9% n=8	23.3% n=7
S C O R E	PASS			
	(60 and above)	91.3% n=230	92.1% n=93	76.7% n=23

Results indicate the failure rate jumped from 8-9% for I-IIIA and IIIBs to 23% for IVs. Conversely, the pass rate dropped from 91-92% for I-IIIA to 77% for IVs.

(d). A simple frequency distribution was run to determine the breakdown of soldiers by AFQT mental categories in our sample. Results indicated the following:

SAMPLE PERCENTAGES BY AFQT MENTAL CATEGORY		
I-IIIA	IIIB	IV
45.8%	26.4%	7.8%
n=252	n=101	n=30

These percentages provide an approximate estimate of the present mental category breakdown for TSOs.

(e). In order to determine future TSO accession requirements, the following steps were taken (NOTE: These steps are outlined in Appendix 5 of the Distribution of Quality Program Handbook):

(1). A frequency distribution was made of CL scores. CL results were used because a minimum CL score is required for entry into the MOS.

(2). The frequency distribution of CL scores was converted to an approximate mental category distribution using tables and procedures outlined in the Distribution of Quality Program Handbook. (NOTE: The frequencies of soldiers which fell within each 5-point CL score category were multiplied by separate factors for each mental category which converted CL results into an estimated frequency distribution of soldiers by mental category. Please refer to Appendix 6 of the Distribution of Quality Program Handbook for further clarification and examples of this procedure.)

(3). Percentages for each mental category were determined by dividing the frequencies of sums for each category by the overall total for all categories. (Percentages were 79.2 for category I-IIIA; 18.8 for IIIB; and 2.0 for IV.)

(4). Each mental category percentage was divided by a factor which controls for historical continuation/survival rates:

I-IIIA:	79/.1058 =	746.69
IIIB :	19/.1543 =	123.14
IV :	2/.1789 =	11.18
	<u>          </u>	
Total	=	881.01

(5). Final future accession rates were determined by dividing each of these results by the total:

I-III A: 746.69/881.01 = 84.8%  
 III B: 123.14/881.01 = 14.0%  
 IV: 11.18/881.01 = 1.2%

e. Conclusions and recommendations

(1). In conclusion, this study found that:

(a). Armed Forces Qualification Test scores, Field Artillery, Electronics, and General Technical scores do the best job, in that order, of predicting SL 3 75C SQTs.

(b). 75Cs in higher mental categories score somewhat higher on the SL 3 SQT than those in lower mental categories.

(c). Approximately 85.8 per cent of 75Cs presently are in mental categories I-III A; 14.4 per cent are from III B; and 7.8 per cent are from IV.

(d). According to statistical analysis results, 84.8 per cent of future 75Cs should come from mental category I-III A; 14.0 per cent should come from III B; and 1.2 per cent should come from IV.

(e). RECOMMEND the use of the following multiple regression equation which uses AFQT, FA, EL, and GT scores to predict success of future 75C recruits on the SQT:

$$(.1165) \times (\text{AFQT}) + (.2252) \times (\text{FA}) + (-.2035) \times \text{EL} + (.1683) \times \text{GT} + 48.61 = \text{Predicted SQT Score}$$

EXAMPLE:

$$(.1165) \times (80) + (.2252) \times (81) + (-.2035) \times 79 + (.1683) \times 75 + 48.61 = 72.72$$

Any predicted SQT score which falls within 11 points of the SQT cutoff (60) indicates a high-risk individual. For example, a recruit who scores 80, 81, 79, and 75 on the AFQT, FA, EL, and GT, respectively, obtains a predicted score of 72.72--which is not within 11 points of the cutoff; therefore, this soldier is not a high risk for failure on the SL 3 75C SQT. The high-risk individual who is motivated and interested in a 75C career might try hard and be fully successful on the SL 3 SQT; nevertheless, in the long run more high-risk soldiers will have trouble with SQTs than nonhigh-risk individuals.

(9). RECOMMEND that further studies be conducted to determine the extent to which Clerical scores as presently configured should continue to be used as a standard for accession into the 75C MOS. This recommendation is based on the finding that other Aptitude Areas--including FA, AFQT, and GT--did a better job of predicting SL 3 SQTs than did Clerical scores. Part of the reason for this finding is that the Aptitude Area Composite scores include overlapping ASVAB subtest scores. For example, both FA and AFQT include two of the three subtest scores which are summed to derive Clerical results. This fact largely explains the seemingly illogical finding that Field Artillery scores do a better job of predicting 75C SQTs than Clerical scores. Nevertheless, one would expect that Clerical scores should be the best predictor if it is to be used as a

standard for accession into 75C. For this reason, studies should be conducted to determine how the Clerical Aptitude Area score needs to be reconfigured so it will do a better job of predicting success on the 75C GQT.

(2). Changes in equipment, doctrine, training and organization during the next five years which will impact on soldier quality requirements for 75C include the completion of fielding of TACCS, which will require computer literacy of all 75Cs. Restructuring of personnel organizations may require an increase in flexibility and perhaps task realignment.

(3). Because of the above drivers, the quality accession SL3 75C should be 84.8% for mental categories I-IIIA; 14% for IIIB; and 1.2% for IV. Any reduction from this standard will seriously degrade the Adjutant General School's ability to provide soldiers capable of providing needed support to the troops and commander on the field.

29 Sep 87

DISTRIBUTION OF QUALITY (DQ) REPORT  
FOR 75D\*

a. Summary

(1). The required recruit accession quality mix for 75D is 86.3% for I-IIIA, 12.4% for IIIB, and 1.3% for IV.

(2). Deviation in a negative direction from these standards will result in numerically fewer course graduates concurrent with a degradation in academic standards, impacting directly on the quality of Personnel Service Support.

b. Target Skill Level

(1). Skill level (SL) 3 (E-6) was used. SL 3 was selected because, as section chiefs, performance of 75Ds at this critical level determines success and failure of the MOS mission.

c. Performance measure

(1). The Skill Qualification Test (SQT) was used to evaluate proficiency in the MOS. The selection of the SQT is based on the assumption that this measurement provides an acceptable estimate of performance of critical MOS tasks. Furthermore, the SQT was used because it provides a reliable, valid means of estimating the ability to perform critical tasks at SL 3.

(2). Content Validity

Content validity is the extent to which a test measures job performance in the MOS. The SQT was systematically validated for content by the SQT Branch of DOTD using a series of rigorous checks and reviews outlined in TRADOC Regulation 351-2, Skill Qualification Test (SQT) and Common Task Test (CTT) Development, Policies, and Procedures. These procedures included a review of the SQT task list, peer/psychometric review of each task test, expert/murder board review, editorial review, untrained tryout, soldier tryout, setting task training standards, assigning final administration time limit, setting minimum passing score, and final review of camera ready materials.

(2.). Reliability

An estimate of the internal reliability of the test is important to determine the extent to which the instrument is consistent (within itself) in measuring performance. The Coefficient Alpha technique was used to estimate the reliability of the SL 3 75D SQT.

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POC for statistical/research portions of this report is Dr. Phillip Vandivier, AV 699-3821.

Coefficient Alpha provides an estimate of the extent to which all test items intercorrelate with one another. A coefficient of .31 was obtained, which indicates the 75D SL 3 SQT has a moderate amount of internal reliability.

#### d. Research Design and Implementation

##### (1). Test Administration and Data Collection Procedures

SQTs were administered IAW procedures outlined in TRADOC Reg 351-2. Also, the Armed Services Vocational Aptitude Battery (ASVAB) was administered upon soldier entry into the Army IAW routine procedures.

Data was extracted from official test results obtained from MILPERCEN with the help of the SSC-NCR Liaison. All 463 available cases (the entire population of SL 3 75Ds) were used for data analyses.

(2). Data analyses were conducted with the use of the Statistical Package For the Social Sciences--Personal Computer Plus package. Results are as follows:

(a). A stepwise multiple regression procedure was conducted to determine what combination of ASVAB Aptitude Areas [Armed Forces Qualification Test (AFQT), Clerical (CL), Combat (CO), Electronics Repair (EL), Field Artillery (FA), General Maintenance (GM), Mechanical Maintenance (MM), Operators/Food (OF), Surveillance/Communications (SC), and Skilled Technical (ST) scores] did the best job of predicting SQT scores. Multiple regression is the preferred procedure used in the behavioral sciences when the object is to determine which of several combinations of predictors does the best job of predicting a single criterion; and to determine how much weight each predictor has in the prediction of the criterion. Results indicated AFQT and FA together significantly predicted SL 3 75D SQTs ( $R=.356$ ;  $F=20.74$ ;  $p<.01$ ). A total of 12.7 per cent of the variance in SQT scores was explained by AFQT and FA. AFQT accounted for 10.5 per cent of the variance in SQT scores ( $F=33.68$ ;  $p<.001$ ), followed by FA ( $F=7.09$ ;  $p<.01$ ), which accounted for an additional increase of 2.2 per cent in the variance of SQTs. After these two no other variable or variables contributed significantly to the prediction of SQTs. (Technically, no other variable added anything unique to the prediction of SQTs after AFQT and FA were already in the regression equation.)

Although statistically significant, the magnitude or strength of the relationship between AFQT and FA, on the one hand, and SL 3 75D SQTs, on the other, could best be described as mild: AFQT and FA together explained 12.7 per cent of the variance in SQTs--but 87.3 per cent remains unexplained by ASVAB results.

Please note: Pearson  $r$  results indicated several other variables significantly predict SL 3 SQTs, including CL ( $r=+.27$ ;  $p<.001$ ),

ST ( $r=+.28$ ;  $p<.001$ ), and CO ( $r=+.18$ ;  $p<.01$ ), among others. However, none of these variables made significant, unique contributions to SQTs above and beyond what was accounted for by AFQT and FA.

(b). A t test was computed to determine whether significant differences exist between the SQT averages of soldiers in mental categories I-III A (upper 50th percent) vs. IIIB-IV (10 to 49th percent) on AFQT results--which are calculated from ASVAB subtest results. The difference of 4.75 points between the average of 82.10 for category I-III A soldiers and the mean of 77.35 for category IIIB personnel is statistically significant ( $t=3.76$ ;  $p<.001$ ). A followup Pearson r analysis indicated a mild but significant positive correlation between the two variables ( $r=+.33$ ;  $p<.001$ ). These analyses provide evidence that SQT results do tend to increase with mental category.

(c). A minimum passing SQT score of 60 was determined by subject matter experts at the school. Approximately 6% of the 75D sample failed to meet this performance standard.

Next, a frequency distribution was made of the percentages of 75Ds who passed and failed (using the minimum passing SQT score) across different mental categories. Results were as follows:

PERCENTAGE OF PASS/FAILS BY MENTAL CATEGORY

		M E N T A L C A T E G O R Y		
		I-III A	IIIB	IV
S Q T	FAIL (59 and below)	3.2% n=9	9.4% n=13	14.7% n=5
	PASS (60 and above)	96.8% n=268	90.6% n=126	85.3% n=29

Results indicate that the failure and pass rates increase and decrease, respectively, from I-IIIA's to IIIBs to IVs.

(d). A simple frequency distribution was run to determine the breakdown of soldiers by AFQT mental categories in our sample. Results indicated the following:

SAMPLE PERCENTAGES BY  
AFQT MENTAL CATEGORY

I-III A	IIIB	IV
61.6%	30.9%	7.6%
n=277	n=139	n=34

These percentages provide an approximate estimate of the present mental category breakdown for 75Ds at SL 3.

(a). In order to determine future 75D accession requirements, the following steps were taken [NOTE: These steps are outlined in Appendix G of the Distribution of Quality Program Handbook]:

(1). A frequency distribution was made of CL scores. CL results were used because a minimum CL score is required for entry into the MOS.

(2). The frequency distribution of CL scores was converted to an approximate mental category distribution using tables and procedures outlined in the Distribution of Quality Program Handbook. [NOTE: The frequencies of soldiers which fell within each 5-point CL score category were multiplied by separate factors for each mental category which converted CL results into an estimated frequency distribution of soldiers by mental category. Please refer to Appendix G of the Distribution of Quality Program Handbook for further clarification and examples of this procedure.]

(3). Percentages for each mental category were determined by dividing the frequencies of sums for each category by the overall total for all categories. (Percentages were 81.1 for category I-III A; 17.4 for IIIB; and 1.5 for IV.)

(4). Each mental category percentage was divided by a factor which controls for historical continuation/survival rates:

I-III A:	81/.1058 =	765.60
IIIB :	17/.1543 =	110.18
IV :	2/.1789 =	11.18

Total = 886.96

(5). Final future accession rates were determined by dividing each of these results by the total:

I-III A:	765.60/886.96 =	86.3%
IIIB:	110.18/886.96 =	12.4%
IV:	11.18/886.96 =	1.3%

e. Conclusions and recommendations

(1). In conclusion, this study found that:

(a). Armed Forces Qualifications Test results and Field Artillery scores did the best job, in that order, of predicting soldier performance on the 75D SL 3 SQT. No other variable

contributed to the prediction of SQTs above and beyond what was provided by these two variables.

(b). Overall results suggest 75Ds in higher mental categories tend to score higher on the SL 3 SQT than those in lower mental categories.

(c). Approximately 61.6 per cent of 75Ds presently are in mental categories I-III A; 30.9 per cent are from IIIB; and 7.6 per cent are from IV.

(d). According to statistical analysis results, 86.3 per cent of future 75Ds should come from mental category I-III A; 12.4 per cent should come from IIIB; and 1.3 per cent should come from IV.

(e). RECOMMEND the use of the following multiple regression equation which uses AFQT and FA results to predict success of future 75D recruits on the SL 3 SQT:

$$(.1731) \times (\text{AFQT}) + (.1102) \times (\text{FA}) + 60.25 = \text{Predicted SQT Score}$$

EXAMPLE:

$$(.1731) \times (85) + (.1102) \times (80) + 60.25 = 83.8$$

Any predicted SQT score which falls within 11 points of the SQT cutoff (60) indicates an individual with high risk for failure on the SL 3 75D SQT. For example, a recruit who scores 85 on the AFQT and 80 on FA obtains a predicted SL 3 SQT score of 83.8--which is not within 11 points of the cutoff (60); therefore, this soldier is not high risk for failure on the SL 3 75D SQT. Please note: High-risk individuals who are motivated and interested in a 75D career might try hard and be fully successful on the SQT; nevertheless, in the long run more high-risk soldiers will have trouble with SQTs than nonhigh-risk individuals.

(9). RECOMMEND that further studies be conducted to determine the extent to which CL scores as presently configured should continue to be used as a standard for accession into the 75D MOS. This recommendation is based on the finding that AFQT and FA results both did a better job of predicting SL 3 75D SQTs than did CL. Part of the reason for this finding--particularly in the case of FA--is that Aptitude Area Composite scores include overlapping ASVAB subtest scores. For example, FA includes two of the three subtest scores which are summed to derive CL results. This fact largely explains the seemingly illogical finding that FA does a better job of predicting SL 3 75D SQTs than CL scores. Nevertheless one would expect that CL scores should be the best predictor if it is to be used as a standard for accession into 75D. For this reason, studies should be conducted to determine whether and how the CL Aptitude Area score needs to be reconfigured so it will do a better job of predicting success on the SL 3 75D SQT.

(2). Changes in equipment, doctrine, training, and organization during the next five years which will impact of soldier quality requirements for 75D include the completion of fielding of TACCS, which will require computer literacy of all 75Ds. Restructuring of personnel organizations may require an

increase in flexibility and perhaps task realignment.

(3). Because of the above drivers, the quality accession mix for 75Ds cannot be less than 86.3% for I-III A; 12.4% for III B; and 1.3% for IV. Any reduction from this standard will seriously degrade the Adjutant General School's ability to provide soldiers capable of providing needed support to the troops and Commander on the battlefield.

DISTRIBUTION OF QUALITY (DQ) REPORT  
FOR 75E\*

## a. Summary

(1). The required recruit accession quality mix for MOS 75E should be 85.5% for mental categories I-IIIA; 13.7% for IIIB; and .6% for IV.

(2). Deviation in a negative direction from these standards will result in numerically fewer course graduates concurrent with a degradation in academic standards, impacting directly on the quality of Personnel Service Support.

## b. Target Skill Level

(1). Skill level (SL) 3 (E-6) was used. SL 3 was selected because this is the level of most section chiefs in this MOS throughout the Army. For this reason, performance of SL 3 soldiers is critical for mission success.

## c. Performance measure

(1). The Skill Qualification Test (SQT) was used to evaluate proficiency in the MOS. The selection of the SQT is based on the assumption that this measurement provides an acceptable estimate of performance of critical MOS tasks. Furthermore, the SQT was used because it provides a reliable, valid means of estimating the ability to perform critical tasks at SL 3.

## (2). Content Validity

Content validity is the extent to which a test measures job performance in the MOS. The SQT was systematically validated for content by the SQT Branch of DOTD using a series of rigorous checks and reviews outlined in TRADOC Regulation 351-2, Skill Qualification Test (SQT) and Common Task Test (CTT) Development, Policies, and Procedures. These procedures included a review of the SQT task list, peer/psychometric review of each task test, expert/murder board review, editorial review, untrained tryout, soldier tryout, setting task training standards, assigning final administration time limit, setting minimum passing score, and final review of camera ready materials.

## (2.). Reliability

An estimate of the internal reliability of the test is important to determine the extent to which the instrument is consistent (within itself) in measuring performance. The Coefficient Alpha procedure was used to estimate the reliability of the 75E SQT. Coefficient Alpha provides an estimate of the

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\*This report format follows the DQ Analysis Report format on page 12 of the Distribution of Quality Program Handbook, dated Jun 87, and published by SSC-NCR. POC for the empirical portions of this report is Dr. Phillip Vandivier, Analysis Division,

Directorate of Combat Developments, AV 699-3885.  
extent to which all test items intercorrelate with one another. A coefficient of .766 was obtained, which indicates the SL 3 75E SQT has a moderate, or acceptable amount of internal reliability.

d. Research Design and Implementation

(1). Test Administration and Data Collection Procedures

SQTs were administered IAW procedures outlined in TRADOC Reg 351-2. Also, the Armed Services Vocational Aptitude Battery (ASVAB) was administered upon soldier entry into the Army IAW routine procedures.

Data was extracted from official test results obtained from MILPERCEN with the help of the SSC-NCR Liaison. The entire population of 191 SL 3 75Es was used; however, computation requirements necessitated the elimination of some records because of incomplete data.

(2). Data analyses were conducted with the use of the Statistical Package For the Social Sciences--Personal Computer Plus package. Results are as follows:

(a). A stepwise multiple regression procedure was conducted to determine what combination of ASVAB predictor variables [Armed Forces Qualification Test (AFQT), Clerical (CL), Army Combat (CO), Electronics (EL), Field Artillery (FA), General Maintenance (GM), Mechanical Maintenance (MM), Operators/Food (OF), Surveillance/Communications (SC), and Skilled Technical (ST) scores] did the best job of predicting SQT scores. Multiple regression is the preferred procedure used in the behavioral sciences when the object is to determine which of several combinations of predictors does the best job of predicting a single criterion; and to determine how much weight each predictor has in the prediction of the criterion.

Multiple regression results indicated FA and AFQT together significantly ( $R=.5044$ ;  $F=20.47$ ;  $p<.01$ ) predicted SL 3 SQTs. A total of 25.4 per cent of the variance in 75E SQT scores was explained by these two variables in combination. FA results accounted for approximately 20.1 per cent of the variance in SQT scores ( $F=30.391$ ;  $p<.001$ ); followed by AFQT ( $F=8.637$ ;  $p<.01$ ), which accounted for an additional 5.4 per cent of SL 3 SQT variance. After FA and AFQT no other variable or variables contributed significantly to the prediction of SQT.

Although statistically significant, the strength of the predictive relationship between AFQT, FA, EL, and GT, on the one hand, and SQT scores, on the other, can best be described as weak: Although 25.4 per cent of the variance in SQT scores was explained, a total of 74.6 per cent of SQT variance remains unexplained by ASVAB scores.

Please note: Mild but statistically significant Pearson  $r$  correlations with SQTs ranging between +.31 and +.43 were found for ALL other predictor variables. (All were significant at the  $p < .001$  level.) Nevertheless, none of these variables significantly added to the prediction of SL 3 75E SQT scores above and beyond what was provided by FA and AFQT. (Technically, none of these variables made significant contributions to the prediction of SQTs after FA and AFQT scores were already entered into the regression equation.) FA and AFQT had Pearson  $r$  correlations with SQTs of +.45 ( $p < .001$ ) and +.43 ( $p < .001$ ), respectively. SL had a Pearson  $r$  of +.36 with SL 3 SQTs.

(b). A  $t$  test was computed to determine whether significant differences exist between the SL 3 SQT averages of soldiers in mental category I-III A (upper 50th percent) vs. IIIB-IV (10 to 49th percent) on Armed Forces Qualification Test results--which are calculated from ASVAB subtest results. The difference of 8.54 points between the average of 81.12 for category I-III A soldiers and the mean of 72.58 for category IIIB-IV personnel is statistically significant ( $t=4.46$ ;  $p < .001$ ). As indicated above, a Pearson  $r$  analysis indicated a mild but significant positive correlation between AFQTs and SL 3 75E SQTs ( $r=+.43$ ;  $p < .001$ ). These analyses provide convincing evidence that SQT results do tend to increase with mental category.

(c). A minimum passing SQT score of 60 was determined by subject matter experts at the school. Approximately 7% of the 75E sample failed to meet this performance standard.

Next, a frequency distribution was made of the percentages of 75Es who passed and failed (using the minimum passing SQT score) across different mental categories. Results were as follows:

PERCENTAGE OF PASS/FAILS BY MENTAL CATEGORY

		M E N T A L C A T E G O R Y		
		I-III A	IIIB	IV
S				
Q	FAIL			
T	(59 and below)	4.1% n=5	9.6% n=5	25.0% n=3
S				
C	PASS			
D	(60 and above)	95.9% n=117	90.4% n=47	75.0% n=9
E				
S				

Results indicate the failure rate jumped from 4% for I-IIIA to 10% and 25% for IIIBs and IVs, respectively. Conversely, the pass rate dropped from 96% for I-IIIA to 90% for IIIBs and 75% for

IVs. Clearly, this data provides evidence that SQT performance increases with mental categories.

(d). A simple frequency distribution was run to determine the breakdown of soldiers by AFQT mental categories in our sample. Results indicated the following:

SAMPLE PERCENTAGES BY AFQT MENTAL CATEGORY		
I-III A	II B	IV
65.6%	28.0%	6.5%
n=122	n=52	n=12

These percentages provide an approximate estimate of the present mental category breakdown for 7SEs.

(e). In order to determine future 7SE accession requirements, the following steps were taken [NOTE: These steps are outlined in Appendix G of the Distribution of Quality Program Handbook]:

(1). A frequency distribution was made of CL scores. CL results were used because a minimum CL score is required for entry into the MOS.

(2). The frequency distribution of CL scores was converted to an approximate mental category distribution using tables and procedures outlined in the Distribution of Quality Program Handbook. [NOTE: The frequencies of soldiers which fell within each 5-point CL score category were multiplied by separate factors for each mental category which converted CL results into an estimated frequency distribution of soldiers by mental category. Please refer to Appendix G of the Distribution of Quality Program Handbook for further clarification and examples of this procedure.]

(3). Percentages for each mental category were determined by dividing the frequencies of sums for each category by the overall total for all categories. (Percentages were 79.5 for category I-III A; 18.8 for II B; and 1.7 for IV.)

(4). Each mental category percentage was divided by a factor which controls for historical continuation/survival rates:

$$\begin{array}{l} \text{I-III A: } 80/.1058 = 756.14 \\ \text{II B : } 19/.1543 = 123.14 \\ \text{IV : } 1/.1789 = 5.59 \\ \hline \text{Total} = 884.87 \end{array}$$

(5). Final future accession rates were determined by dividing each of these results by the total:

I-III A:	756.14/884.87	= 85.5%
III B:	123.14/884.87	= 13.9%
IV:	5.59/884.87	= .6%

e. Conclusions and recommendations

(1). In conclusion, this study found that:

(a). Field Artillery and Armed Forces Qualification Test scores do the best job, in that order, of predicting SL 3 75E SQTs.

(b). 75Es in higher mental categories score somewhat higher on the SL 3 SQT than those in lower mental categories.

(c). Approximately 65.6 per cent of 75Es presently are in mental categories I-III A; 28.0 per cent are from III B; and 6.5 per cent are from IV.

(d). According to statistical analysis results, 85.5 per cent of future 75Es should come from mental category I-III A; 13.9 per cent should come from III B; and .6 per cent should come from IV.

(e). RECOMMEND the use of the following multiple regression equation which uses FA and AFQT scores to predict success of future 75E recruits on the SQT:

$$(.2162) \times (FA) + (.1586) \times (AFQT) + 47.12 = \text{Predicted SQT Score}$$

EXAMPLE:

$$(.2162) \times (75) + (.1586) \times (72) + 47.12 = 74.75$$

Any predicted SQT score which falls within 11 points of the SQT cutoff (60) indicates a high-risk individual. For example, a recruit who scores 75 on the FA and 72 on the AFQT obtains a predicted score of 74.75--which is not within 11 points of the cutoff; therefore, this soldier is not a high risk for failure on the SL 3 75E SQT. The high-risk individual who is motivated and interested in a 75E career might try hard and be fully successful on the SL 3 75E SQT; nevertheless, in the long run more high-risk soldiers will have trouble with SQTs than nonhigh-risk individuals.

(9). RECOMMEND that further studies be conducted to determine the extent to which Clerical scores as presently configured should continue to be used as a standard for accession into the 75E MOS. This recommendation is based on the finding that other Aptitude Areas--including FA and AFQT--did a better job of predicting SL 3 75E SQTs than did Clerical scores. Part of the reason for this finding is that the Aptitude Area Composite scores include overlapping ASVAB subtest scores. For example, both FA and AFQT include two of the three subtest scores which are summed to derive Clerical results. This fact largely explains the seemingly illogical finding that Field Artillery scores do a better job of predicting 75E SQTs than Clerical scores. Nevertheless, one would expect that Clerical scores should be the best predictor if it is to be used as a standard for accession into 75E. For this reason, studies should be conducted to determine how the Clerical Aptitude Area score needs to be

reconfigured so it will do a better job of predicting success on the 75E SQT.

(2). Changes in equipment, doctrine, training, and organization during the next five years which will impact on soldier quality requirements for 75E include the completion of fielding of TACCS, which will require computer literacy of all 75Es. Restructuring of personnel organizations may require an increase in flexibility and perhaps task realignment.

(3). Because of the above drivers, the quality accession mix for 75Es cannot be less than 85.5% for mental categories I-III A; 13.9% for IIIB; and .6% for IV. Any reduction from this standard will seriously degrade the Adjutant General School's ability to provide soldiers capable of providing needed support to the troops and commander on the battlefield.

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DISTRIBUTION OF QUALITY (DQ) REPORT  
FOR 75F\*

a. Summary

(1). The required recruit accession quality mix for 75F is 90.0% for mental categories I-III A; 10.0% for IIIB; and 0.0% for IV.

(2). Deviation in a negative direction from these standards will result in numerically fewer course graduates concurrent with a degradation in academic standards, impacting directly on the quality of Personnel Service Support.

b. Target Skill Level

(1). Skill level (SL) 3 (E-6) was used. SL 3 was selected because, as the level of most 75F section chiefs, success or failure of the MOS mission depends on the performance of 75F E-6s.

c. Performance measure

(1). The Skill Qualification Test (SQT) was used to evaluate proficiency in the MOS. The selection of the SQT is based on the assumption that this measurement provides an acceptable estimate of performance of critical MOS tasks. Furthermore, the SQT was used because it provides a reliable, valid means of estimating the ability to perform critical tasks at SL 3.

(2). Content Validity

Content validity is the extent to which a test measures job performance in the MOS. The SQT was systematically validated for content by the SQT Branch of DOTD using a series of rigorous checks and reviews outlined in TRADOC Regulation 351-2, Skill Qualification Test (SQT) and Common Task Test (CTT) Development, Policies, and Procedures. These procedures included a review of the SQT task list, peer/psychometric review of each task test, expert/murder board review, editorial review, untrained tryout, soldier tryout, setting task training standards, assigning final administration time limit, setting minimum passing score, and final review of camera ready materials.

(2.). Reliability

An estimate of the internal reliability of the test is important to determine the extent to which the instrument is consistent (within itself) in measuring performance. The

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\*POC for the statistical/research portions of this report is Dr. Phillip Vandivier (AV 699-3821).

Coefficient Alpha procedure was used to estimate the reliability of the 75F SQT. Coefficient Alpha provides an estimate of the extent to which all test items intercorrelate with one another. A coefficient of .85 was obtained, which indicates the 75F SL 3 SQT has a moderate amount of internal reliability.

#### d. Research Design and Implementation

##### (1). Test Administration and Data Collection Procedures

SQTs were administered IAW procedures outlined in TRADOC Reg 351-2. Also, the Armed Services Vocational Aptitude Battery (ASVAB) was administered upon soldier entry into the Army IAW routine procedures.

Data was extracted from official test results obtained from MILPERCEN with the help of the SSC-NCR Liaison. Data analyses were conducted on the entire population of 138 SL 3 75Fs.

(2). Data analyses were conducted with the use of the Statistical Package for the Social Sciences--Personal Computer Plus package. Results are as follows:

(a). A stepwise multiple regression procedure was conducted to determine what combination of ASVAB Aptitude Areas (Armed Forces Qualification Test (AFQT), Clerical (CL), Combat (CO), Electronics Repair (EL), Field Artillery (FA), General Maintenance (GM), Mechanical Maintenance (MM), Operators/Food (OF), Surveillance/Communications (SC), and Skilled Technician (ST) scores) does the best job of predicting SQT scores. Multiple regression is the preferred procedure used in the behavioral sciences when the object is to determine which of several combinations of predictors does the best job of predicting a single criterion; and to determine how much weight each predictor has in the prediction of the criterion. Results indicated AFQT results significantly ( $r=+.27$ ;  $F=6.43$ ;  $p<.05$ ) predicted SQT. A total of 7.4 per cent of the variance in SQT scores was explained by AFQT results. No other variable or combination of variables made a significant, unique contribution to the prediction of SQTs above and beyond what was provided by AFQTs. (Technically, no other variable added anything unique to the prediction of SL 3 SQTs after AFQT was already in the regression equation.) For this reason, the multiple regression procedure was reduced to a simple Pearson  $r$  between AFQTs and SQTs.

Although statistically significant, the strength of the predictive relationship between AFQTs and SL 3 SQT scores can best be described as mild: Although 7.4 per cent of the variance in SQT scores was explained, a total of 92.6 per cent of SQT variance remains unexplained by ASVAB results.

Please note: No other Pearson  $r$  correlations between ASVAB predictors and SQTs were statistically significant at the  $p<.05$

level; therefore, no predictive relationship exists between the other ASVAB variables and SL 3 SQTs.

(b). A t test was computed to determine whether significant differences exist between the SQT averages of soldiers in mental category I-III A (upper 50th percent) vs. IIIB-IV (10 to 49th percent) on Armed Forces Qualification Test results--which are calculated from ASVAB subtest results. The difference between the average of 82.92 for category I-III A soldiers and the mean of 81.06 for category IIIB-IV personnel is not statistically significant ( $t=.77$ ;  $p>.05$ ). Therefore, these results do not support the contention that SQTs for 75Fs at SL 3 increase with mental category.

(c). A minimum passing SQT score of 60 was determined by subject matter experts at the school. Approximately 7% of the 75F sample failed to meet this performance standard.

Next, a frequency distribution was made of the percentages of 75Fs who passed and failed (using the minimum passing SQT score) across different mental categories. Results were as follows:

PERCENTAGE OF PASS/FAILS BY MENTAL CATEGORY

		M E N T A L   C A T E G O R Y		
		I-III A	IIIB	IV
S				
Q	FAIL			
T	(59 and below)	6.5% n=6	2.8% n=1	37.5% n=3
S				
C	PASS			
D	(60 and above)	93.5% n=86	97.2% n=35	62.5% n=5
E				
S				

Results need to be interpreted with caution due to the small number of cases (3) in mental category IV. With this fact in mind, results indicate that I-III A and IIIB soldiers fail less and succeed more on the SL 3 SQTs than their mental category IV counterparts. The overall pattern of higher mental category soldiers doing better than lower ones did not hold up in the comparison of I-III A vs. IIIB data: IIIB had a slight edge on I-IIIAs on both passes and failures.

(d). A simple frequency distribution was run to determine the breakdown of soldiers by AFQT mental categories in our sample. Results indicated the following:

SAMPLE PERCENTAGES BY  
AFQT MENTAL CATEGORY

I-III A	IIIB	IV
67.6%	26.5%	5.9%
n=92	n=36	n=8

These percentages provide an approximate estimate of the present mental category breakdown for 75Fs at SL 3.

(e). In order to determine future 75F accession requirements, the following steps were taken [NOTE: These steps are outlined in Appendix G of the Distribution of Quality Program Handbook]:

(1). A frequency distribution was made of Clerical scores. Clerical results were used because a minimum Clerical score is required for entry into the MOS.

(2). The frequency distribution of Clerical scores was converted to an approximate mental category distribution using tables and procedures outlined in the Distribution of Quality Program Handbook. [NOTE: The frequencies of soldiers which fell within each 5-point Clerical score category were multiplied by separate factors for each mental category which converted Clerical results into an estimated frequency distribution of soldiers by mental category. Please refer to Appendix G of the Distribution of Quality Program Handbook for further clarification and examples of this procedure.]

(3). Percentages for each mental category were determined by dividing the frequencies of sums for each category by the overall total for all categories. (Percentages were 85.7 for category I-III A; 14.3 for IIIB; and 0 for IV.)

(4). Each mental category percentage was divided by a factor which controls for historical continuation/survival rates:

I-III A:	86/.1058 = 812.85
IIIB :	14/.1543 = 90.73
IV :	0/.1789 = 0

Total = 903.58

(5). Final future accession rates were determined by dividing each of these results by the total:

I-III A:	812.85/903.58 = 90.0%
IIIB:	90.73/903.58 = 10.0%
IV:	0/903.58 = 0.0%

e. Conclusions and recommendations

(1). In conclusion, this study found that:

(a). Overall results showed a mild positive predictive relationship between Armed Forces Qualification Test results and

SL 3 SQTs. No other ASVAB variable significantly predicted SQTs. Subsequent analyses showed that 75Fs in mental categories I-III A and IIIB tend to do better on SQTs than those in IV; however, this pattern of higher mental category soldiers doing better on SQTs did not hold up for comparisons of I-IIIAs vs. IIIBs, or for I-IIIAs vs IIIB-IVs.

(b). Approximately 67.6 per cent of 75Fs presently are in mental categories I-III A; 26.5 per cent are from IIIB; and 5.9 per cent are from IV.

(c). According to statistical analysis results, 90.0 per cent of future 75Bs should come from mental category I-III A; 10.0 per cent should come from IIIB; and 0.0 per cent should come from IV.

(d). RECOMMEND the use of the following multiple regression equation which uses an Armed Forces Qualification Test results to predict success of future 75F recruits on the SQT:

$$(.1735) \times (\text{AFQT}) + (73.62) = \text{Predicted SQT Score}$$

EXAMPLE:

$$(.1735) \times (85) + (73.62) = 88.36$$

Any score which falls within 12 points of the SQT cutoff (60) indicates a high-risk individual. For example, a recruit who scores 85 on the AFQT obtains a predicted SQT score of 88.36-- which is not within 13 points of the cutoff (60); therefore, this soldier is not high risk for failure on the 75F SQT. Please note: High-risk individuals who are motivated and interested in a 75F career might try hard and be fully successful on the SQT; nevertheless, in the long run more high-risk soldiers will have trouble with SQTs than nonhigh-risk individuals.

(e). RECOMMEND that further studies be conducted to determine the extent to which Clerical scores as presently configured should continue to be used as a standard for accession into the 75F MOS. (Perhaps AFQT scores, which did significantly predict SQTs, should be used instead.) This recommendation is based on the finding that Clerical scores did not significantly predict SQT performance.

(2). Changes in doctrine, training, technical ability, etc. which are expected to impact on the quality of soldiers needed five years from now include the completion of fielding of TACCS, which will require computer literacy of all 75Fs. Restructuring of personnel organizations may require an increase in flexibility and perhaps task realignment.

(3). Because of the above drivers, the quality accession 75F mix should be 90.0 per cent for I-III A; 10.0 percent for IIIB; and 0.0 per cent for IV. Any reduction from this standard will seriously degrade the 75F's ability to support the soldier and Commander on the battlefield.