

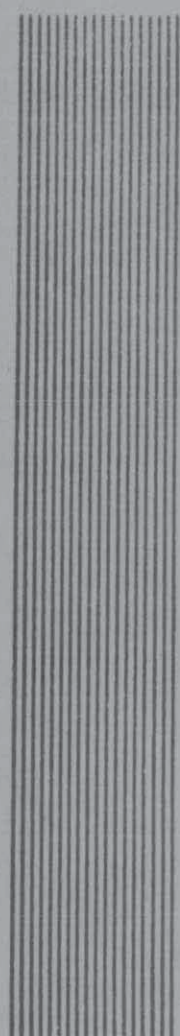
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**INFORMATION OBTAINED IN
TESTS OF A MEASURE OF WORK
AND RESPONSIBILITY IN THE
CANADIAN ARMED FORCES**

**BY
D.R. HANSEN**



ORAE REPORT NO. R58



**OPERATIONAL RESEARCH AND ANALYSIS ESTABLISHMENT
DEPARTMENT OF NATIONAL DEFENCE**

OTTAWA, CANADA

NOVEMBER 1975

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This report does not necessarily represent the views
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ABSTRACT

Time-Span of Discretion (TSD) proved to be a statistically valid indicator of military work-level and could be measured in most work-roles. Where measurement was not possible, problems of organization or management were found. The TSD data provided information about the forces. The present rank structure has more levels than can be used effectively by any of the three service elements. Some ranks are equivalent in name only, in the three. Because of environmentally dictated organizational differences, a common rank structure in the forces cannot be optimum for each environment. Individuals reach conclusions about fair-pay for military work differently than for civilian work. Consequently, it is not valid to treat military personnel simply as civilians in uniform for pay considerations. Morale suffers when rank and pay structures do not match, or when service personnel must fill positions established at higher rank than their own.

RESUME

La période d'autonomie de responsabilité s'est avérée un indicateur valable du niveau de travail des militaires et il semble possible de l'évaluer pour la majorité des fonctions. Là où une estimation s'est avérée impossible, des problèmes d'organisation et de gestion étaient évidents. Les données de la période d'autonomie fournissent des indications sur les forces armées; la structure actuelle des grades a plus de niveaux qu'il n'en est nécessaire au fonctionnement efficace de chacune des 3 unités de service, où certains grades ne sont équivalents que par le nom. A cause des différences dans les organisations résultant des besoins propres de chaque unité, une structure de grades commune aux trois unités des forces armées ne peut être la solution optimale pour chaque milieu. Certains tirent des conclusions différentes en ce qui a trait à une rémunération équitable pour le travail des militaires et des non militaires. Par conséquent, il ne serait pas valable, pour les besoins de rémunération, de considérer le personnel militaire comme des civils en uniforme. Le moral est affecté lorsque les structures de grades et de rémunération ne correspondent pas, ou lorsque le personnel en service doit occuper des postes établis à un niveau plus élevé que le leur.

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INFORMATION OBTAINED IN TESTS OF A MEASURE OF
WORK AND RESPONSIBILITY IN THE CANADIAN ARMED FORCES

PART 1

INTRODUCTION

1. In organizations of paid staff, knowledge of the level of each employee's work is needed to help set pay levels. It is useful, too, in deciding how to organize and who to promote.
2. The head of a small organization can know and assess the work of each employee. This is not possible in large organizations. In them, some measure of work-level is required, not only to help set pay rates, but to provide the information needed to select those who should be advanced, and to assure that the best organizational arrangement is used.
3. This requirement for work-level determination exists for military organizations as it does for non-military ones. Military pay levels need to be related to those in other sectors of the economy. New military specialties arise which must be fitted into the structure. Individuals are promoted and reorganizations take place which should be based on accurate information about the work being done, including its level.
4. Job-evaluation and job-matching methods have been used by the Canadian Forces to assess and to compare jobs. The results of their use have not always proven satisfactory to those affected. Furthermore, they are not applicable to the sort of military activities for which no civilian counterpart exists. Activities of this kind require a measure whose

application is independent of the nature of the work involved. Such a measure could permit military and civilian work to be directly compared for pay determination purposes. In addition, it could provide information to help decide on the form of organizational structure best suited to the activities involved.

5. Research conducted in Britain over 20 years ago by Dr. Elliott Jaques, a Canadian, revealed the existence of a quantitative measure of the type needed. He discovered that managers and subordinates alike assess level of work in terms of a single criterion. That criterion is time. Jaques gave the name Time-Span of Discretion (TSD) to the measure of work-level which is based on the criterion (Ref. 1). He devised techniques of TSD measurement and tested them.

6. A brief description of the TSD measure is given in Annex A. Its essentials can be understood by considering the case of a manager who must assign a long, important task to a new, untried subordinate. In this situation, the manager will monitor the work closely at first. If he finds it progressing well, his confidence in the subordinate's abilities will increase. This will lead him to review the work less often. The maximum length of time the superior permits the subordinate to work on a task, without review, is the TSD of the work. In the hypothetical example just described, TSD increased as the superior came to know the subordinate's level of ability. This is the usual case. Busy managers normally limit the frequency of reviews to the minimum they consider prudent. This sets some maximum limit to the length of time a subordinate will be permitted to work without task review. That, in turn, fixes the maximum level of the work in the role -- its TSD.

7. Further study by Jaques revealed the existence of a close statistical relationship between TSD and the level of pay which employees, in confidence, said was fair for their work. He

called this the Felt-Fair Pay level (FFP). These findings led him to formulate a theory of work and payment which he published in 1961, in a book entitled "Equitable Payment -- A General Theory of Work, Differential Payment and Individual Progress" (Ref. 2). Since then, Jaques has refined the techniques of TSD measurement. They are described in his 'Time-Span Handbook' (Ref. 3).

8. Several researchers on this continent have investigated time-span methods. Atchison (Ref. 4) applied them to the occupational roles of engineers, scientists and mathematicians employed in three establishments of the United States Navy. He found a high correlation between the level of pay workers said was fair for their work and the level of that work measured in TSD units. Richardson tested the measure with a group of "middle-managers" in engineering, factory production, and administration in the Honeywell Company in Minneapolis. His results provide strong support for the validity of TSD as a measure of work-level that reflects the level of pay workers say is fair for their work (Ref. 5). Time-span methods have been investigated by Crossman and his associates at the University of California, Berkeley. A member of that group, Laner, using a modified form of TSD, has published additional evidence to confirm that managers and subordinates alike sense level of work in terms of the parameter time (Ref. 6).

9. One objective of Richardson's study was to see if the relationship between TSD and FFP which had been reported by Jaques was genuine, or an "elegant artifact", and if genuine, to try to discover why the relationship existed and to explain it. He examined these two parameters together with sixteen other variables, including factors of the type used in job-evaluation schemes (know-how required; problem-solving-ability needed; freedom-to-act; etc.) He concluded that FFP and TSD were directly and linearly related, and that no other or

intervening variable served to explain that relationship.

10. A consideration of the foregoing factors suggested that time-span methods might provide a common method of work-level measurement which could be used in both the military and civilian sectors. The relationship between TSD and FFP was viewed as an interesting one which, if it held for military settings, might provide a way to relate military and civilian work for pay comparison purposes. This led the Defence Research Board, with the concurrence of Canadian Military Headquarters, to undertake the study this report describes. Its purpose was to test the potential applicability of time-span methods for use in the armed forces.

11. The worth of a new measure is tested by using it and assessing the apparent validity of the measured results. If they appear credible, the measure may prove to be a valuable one. If it provides a degree of precision not formerly available, then new information may be gained about whatever is being measured. In that case, interest may shift from the characteristics of the measure being tested to the new information it supplies about the measured parameter. Such a shift occurred during this study. It was started to test TSD. As the study progressed, confidence grew in the validity of TSD as a measure of military work. With that growth came a shift of interest to the information given by the measure about such things as rank and organizational structure, pay field arrangements and promotion practices. This report includes some of that information.

PART 2

OBJECTIVES

12. Four main objectives were set at the beginning of the study. They were:

a. TO SEE IF THE TECHNIQUES OF TSD MEASUREMENT CAN BE USED FOR MILITARY WORK AND RESPONSIBILITY.

These techniques were developed and tested in civilian settings. It was not clear that they would function in a military organization: there was reason to believe they might not. Jaques has stated that TSD measurement is possible only in situations where a manager is authorized to select and to 'deselect' his subordinates. In the armed forces, subordinate personnel are not normally selected by the person to whom they report -- they are 'posted' in. Deselection is possible only in extreme cases. It was necessary to see if this might invalidate the use of time-span methods in military organizations. In addition, differences in the requirements and modes of operation in the different service environments (sea, land and air) have led to the development of different management styles in the three service elements. It seemed desirable to see how these differences might affect TSD measurement.

b. TO LEARN IF TSD REFLECTS A SENSE OF MILITARY WORK-LEVEL. In civilian organizations, TSD has been found to reflect a sense of work-level. It was necessary to see if it was an equally effective mirror of military work.

- c. TO LEARN IF TSD REFLECTS A SENSE OF FAIR-PAY FOR MILITARY WORK. To serve as a comparator of military and civilian work for pay determination purposes, TSD needed to satisfy this requirement.
- d. TO SEEK EVIDENCE OF THE UNIVERSALITY CLAIMED FOR TSD. Its advocates claim that TSD is used by everyone, although they are not conscious that they use it (Ref. 7). The evidence of civilian studies supports this claim. No tests of TSD were known to have been conducted in a military organization. Consequently, the study provided an opportunity to obtain new information to either support or counter the claim of universality.

13. The pursuit of the objectives just outlined was undertaken through procedures designed to test the following hypotheses:

- a. Hypothesis 1. The level of work performed by service personnel in the Canadian Forces can be measured in TSD units.
- b. Hypothesis 2. The TSD of that work will tend to increase with increasing military rank.
- c. Hypothesis 3. Service personnel can state a figure of FFP for their work.
- d. Hypothesis 4. FFP correlates positively with TSD.

During the course of the investigation, Hypothesis 2 was extended to relate TSD and other indicators of work-level.

PART 3

PROCEDURE

14. Data for the study were collected through confidential interviews with individuals and their managers. Care was taken to make the interviews non-threatening by assuring those interviewed that the study was for research purposes only and that the data obtained would be handled in such a way as to protect their identity. In addition, each was informed that he could feel free either to decline to be interviewed, or to withdraw from the interview after it was underway (only three persons either declined or withdrew).

15. Whenever practicable, random selection was used to identify work-roles to be included in the study. When this could not be done, care was taken to ensure that the roles selected were typical of those at the Base or Unit. Once a work-role was chosen, chain of command was usually followed to find others of higher rank, and of lower. No role was used in the study unless the occupant of that role had worked in it, under his present manager, for at least three months.

16. The first portion of each interview was designed to direct the discussion to a consideration of the specific tasks which had to be completed to do the job properly. Time-span measurement requires managers and subordinates alike to think of the subordinate's work in terms of tasks, rather than in the more general terms of the responsibilities which the work entails.

17. The required information about the subordinate's work was obtained separately from managers and their subordinates. This procedure provided two TSD figures for each work-role. The

first was measured in the conventional manner. The second was based on information supplied by the subordinate alone.

18. Data were collected in each of three service environments. The first work-roles studied were at an Air Support Base, the next at a Land Base. Finally, the study was extended to include work-roles on two ships and a submarine, and at a training and technical support facility (Annex B).

19. The measurement of TSD was made in units of hours, days, weeks, and months, as appropriate. For ease of comparison all measurements have been converted to hours, based on an assumed 40-hour week and 4-week month. These assumptions may have produced some error in the resulting hour values, since the nominal work-week was not the same for all: it was 37 1/2 hours for some, 42 hours for others. (The actual number of hours worked was often much greater than this, especially during special activities, exercises, or while at sea.) The extent of error which may have resulted from the use of the conversion figures noted is uncertain, as the sensitivity of the work-week variable is not known to have been determined. It is not thought to be appreciable, however.

20. A total of 88 trades have been defined in the Canadian Forces. Each non-commissioned officer (NCO) and private is in one of these trades. They are grouped for pay purposes into three groups or 'fields' designated Pay Fields A, B & C. All trades in the same Pay Field have the same pay range. Beginning with data collection for land-force personnel, each individual's trade was recorded to enable the relationship between Pay Field and TSD, and Pay Field and FFP to be examined.

21. Statistical ranking methods were used in the study. In analysis using such methods, the median is usually a more convenient and meaningful measure than the mean. For that

reason, most tabular data in this report are listed in terms of median values. Whenever possible, however, both means and medians are given as this provides some information about the distribution of data values.

PART 4

RESULTS AND DISCUSSION

GENERAL

22. It was not clear, at the outset, to what extent TSD might be influenced by On-the-Job Training (OJT) practices or Management-by-Objective (MBO) procedures used in the Canadian Forces. Neither was found to limit TSD. Managers were not held responsible for their subordinate's progress in OJT; consequently it did not constitute a task to be considered in TSD measurement. The monthly MBO reports served to document progress, they did not constitute a review of each task. As a result, they did not restrict all TSDs to one month, as might otherwise have been the case.

23. Jaques and others have reported that civilian managers and subordinates alike usually think of a job in terms of the responsibilities involved. As a consequence, they sometimes find it difficult to describe their work in terms of the specific tasks which must be accomplished to satisfy those responsibilities. The study found that military personnel can have this same difficulty. Those in the combat battalion seemed to find it easiest to discuss their work in terms of tasks, possibly because their activities tend to be task-oriented.

24. The TSD data obtained show a preponderance of median TSDs which are even multiples of days, weeks and months. This is understandable. TSD is a measure of time -- the longest period of time a manager will allow the subordinate, in the work-role being considered, to exercise discretion in the pursuit of a task without review. In planning such reviews, managers are unlikely to select intervals which are fractional integers of time. Instead, they may usually be expected to choose whole numbers of days, weeks or months. The data show this to have occurred.

TIME-SPAN OF DISCRETION

25. The TSD of one work-role at the air support base could not be determined; it could be measured in all other roles, including that of a Padre. The role whose TSD could not be found was in a sub-unit which was in the process of re-organizing. The role was occupied by a non-commissioned officer. A statement existed of the responsibilities of the position, but no work appeared to have been assigned, yet. Inability to get a TSD reading in this case may be considered a point in favor of the method. It demonstrates that the technique will detect work-roles which are really non-existent, even though they may appear on an organization chart.

26. It proved more difficult to measure the TSD of some of the work-roles on the ships and submarines than any others encountered thus far. This led the interviewers to reject 15% of these measurements as unreliable. The statistics presented in this report which relate to these naval units are based on 102 measurements for which the application of the conventional measuring procedures was straightforward.

TIME-SPAN OF DISCRETION AND MILITARY RANK

I. AIR SUPPORT UNIT

27. Listed in Table I, for the ranks Private through Major, are the mean and median TSD values, and sample size on which they are based for 134 work-roles at an air support unit.

TABLE I

Mean and Median TSD by Military Rank
for Work-Roles at an Air Support Base

| <u>Rank</u> | <u>Sample Size</u> | <u>Hours</u> | |
|------------------------|--------------------|-----------------|-------------------|
| | | <u>Mean TSD</u> | <u>Median TSD</u> |
| Major | (5) | 496.0 | 480 |
| Captain | (15) | 266.7 | 240 |
| Lieutenant | (6) | 250.0 | 240 |
| Chief Warrant Officer | (5) | 168.0 | 160 |
| Master Warrant Officer | (4) | 130.0 | 140 |
| Warrant Officer | (15) | 171.5 | 160 |
| Sergeant | (26) | 107.8 | 80 |
| Master Corporal | (11) | 33.0 | 40 |
| Corporal | (36) | 20.4 | 18 |
| Private | (10) | 8.1 | 7 |

TSD can be seen to increase progressively with increasing military rank, except for (a) Lieutenant and Captain and (b) the three ranks of warrant officers. The existence of rank dependent differences of TSD was confirmed using the Kruskal-Wallis One-Way Analysis of Variance. This showed these differences to be of high statistical significance - better than 0.001. The level of statistical association of TSD and military rank was measured using Index of Order of Association (Ref. 8).

Its value proved to be +0.86, which indicates a very high level of positive association between these two parameters. The results of these tests confirmed the statistical validity of the progression of TSD with military rank which the table shows.

28. The data for Lieutenants and Captains were tested separately, as was that for the three warrant officer ranks. No significant differences were detected between Lieutenants and Captains in the TSD of their work. Similarly, no differences attributable to military rank were found in the TSD of the work performed by Warrant Officer (WO), Master Warrant Officer (MWO) and Chief Warrant Officer (CWO) ranks. Subsequent discussion with officers at military headquarters showed that this confirmed opinions held there about the work done within each of these groups of ranks. Lieutenant and Captain were already treated as equivalent in the assignment of numbers of personnel to Bases. At the time of unification of the forces in 1967, consideration had been given to the use of rank structure for warrant officers which contained no more than two levels.

29. The lack of TSD differences just noted suggested that the rank structure contained more levels than were needed. Figure 1 provides other evidence of this. It gives the range of TSD values for each rank, marked to show one-standard-deviation centred on the mean. The overlap of TSD for the warrant officer series on the one hand and the two lower officer ranks on the other can be clearly seen.

30. Another possible indicator of excessive rank levels was thought to be the frequency with which ranks were 'skipped', i.e. how often chain-of-command failed to include each consecutive level in the rank structure. This was checked for the NCO ranks by counting the number of levels which separated each subordinate from the NCO who was his manager. The results are listed in Table II for 72 NCOs and Privates. (A level separation of

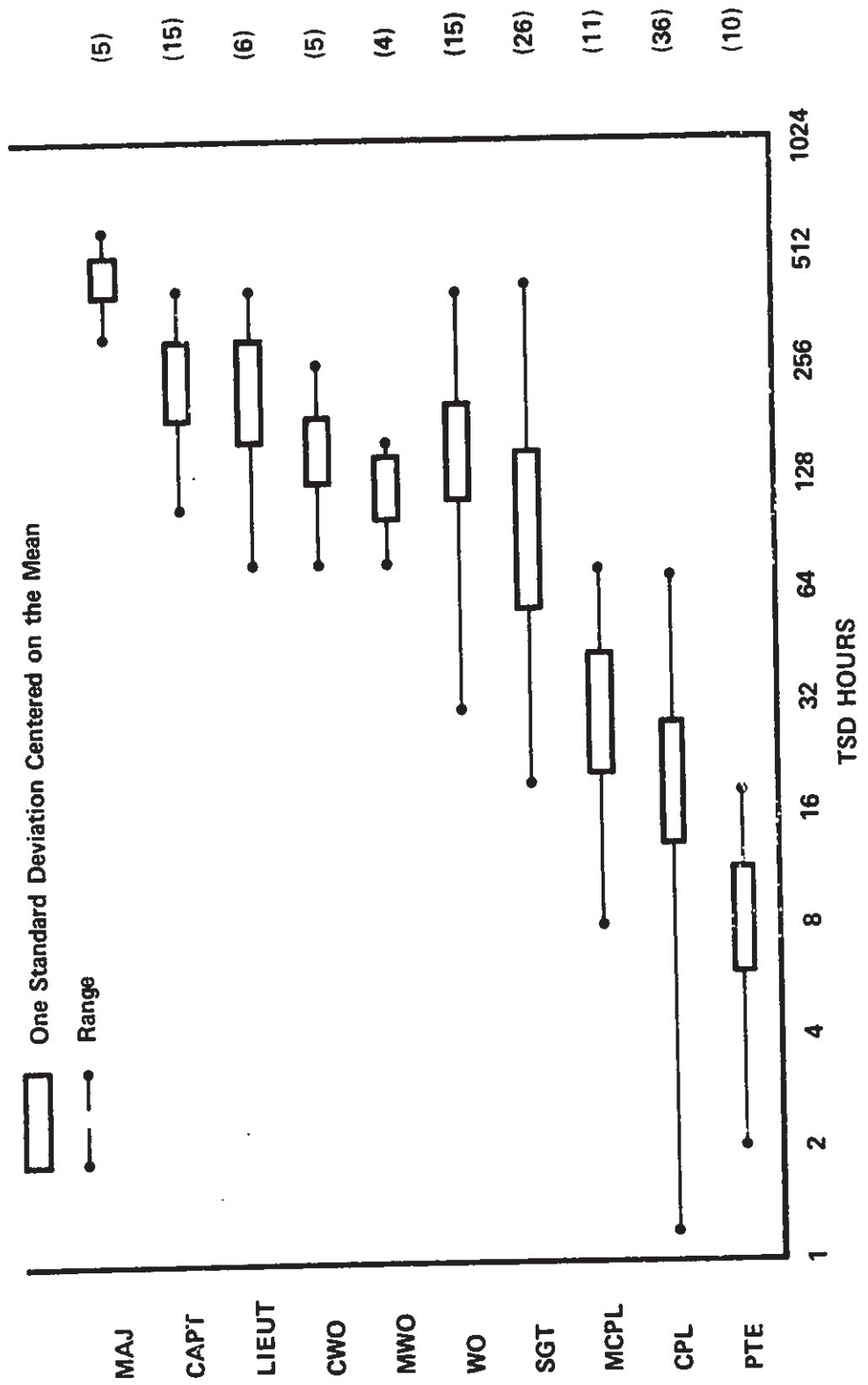


FIGURE 1 - Range of TSD Data for Each Rank - Air Support Unit - 1972

zero (0) indicates that manager and subordinate hold the same rank -- the separation is one (1) if they are in contiguous ranks.)

TABLE II

Rank Levels Separating 72 NCOs and Privates
in Air Support From The NCOs Who Manage Them.

| | | | | | |
|-----------------------|---|----|----|----|---|
| Number of Levels | 0 | 1 | 2 | 3 | 4 |
| Number of Occurrences | 1 | 29 | 29 | 13 | 0 |

Managers and their subordinates can be seen to be separated by more than a single rank in 58% of these cases. This supplies additional evidence of an excessive number of rank levels.

31. The apparent coalescence of ranks suggests the effective existence of an informally revised structure of the type needed to match the requirement. The data were examined in terms of such a structure. Table III shows the mean and median values of TSD which result when Lieutenants and Captains are treated as a single rank, and all Warrant, Master Warrant and Chief Warrant Officers as another.

TABLE III

Mean and Median TSDs for the Coalesced Rank Structure

| <u>Rank</u> | <u>Sample Size</u> | <u>Mean</u> | <u>Median (hours)</u> |
|------------------------|--------------------|-------------|-----------------------|
| Major | (5) | 496.0 | 480 |
| Lieutenant/Captain | (22) | 250.4 | 240 |
| Warrant Officers (all) | (24) | 163.8 | 160 |
| Sergeant | (26) | 107.8 | 80 |
| Master Corporal | (11) | 33.0 | 40 |
| Corporal | (36) | 20.4 | 18 |
| Private | (10) | 8.1 | 7 |

32. From Lieutenant/Captain level to that of Major, the median value of TSD increases by a factor of two. That same ratio is maintained for non-commissioned officers of Master Corporal (MCPL) rank and above. Below MCPL, the ratio increases somewhat. The degree of order in the progression of median values with rank is quite startling, as is the frequency with which they constitute single or multiple integers of weeks or months. An explanation of the latter effect was given in paragraph 24. The cause of the former is thought to be the influence of the MBO procedures used at the Base. Together, these effects support the conclusion that the relationship between TSD and military rank is both genuine and significant.

II. LANDBASE

33. Data comparable to those in Table I are presented in Table IV for 121 work-roles at a Land Base. Of this total, 101 roles were in a combat battalion, the rest were in a number of support units (Construction, Supply, Signals and Helicopter Support).

TABLE IV

Mean and Median TSD by Military Rank for
Land Based Roles

| <u>Rank</u> | <u>Sample Size</u> | <u>Mean TSD</u> | <u>Median TSD</u> |
|------------------------|--------------------|-----------------|-------------------|
| Major | (4) | 720 hours | 760 hours |
| Captain | (9) | 333 | 320 |
| Lieutenant | (4) | 220 | 220 |
| Chief Warrant Officer | (3) | 426.7 | 480 |
| Master Warrant Officer | (3) | 186.7 | 160 |
| Warrant Officer | (9) | 166.7 | 160 |
| Sergeant | (13) | 116.9 | 120 |
| Master Corporal | (19) | 72.4 | 40 |
| Corporal | (50) | 40.1 | 40 |
| Private | (7) | 22.4 | 8 |

Mean TSD can be seen to increase with increasing rank, both for commissioned officers and for NCOs and Privates. The same holds true for the median, except for the ranks of Warrant Officer and Master Warrant Officer. Tests of the data for all ranks confirmed the existence of rank dependent differences which were highly significant -- better than 0.001. The Index of Order of Association of rank and TSD was +0.84. This confirms the validity of the progression of TSD with military rank which the table shows.

34. The rank structure used when these data were obtained treated Lieutenant and Captain as interchangeable. Paragraph 28 noted that data for the Air Support Base showed no significant differences between the two ranks in the TSD of their work. Table IV gives different results. Comparison, based either on the median or median values, shows the TSD of Captain to be about 1.5 times that of Lieutenant. This supports the officers of the regiment who claimed that separate and distinct roles continue to exist in combat battalions for these two ranks.

35. A notable feature of Table IV is the TSD for Chief Warrant Officer. Its value, considering either the median or mean, can be seen to lie between those for Captain and Major, and to be well above that for Master Warrant Officer, the next lower rank. This supports those in the land forces who contend that the rank of CWO, which represents the role of Unit or Regimental Sergeant-Major, carries a very high level of work and responsibility. (The two regiments and one support unit from which the CWO data were obtained each had a complement of only one CWO. This may give the resultant TSD figure, for that rank, more significance than might normally attach to a sample of three.)

36. No statistically significant differences were found between Warrant Officer and Master Warrant Officer in the TSD of their work. Here again, the sample size is only three (one-third the population of that rank in the battalion), so the result must be accepted with caution. However, it is reinforced by the similar result obtained at the air support unit.

37. The range of TSD values for each rank, marked to show one-standard-deviation centred on the mean, is pictured in Figure 2. For officers, the limits of the range can be seen to increase in a systematic way as rank increases, with negligible overlap between the one-standard-deviation portions (of contiguous ranks). For NCOs, the situation is rather different; the progression is less systematic and the overlap, in some cases, large.

38. Figure 2 suggests that Master Warrant Officers are not a separate rank in terms of work-level. Instead, as shown in Table V, they seem to be a select group of Warrant Officers.

TABLE V

Number of WO and MWO at Each TSD Level

Land Force Units

| <u>TSD hours</u> | <u>WO</u> | <u>MWO</u> |
|------------------|-----------|------------|
| 240 | 2 | 1 |
| 160 | 5 | 2 |
| 140 | 1 | |
| 80 | 1 | |

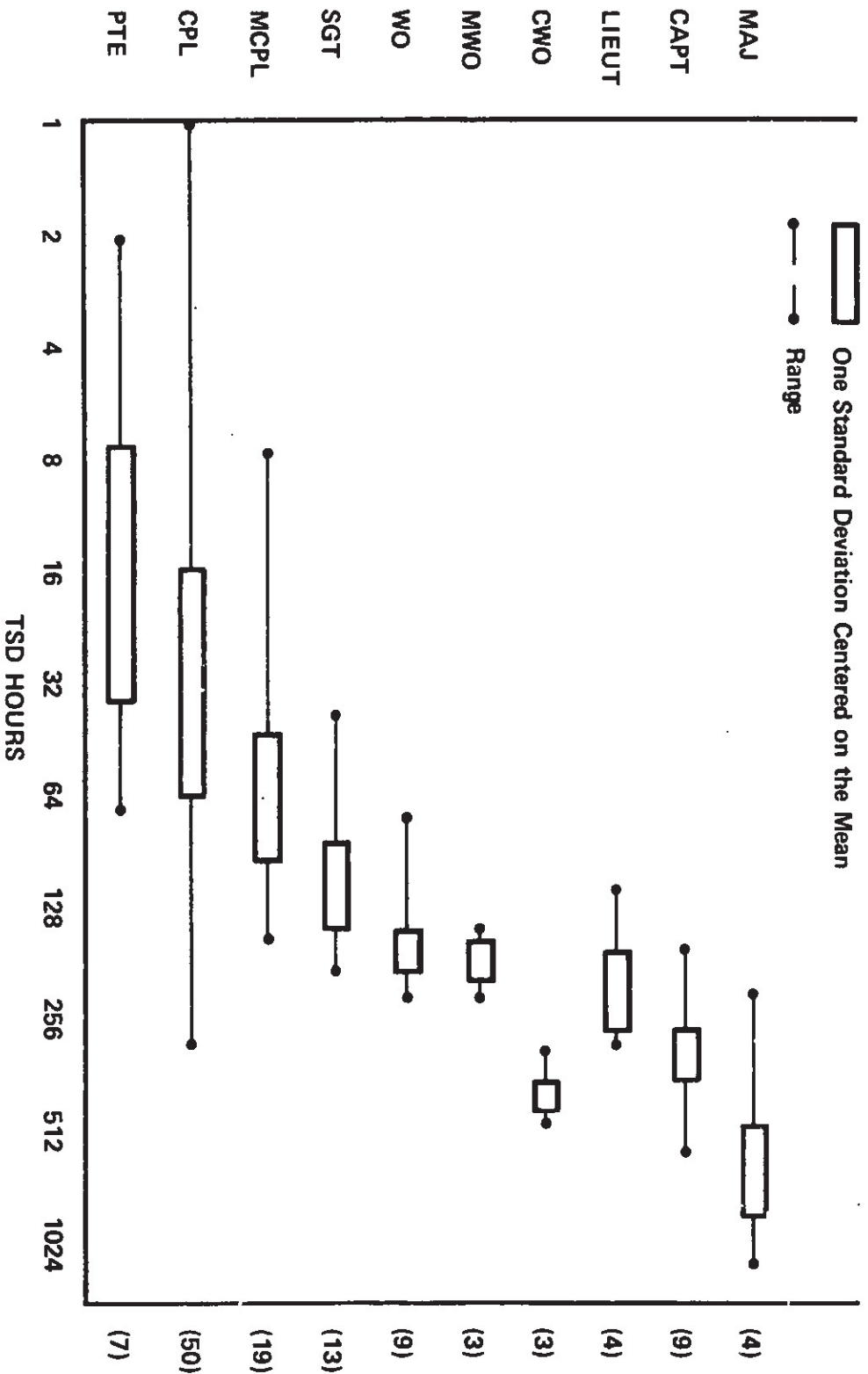


FIGURE 2 - Range of TSD Data for Each Rank - Land Base Units 1973

The ranges of TSDs measured for the three lowest ranks show extensive overlapping. For example, the range for Corporal (CPL) extends above that for Master Corporal at the high end and below that for Private at the low. This confirms the existence of problems mentioned during the interviews, namely:

- a. Several managers said they were unable to get promotions for Corporals whom they considered to be outstanding. (A specific example of this will be discussed in para 40 below; other evidence follows in para 44.)
- b. Most Corporals whose TSD was short appeared to be unhappy with their work, and said they felt it lacked challenge.

39. The overlap of TSD in the ranks Private through Master Warrant Officer may be due to one or more of the following factors:

- a. The use of staff in work normally performed by more senior personnel. This can occur because of:
 - (1) A shortage of senior personnel;
 - (2) Training requirements;
 - (3) Failure to promote deserving individuals because of:
 - (a) the lack of establishment vacancies;
 - (b) vagaries of the promotion system. ?
- b. The use of staff in work normally performed by more junior personnel. This can occur because of:

- (1) A shortage of junior personnel;
 - (2) Questionable management practices;
 - (3) Low level of individual capability due to:
 - (a) promotion error -- the advancement of persons who prove to be incapable of performing the work required of them;
 - (b) performance degradation for any reason.
- c. The use of an unsuitable rank structure -- one that does not match organizational needs.

40. A number of these factors seem to have contributed to the overlap in the data. In only one case is it possible to identify the extent of overlap due to a single factor -- the upper limit of TSD for Corporal was established by a work role whose value (320) hours was well above that of the next highest (120 hours) in that rank. The individual in the 320-hour role performed work which the interviewer thought might challenge a senior NCO or junior commissioned officer. His manager, a Major, said that this Corporal had been recommended for promotion, but that the system had not permitted it to take place. This example supports tentative conclusions reached earlier, during data collection at the air support base, regarding the potential value of time-span information in promotion considerations: it can identify persons whose present work is already in the range of levels to be found at higher rank.

41. Two factors which contributed to the overlap of work level amongst the NCO ranks were the training needs of combat battalions which sometimes require persons to work at jobs normally carried out by their seniors, and the shortage of qualified personnel. At the time of the study, a greater than

normal number of persons worked above rank due to the absence of officers and men in Vietnam, Gagetown, Kingston, and serving in a training function with the Public Duties Detachment.

42. The extent of TSD overlap between Private, Corporal and Master Corporal suggest the existence of additional causes to those discussed in para 39 above. It provides strong evidence that the rank structure in use is unsuited to the needs of the battalion. This agrees with opinions volunteered by persons interviewed during the study who claimed that the present rank structure for NCOs is poorly fitted to the requirements of the land forces. To support that claim they noted the inconsistent status given the rank of Corporal; a person of that rank might perform the duties of Private one day, of Master Corporal the next. They said that:

- ?? | a. The existence of Master Warrant Officer rank had weakened the role of Sergeant (SGT); and,
- ?? | b. The introduction of Master Corporal had lowered the status of Corporal.

It seemed commonly felt that the rank of Master Corporal should be eliminated, and that of Corporal should be given the status it once held.

43. As was done for the Air Base data, the number of rank levels separating managers and their immediate subordinates was checked for evidence of excess rank levels. Table VI lists this information for 72 NCOs and Privates.

TABLE VI

Number of Rank Levels Separating 72 NCOs and Privates
in the Land Forces from the NCOs who Manage them.

| | | | | | |
|-----------------------|---|----|----|----|---|
| Number of Levels | 0 | 1 | 2 | 3 | 4 |
| Number of Occurrences | 5 | 26 | 29 | 11 | 1 |

Managers and subordinates are separated by more than one rank in 57% of the cases. This is almost the same value as for the air support unit. It suggests that in both these service elements it has been necessary to bypass ranks to try to fit the work to the existing rank structure.

44. During the interviews, a number of officers in the land forces had referred to difficulties in gaining promotions for worthy subordinates. Table VI provides evidence that the problem exists; it shows five cases where individuals supervise subordinates whose rank is the same as their own.

III. NAVAL UNITS - SEAGOING

45. The progression of mean and median TSD with military rank is listed in Table VII for 102 officers and other ranks in naval units (two ships and a submarine). (In this case, no roles of Lieutenant rank were encountered.)

TABLE VII

Mean and Median TSD by Military Rank
for some Naval Units

| <u>Rank</u> | <u>Sample Size</u> | <u>Mean TSD</u> <u>(hours)</u> | <u>Median TSD</u> <u>(hours)</u> |
|------------------------|--------------------|-----------------------------------|-------------------------------------|
| Major | (3) | 1040. | 1280 |
| Captain | (7) | 657.1 | 320 |
| Chief Warrant Officer | (4) | 430. | 300 |
| Master Warrant Officer | (9) | 462.2 | 280 |
| Warrant Officer | (13) | 295.4 | 280 |
| Sergeant | (13) | 193.8 | 160 |
| Master Corporal | (13) | 124.7 | 40 |
| Corporal | (36) | 79.8 | 40 |
| Private | (4) | 16.5 | 12 |

Except for Master Warrant Officer and Chief Warrant Officer ranks, the mean TSDs can be seen to increase with increasing rank. The median values show an increase from Private to Major, but with some grouping of ranks. The data have been tested to reveal the existence of rank dependent differences of TSD whose significance exceeds 0.01. The degree of association of military rank and TSD was found for the 95 officers and other ranks for whom complete sets of TSD, FFP and actual pay data were available. The value of this index proved to be +0.74 for TSD and military rank. This indicates a relatively high degree of positive association between rank and time-span.

46. The range of TSD values for each rank, marked to show one-standard deviation centred on the mean, is pictured in Figure 3. The range for each rank can be seen to be very wide, with extensive overlapping among ranks. Tests of rank pairs revealed that differences of TSD between some pairs of contiguous ranks

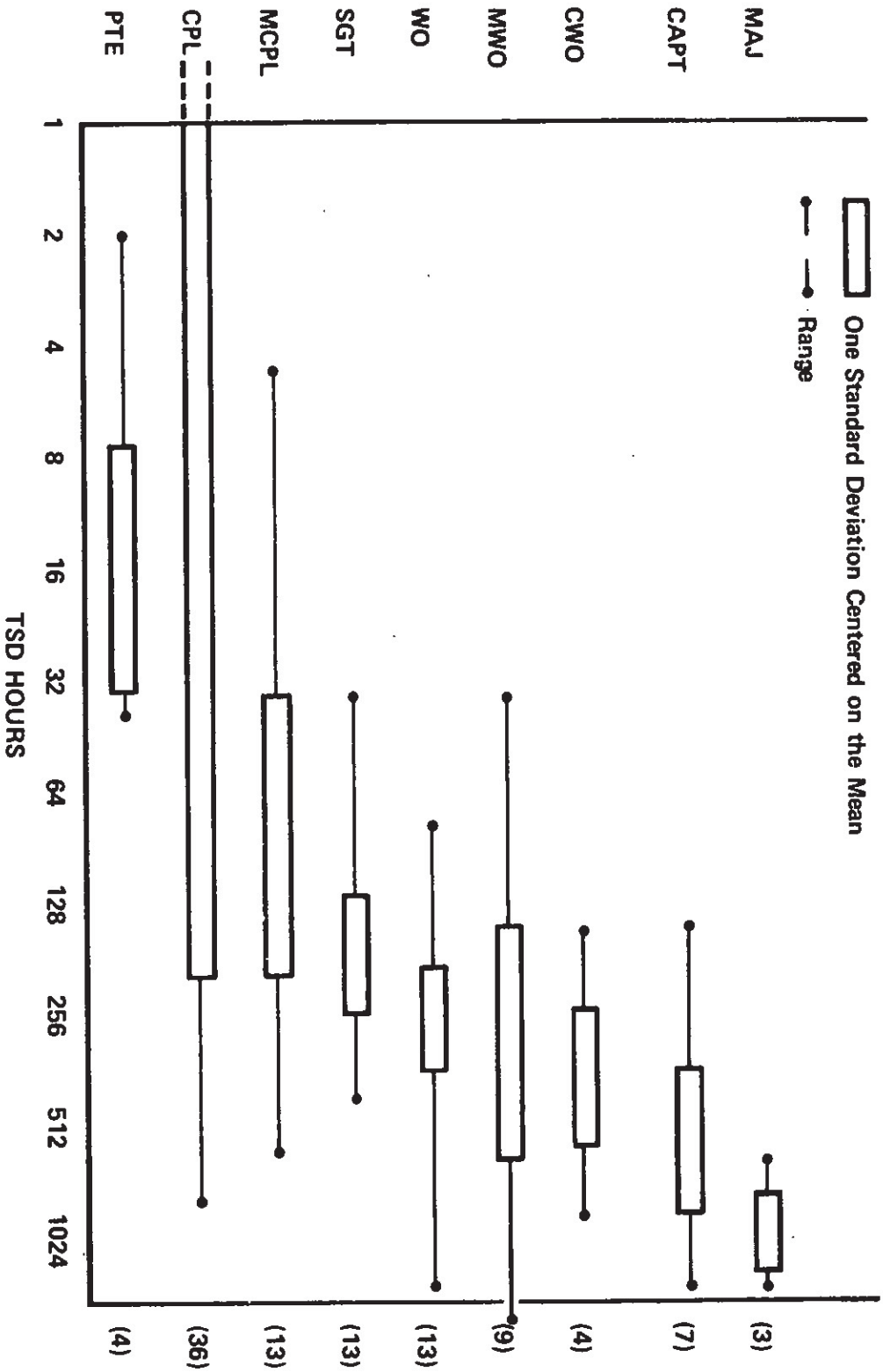


FIGURE 3 - Range of TSD Data for Each Rank - Naval Units 1973

are not statistically significant. This is true for CWO & MWO, MWO & WO and for WO & SGT. The existence of overlapping to the extent found in these data suggests that the rank structure in use has more levels than required. Interestingly, this was the complaint voiced by many of those interviewed, who claimed that there were too many levels in the SGT to CWO range.

47. As was done before, the number of levels which separated each subordinate from his manager was checked. The results are listed in Table VIII.

TABLE VIII

Rank Levels Separating 62 NCOs and Privates in
Naval Units From the NCOs Who Manage Them.

| | | | | | |
|-----------------------|---|----|----|---|---|
| Number of Levels | 0 | 1 | 2 | 3 | 4 |
| Number of Occurrences | 2 | 19 | 26 | 8 | 7 |

The table shows that manager and subordinate are more than one level apart in 66% of the cases. This exceeds the figures found for the other two service environments. It provides strong evidence that the rank structure has considerably more strata than are required for ships or submarines.

TSD VARIATION WITHIN A RANK

48. The initial data from the air support unit showed that TSD increased in a systematic way with increasing military rank. This supported its validity as a measure of military work. An additional test seemed possible. A systematic increase within a rank was postulated since (a) managers may be expected to assign work of a higher level to someone who is

about to be promoted out of a rank than to someone just promoted into it and (b) a range of individual capabilities is likely and managers may be expected to scale the level of assigned work to match their judgement of those capabilities. Evidence of this was sought, beginning with data collection in the land force units. The investigation used data sets consisting of:

- a. A qualitative assessment by his manager of the incumbent's performance relative to the requirements of the work-role*;and,
- b. The TSD of that work-role.

Because it provided the largest number of measurements, the rank of Corporal was selected to investigate in-rank variations of TSD in the land force units.

49. The assessment mentioned in a. above was completed for 43 Corporals, using the questionnaire shown in Annex C. One Corporal was considered by his manager to be overqualified for

*NOTE - Studies of performance evaluation have reported that managers are often reluctant to make and record absolute judgements of their subordinate's performance capabilities (Refs 9, 10). This raises doubts as to the validity and usefulness of such judgements, if obtained. To avoid the problem in this study, managers were not asked for absolute judgements but relative ones -- how well the work expected of the individual suited that person's talents and abilities. This approach, it was thought, would encourage managers to more willingly and accurately rate subordinates, since identification of those whose work was not quite up to standard would not stigmatize the individual.

his job - for that reason his questionnaire was discarded. The remaining 42 were categorized on the basis of work suitability. They fell into three groups as follows: Adequately Matched - 10; Moderately Well Matched - 15; and Very Well Matched - 17. Table IX shows the median TSD for the work-roles in each group.

TABLE IX

Mean and Median TSD by Work Suitability
for 42 Corporals in Land Force Units

| <u>Work Suitability</u> | <u>Adequately Matched</u> | <u>Moderately Well Matched</u> | <u>Very Well Matched</u> |
|-------------------------|---------------------------|--------------------------------|--------------------------|
| Sample Size | (10) | (15) | (17) |
| Mean TSD (hours) | 24.7 | 29.6 | 62.1* |
| Median TSD " | 10 | 24 | 40** |

*NOTE This figure reduces to 46 hours when the datum for the Corporal mentioned in para 40 is removed.

**NOTE The median TSD of 40 hours for those Corporals rated Very Well Matched equals that for all 42 used in the table. This unexpected result is due to the form of the distribution of TSD, which is not smooth, but contains many 'tied' values.

Both mean and median TSD can be seen to increase with increasing level of Work Suitability. This confirms the expected; that managers assign higher-level work to those whom they judge most capable, and work of a lower level to persons they judge less competent in terms of the requirements of the job. Confirmation of this, using TSD, provides additional evidence of it's validity as a measure of military work and responsibility.

50. The median TSD for Corporals whose work suitability was rated lowest was 10 hours. This is 25% above the mean for Privates (8 hours). Thus, the level of work assigned to those considered least able to cope with their work was marginally higher than the median for the next lower rank. This is reasonable, and lends confidence both to the credibility of the rating procedure and to the use of TSD in such rating.

51. The data of Table IX show that managers, in discriminating between levels of Work Suitability, used thought processes which resulted in changes of about 2:1 in median TSD, in moving from one level to the next.

52. The data summarized in Table IX were tested for significance. The tests confirmed the existence of differences with rating level whose significance exceeds 0.1.

53. Evidence of in-rank variations of TSD of the kind just described was sought in the ship and submarine data. The same approach was planned and the same questionnaire used. In making this assessment, land-force managers were thought to compare individual performance against some norm they held for the work of the rank. It had been assumed that naval managers would use the same approach. However, as the interviews progressed it became apparent that many persons held positions established at a rank other than their own. In this situation, a manager might assess the suitability of work against a norm for the rank of the position rather than that of the incumbent. The questionnaire was not designed to detect this, if it occurred. The identification of those persons who were considered to be overqualified for their work had been planned. This proved useful.

54. Two ranks were selected for the test. They were:
- a. MWO - which coupled the greatest homogeneity of rank (only one non-MWO position) with the next to largest number of work-roles for which rank and position were matched.
 - b. CPL - which gave the largest total number of work-roles in a rank (33), but contained positions at four different rank levels: Corporal/Private - 11; CPL - 15; Master Corporal (MCPL) - 6; SGT - 1.
55. Table X lists the results for Master Warrant Officers.

TABLE X

Mean and Median TSD by Work Suitability
for 8 MWOs in Naval Units.

| <u>Work Suitability</u> <u>Rating</u> | <u>Adequately</u> <u>Matched</u> | <u>Moderately Well</u> <u>Matched</u> | <u>Very Well</u> <u>Matched</u> |
|--|-------------------------------------|--|------------------------------------|
| Sample size | (2) | (2) | (4) |
| Mean TSD (hours) | 140 | 200 | 800 |

As had been found in the land force study, mean TSD increased with increasing goodness of work-match. These data for Master Warrant Officers do not prove the statistical significance of the differences, however.

56. The sample of 33 Corporals for whom Work Suitability ratings were made included 3 who were said by their managers to be overqualified. The data were tested to see if the TSD of the work assigned to them tended to be higher than the rest. Table XI lists the results of that test.

TABLE XI

Mean and Median TSD by Work Suitability Rating for Corporals
Rated as (i) Not Overqualified or (ii) Overqualified

| <u>Work Suitability</u> <u>Rating</u> | <u>Not Over-</u> <u>Qualified</u> | <u>Over-</u> <u>Qualified</u> |
|--|--------------------------------------|----------------------------------|
| Sample Size | (30) | (3) |
| Mean TSD (hours) | 45.1 | 421 |
| Median TSD " | 36 | 320 |

The mean and median TSD of those considered overqualified clearly exceed those measures for the remaining 30 Corporals. The differences were tested and found to be statistically significant beyond the 0.1 level.

57. Data for the three overqualified individuals were removed, and the remainder examined for TSD differences related to degree of Work Suitability. No statistically significant differences were found. It was then checked to compare the TSDs of Corporals in positions which matched their rank with those in positions established at the MCPL or SGT level. Table XII lists this comparison.

TABLE XII

Mean and Median TSD of 30 Corporals in Naval Units

By Rank Level of Position

| <u>Position</u> <u>Level</u> | <u>CPL &</u> <u>C - P</u> | <u>MCPL &</u> <u>SGT</u> |
|---------------------------------|----------------------------------|---------------------------------|
| Sample Size | (24) | (6) |
| Mean TSD (hours) | 43.3 | 52 |
| Median TSD " | 28 | 40 |

The mean TSD is higher, as is the median for Corporals held against positions established at ranks above their own. This seems reasonable. In this case, the data do not prove it, however.

WEIGHT-OF-WORK

58. TSD is claimed to reflect the feeling of 'weight-of-work'. That is to say, a person will feel his work becoming heavier if TSD increases, and lighter if it is reduced. The median TSD values obtained in the study tended to be highest for those in the naval units and lowest for the air support personnel. If TSD measures what is claimed for it, these results suggest that naval-unit-work (aboard ship or submarine) should tend to feel heavier than in the other two environments, and work at the air support base tend to feel lighter. Ancillary data collected during the study enabled this to be tested.

59. Each of those interviewed was asked to indicate how his work felt in terms of amount and difficulty. This information was collected using questionnaires of the type shown in Annex D. Table XIII lists, for persons in each environment, the percentages who indicated that they found their work to be: (a) on the light side; (b) just about right for them; (c) on the heavy side.

TABLE XIII

| | <u>Weight-of-Work By Service Environment</u> | | | |
|-------------|--|--------------------------------|-------------------------|--------------------------------|
| | <u>Sample Size</u> | <u>Lighter Than Just Right</u> | <u>Just About Right</u> | <u>Heavier Than Just Right</u> |
| Air Support | (130) | 27.7% | 42.3% | 30% |
| Land Force | (91) | 17.6% | 47.2% | 35.2% |
| Naval Units | (105) | 13.9% | 30.6% | 55.5% |

Progressing downward through the table, one notes a decrease in the percentage of those who consider their work to be on the light side, and an increase in those who claim it to be heavier than Just About Right. This result is in line with the differences of median TSD with service environment which are noted above, and provides further evidence that TSD is a meaningful measure of military work.

FELT-FAIR PAY

60. The percentage of those interviewed who gave the pay level they considered fair for their work was 86% in air support, 87% at the Land Base, and 93% in the naval units. The question was answered most readily by persons who planned soon to retire or take their discharge from the armed forces. They frequently referred to pay levels "On Civvy Street", or mentioned some specific civilian job to support the figure they gave. This agrees with the study by Wood (Ref. 11). He has reported that "in cases where there is some association with an industrial counterpart--there is a stronger perception of equitable pay". (It should be noted that no one justified the FFP level given by referring to civilian work for which he lacked training.)

61. A number of persons said the work they did was worth the same pay as They then identified by name some person, position or trade in their unit, or another. Some mentioned comparable work in both the military and civilian sectors and gave two figures of FFP, one for each sector. When this happened, the figure for civilian work was usually the higher of the two. Exceptions occurred in the case of a few junior staff in certain administrative roles: they gave lower figures for work as a civilian.

62. A number declined to answer because they said they lacked

any suitable reference. A typical comment was, "I don't know what jobs are worth on Civvy Street". This sort of comment, together with the references to similar work in the military and civilian sectors, suggests that some individuals arrive at their assessment of fair pay through the use of a direct comparison process. Many gave no indication of the rationale behind their statement of fair pay.

63. Several who gave no FFP level reacted strongly when the question was asked and said it was one they should not be expected to answer. Most who gave no FFP seemed not unwilling, but totally unable to give one. This group appeared to consist of individuals who were completely dedicated to a military career. This should not be interpreted to imply any lack of dedication on the part of any who gave a FFP level. Rather, it suggests that some persons who expect to make a career in the military service continue to make pay comparisons with work outside the armed forces, while others do not.

64. Most gave their FFP level in dollars (per month or year); a few said that it should be "more" (than they now received); some gave no figure but wrote "present pay", or a similar expression. This proved to have two possible meanings for persons assigned to ships or submarines. Some intended it to mean base pay plus allowances; others meant base pay only. Unless the interviewee had indicated otherwise, the term was interpreted to mean base pay only.

65. Both before the study and during the early part of it, skeptics had predicted that all those questioned would state a FFP level which exceeded the amount of their present pay. There was no evidence of this. On the contrary, some in each service environment indicated that they considered themselves to be overpaid for their work - a larger number said they were fairly paid. Table XIV shows the percentage of those interviewed in

each service environment who considered themselves to be (a) Overpaid, (b) Fairly Paid and (c) Underpaid for their work.

TABLE XIV

Percentage in Each Service Environment Who
Claim to be Overpaid, Fairly Paid or Underpaid
for Their Work

| | <u>Overpaid</u> | <u>Fairly Paid</u> | <u>Underpaid</u> |
|-------------|-----------------|--------------------|------------------|
| Air Support | 15% | 29% | 56% |
| Land Base | 17% | 34% | 49% |
| Naval Units | 3% | 22% | 75% |

FELT-FAIR PAY WHEN RANK AND POSITION LEVEL DIFFER

66. To a greater extent than had been found for the other service environments, naval personnel filled positions of rank different from their own. The data were examined to see if this might have influenced the FFP levels given. The rank of Corporal was first selected for this test. Table XV shows mean and median FFP for 33 naval Corporals in positions established at (a) Corporal/Private or Corporal and (b) Master Corporal or Sergeant.

TABLE XV

Mean and Median FFP of Corporals in
Naval Positions of Different Ranks

| <u>Position Level</u> | <u>C - P & CPL</u> | <u>MCPL & SGT</u> |
|-----------------------|----------------------------|---------------------------|
| Sample Size | (26) | (7) |
| Mean FFP (\$/month) | 850.4 | 908.7 |
| Median FFP " | 837.4 | 950 |

Corporals who filled positions whose rank exceeded their own can be seen to have higher mean and median FFPs than where the rank and position of the incumbent are equal. This is a plausible result, although tests showed that these data did not prove it.

67. A subsequent test was tried using data for Sergeants. It was chosen because that rank provided a sample almost equally divided between positions at two rank levels: SGT -- 6; and WO -- 7. Table XVI lists mean and median FFPs for SGTs in these positions.

TABLE XVI

Mean and Median FFP for Sergeants in
Naval Positions Established at Two Levels

| <u>Position Level</u> | <u>SGT</u> | <u>WO</u> |
|-----------------------|------------|-----------|
| Sample Size | (6) | (7) |
| Mean FFP (\$/month) | 962.2 | 1210.7 |
| Median FFP " | 933.3 | 1167 |

These results support those obtained for Corporals -- mean and median FFP for SGTs in the higher ranking position (WO) exceed those measures where the rank of the position and that of the incumbent are matched. The differences were found to be at the 0.05 level, which indicates that they are probably significant.

FELT-FAIR PAY AND ACTUAL PAY

68. Land Force data were used to investigate the relationship between the FFP levels given and the actual pay received. Those who claimed to be underpaid for their work gave FFP figures which averaged 14% above the average of their actual pay. Those who indicated overpayment gave figures whose mean fell 11% below

their average actual pay. The average FFP for the entire group of officers and other ranks exceeded their mean pay level by 4.2%.

69. The data on FFP in these units were collected during a period of seven weeks beginning in late April 1973. Members of the forces had received their last general pay increase effective 1 October 1972. In the period 1 October 1972 to 1 May 1973 wages in Canada, as reflected in the Wages Index published by the Department of Labour, rose by 4.4%. It is interesting to note how closely this figure matches that by which the average FFP exceeded the average actual pay for the group sampled.

TIME-SPAN OF DISCRETION AND FELT-FAIR PAY

70. The relationship between TSD and FFP for the work-roles examined in each of the three service environments was tested, using regression analysis. The correlation co-efficient for the two parameters is listed in Table XVII.

TABLE XVII

Correlation Co-efficient of TSD and FFP

for each Service Environment

| | |
|------|--------|
| Air | + 0.66 |
| Land | + 0.71 |
| Sea | + 0.5 |

These values indicate that, for work-roles in the air and land environments, TSD accounts for from 40 to 50% of the variance in the FFP data. For the naval units studied, the figure is 25%. Higher correlations than these have been reported for civilian populations, with TSD explaining 75% or more of the FFP variance. This suggests that the military view of fair pay is influenced

by one or more factors of less importance to civilians. Military rank seemed to be a likely factor, as it provides a highly visible, uniform indicator of hierarchical level not found in civilian organizations. In fact, during the interviews when the FFP question was asked, some of those interviewed had stressed their view that pay should be "by rank."

71. The influence of military rank in explaining the FFP results was investigated by examining the degree of association of FFP and rank. Table XVIII lists the Index of Order of Association of those two parameters. Also given are indices for TSD and FFP, plus those shown earlier in this report which relate Rank and TSD.

TABLE XVIII

Index of Order of Association by Pairs,
of Rank, TSD, and FFP for each Environment.

| | <u>Rank/TSD</u> | <u>Rank/FFP</u> | <u>TSD/FFP</u> |
|------|-----------------|-----------------|----------------|
| Air | 0.860 | 0.756 | 0.616 |
| Land | 0.840 | 0.838 | 0.636 |
| Sea | 0.744 | 0.667 | 0.559 |

In each service environment, the Order of Association of TSD and FFP can be seen to be lower than for either of the other pairs of parameters. This would be the case if their relationship depended heavily on military rank. Were FFP and TSD associated through military rank alone, the index which related them would be the product of the indices in the first two columns of the table. (Index of Order of Association is and can be handled as a probability.) For the environments under study, those products are +0.65; +0.70; and +0.5. These values fall quite near the indices in column 3. For the population studied, this suggests that military rank serves as a bridging variable to explain much of the association of TSD and FFP.

PAY FIELD AND TIME-SPAN OF DISCRETION

72. Data for Corporals in the land-based and naval units were examined to see if those in different pay fields did work of different levels. The median TSD for each pay field in each of these two service elements was 40 hours, except for Pay Field C at the Land Base. Its median was 8 hours, based on a sample of 5 Corporals. Tests of the complete data failed to reveal statistically significant differences of TSD with pay field. This supports the claims of those NCOs in Pay Field A who, during the interviews, said their work was just as demanding as that of persons in Pay Field B.

PAY FIELD AND FELT-FAIR PAY

73. Data for Corporal rank in the land forces were used, too, to examine the variations of FFP with pay field. Table XIX lists the mean and median values of FFP by pay field for 36 Corporals. The table also shows sample size, age and actual pay.

TABLE XIX

Mean and Median FFP by Pay Field for

Corporals in the Land Forces

| | <u>Pay Field A</u> | <u>Pay Field B</u> | <u>Pay Field C</u> |
|-------------------|--------------------|--------------------|--------------------|
| Sample Size | (9) | (22) | (5) |
| Mean Age (years) | 31.6 | 30.2 | 38.8 |
| Median Age " | 30 | 29.5 | 40 |
| Mean FFP (\$/mth) | 737.3 | 737.6 | 862.8 |
| Median FFP " | 742 | 735 | 857 |
| Mean Actual Pay " | 681 | 727 | 857 |
| Median " " " | 690 | 730 | 857 |

74. Table XIX shows that median Actual Pay and median Felt-Fair Pay are equal for Pay Field C, and nearly equal for Pay Field B. This indicates that those questioned in these two fields believe that their present pay level is fair for the work expected of them.

75. For Pay Field A, median FFP exceeds median Actual Pay by about 9%, and is slightly more than the median FFP for the next higher pay field. This confirms that Corporals in Pay Field A consider themselves underpaid and, as many claimed during the interviews, think they should receive as much as the infantry, for example, or other trades in Pay Field B.

76. The variation of FFP by Pay Field was tested for Corporals in the naval units. Table XX gives the mean and median FFP for the three fields.

TABLE XX

Mean and Median FFP by Pay Field for
Corporals in Naval Units.

| <u>Pay Field</u> | <u>A</u> | <u>B</u> | <u>C</u> |
|---------------------|----------|----------|----------|
| Sample Size | (7) | (15) | (11) |
| Mean FFP (\$/month) | 763 | 850 | 900 |
| Median FFP " | 782.1 | 861.1 | 916.4 |

FFP can be seen to increase with increasing pay field level - the differences are at the 0.1 level of significance.

77. As noted earlier, this group of Corporals contained individuals serving in positions established at higher rank. The higher-rank data were removed and the remainder tested to see if the increase of FFP by Pay Field noted in Table XX might depend upon the existence of these higher ranking positions. Table XXI shows the results.

TABLE XXI

Mean and Median FFP by Pay Field for Corporals

Filling Corporal Positions in Naval Units.

| <u>Pay Field</u> | <u>A</u> | <u>B</u> | <u>C</u> |
|---------------------|----------|----------|----------|
| Sample Size | (6) | (12) | (8) |
| Mean FFP (\$/month) | 802 | 863.3 | 867.3 |
| Median FFP " | 781.5 | 841.5 | 853 |

The statistical measures of FFP now differ little for Pay Fields B & C. The differences shown in Table XX thus appear due to Corporals in positions of higher rank, who feel they deserve the pay of that rank. Pay Field A remains at a lower FFP level than the rest. This difference may not be real, however, as tests showed that these data contained no statistically significant differences of FFP by Pay Field.

PART 5

CONCLUSIONS

MEASURABILITY OF TSD

78. TSD proved to be measurable in most of the work-roles studied. It was most easily measured where the activities were task-oriented, as in the combat battalion. The MBO procedures used at the air support Base created conditions of clear task delineation and goal setting which facilitated measurement.

79. In cases where TSD was either difficult or impossible to measure, organizational or management problems of some kind were found. The case noted in para 25 suggests that TSD may be a powerful tool for organizational audit, since it can detect roles that are essentially non-existent, even though they may appear on the organization chart. It can also identify the existence of problems of excess levels of supervision and less than optimum management arrangements.

SIGNIFICANCE OF THE TSD MEASURE

80. Excellent statistical agreement was found to exist between TSD determined in the prescribed manner, which measures the level of assigned work as viewed by the manager who assigns it, and that based on information supplied by the subordinate alone. This shows that the measure holds the same meaning for manager and subordinate alike.

81. Its significance as a meaningful measure of military work is demonstrated by:

- a. The systematic increase of TSD which tended to accompany increased military rank.
- b. Deviations from this progression which matched the judgement of military personnel about the relative levels of the work involved. Examples are:
 - (1) Statistically similar TSDs for Lieutenants and Captains in the air support unit and differences between these two ranks in the combat battalion.
 - (2) The lack of significant TSD differences between the three ranks of warrant officer in air support.

- (3) The very high level of TSD for CWOs who serve as Regimental or Unit Sergeant Majors.
 - (4) The considerable degree of TSD overlap between adjoining ranks of NCO in the naval units, and to a lesser extent in the land force units.
- c. In the naval units, the high TSD levels found for Corporals who were considered to be overqualified for the work required of them.
 - d. The evidence obtained in land force units that the TSD of NCOs tended to increase with increasing Work Suitability rating.
 - e. The exceptionally high TSD for the land-force corporal who was claimed, by his manager, to be exceptionally capable.
 - f. The fact that Corporals in land units whose TSD was very short were dissatisfied with their work, and said it lacked challenge.

82. Its significance as a management tool is revealed in its ability to detect problems of organization and management.

RANK STRUCTURE

83. Groups of contiguous ranks with similar TSD levels were found to exist within each of the three elements of the forces. The existence of this grouping shows that the rank structure contains more levels than required, and that it has been necessary to adapt the structure to the organizational requirement. This conclusion finds support in the frequency with which chain-of-command bypasses individual NCO ranks: it occurs more than

half the time in the air support and land force units sampled, and two-thirds of the time in the naval units.

84. The extent of the grouping differs for the different service elements. This shows that the three military environments have different organizational requirements, and that the common rank structure presently used in the Canadian Forces does not match any of the three.

85. It is not surprising that the organizational requirements should differ, in view of the differences in the operational situations. For example, a ship's captain is physically close to his crew, and normally can communicate with them readily. A combat battalion, on the other hand, is often widely dispersed. Its commander may be without communication with portions of the battalion for significant periods of time. Clearly, the form of organizational structure needed to assure effective command and control will differ for the two situations. More levels of supervision will be required in the battalion than aboard ship. A common rank structure cannot be optimum for both.

86. The data show that the organizational needs for commissioned officers in the two lowest ranks differ in the three service elements. Lieutenant and Captain are treated interchangeably in air support; naval units appear to require only the rank of Captain; separate and distinct roles continue to exist in the land force battalions for the two ranks.

87. The common rank structure presently used for NCOs provides more levels of supervision than are needed in any of the three service environments. For air support, the excess is two in the warrant officer series. It is two as well, for land-based roles, as shown by the similar TSD values found for Corporal and Master Corporal on the one hand, and Warrant and

Master Warrant Officer on the other. The structure supplies three more levels than can be used effectively aboard ship. This excess has been 'absorbed' in naval units by tasking the three levels of warrant officer at much the same level, and by treating Corporal and Master Corporal rather similarly in terms of tasking.

88. Significant differences were found among the three service elements in the level of work performed by certain ranks. The extent of these differences, coupled with differences in the nature of the work and the training requirements for it, indicate that some ranks are equivalent in name only in the three environments.

89. Resourceful, dedicated people usually manage to find a way to operate despite organization obstacles. The present rank structure constitutes an obstacle to effective operations in all three service environments. Military personnel have made organizational adjustments to try to compensate for the excessive number of levels of supervision which the structure provides. However, there seems little doubt that a better match between rank structure and organizational requirement would make for smoother and more effective operations, and would improve morale, particularly aboard ships and in submarines where the problem is most extreme.

UNIVERSALITY OF TIME-SPAN OF DISCRETION

90. None of the persons interviewed in this study had heard of the concept of measuring work-level in terms of time. Nor were any familiar with the procedures of TSD measurement. Despite this, the progression of TSD values matched the judgement of military personnel about the relative importance of the work performed in the various ranks. This supplies strong evidence that the service personnel involved assess work-level in terms of the measure of time which TSD describes, even though they

may be unaware they do so. This, in turn, supports those who argue that it is used, unconsciously, by everyone.

91. In all three environments, good statistical agreement existed between TSD measured in the conventional manner, and that based on information supplied by the subordinate, alone. This is convincing evidence that TSD is a 'read-out' of work level that holds a common meaning for manager and subordinate alike, and bolsters the argument for its universality.

PAY CONSIDERATIONS

92. Most of those interviewed gave a FFP level for their work. The majority who gave one claimed it to be more than they presently received; a minority said that they were fairly paid; a small percentage said they were overpaid for the work assigned to them.

93. A higher proportion of those in sea-going units said they were underpaid for their work than was found to be the case in the other environments. To some extent, this was due to the large proportion of naval NCOs who filled positions established at higher rank than their own.* An additional explanation for their claimed under-payment is that those in the naval units felt their work to be heavier than did persons in the other service environments. The TSD data provide statistical support for their claim.

* The practice of filling positions with individuals of lower rank is objectionable both to those in such positions and to their immediate subordinates. The incumbents feel they deserve the pay of the rank at which the position is established. Their subordinates say the situation makes their work more difficult. "My boss can't protect me because he lacks the rank he should have", is how one NCO phrased it.

94. TSD has been found to explain most of the variance in civilian FFP data. This study shows that it explains much less of the variance in military FFP. This, in turn, indicates that the military view of fair pay is influenced by one or more factors that are less important to civilians. That such is the case is confirmed by the two figures of FFP given by some individuals for the same job: one figure for that work done as a civilian, the other if done as a military officer or serviceman.

95. Examination of the degree of statistical association of TSD, FFP and military rank revealed that service personnel view military rank as the principle factor upon which pay differentials should be based. This is consistent with the view expressed by many of those interviewed, who claimed that "pay should be by rank".

96. The FFP data show that military personnel do not believe that pay levels for the military should be established solely on the basis of the level of an individual's current work. This has important implications for the design of military pay systems. It indicates that efforts to relate military pay levels to non-military references will not prove satisfactory if the resultant pay scales contain anomalies compared to the rank structure. Such anomalies will be viewed as inequities of pay, and will adversely affect morale.

97. The results of the study highlight the need to avoid any tendency to consider service personnel simply as civilians in uniform when dealing with the matter of their pay.

PAY FIELD ARRANGEMENT

98. The study found much dissatisfaction with the present pay field arrangement for trades. Sentiment among the NCOs

appeared to favor "pay-by-rank" with trade's pay when qualified. The use of the present three-level pay field arrangement cannot be justified on the basis of differences in work level between the three fields: The TSD figures gave no clear indication that the level of work in one trade was higher than in another. Nor do the FFP levels stated by tradesmen indicate a clear need for several groups of trades. The study had not been designed with clarification of pay requirements by trade in mind. A suitably organized study, using TSD as a measure, might shed useful light on this question.

PART 6

SUMMARY

CONCERNING TIME-SPAN METHODS

99. Validity of TSD. TSD was found to be a statistically valid indicator of military work-level.

100. Universality of TSD. Strong evidence was obtained to support those who claim that everyone assesses level of work in terms of the measure of time TSD describes, although they are generally unaware that they do so.

101. Measurability of TSD. The existing techniques of time-span measurement proved applicable to almost all the work-roles studied. When measurement was difficult or impossible, problems of organization or management were found to exist.

102. Relationship of TSD and FFP. TSD explained some of the variance in the FFP data, but less than has been reported for civilian organizations. Furthermore, military personnel sometimes gave two FFP figures -- one for the work if done by a civilian, the other for that same work if performed by a member

of the armed forces. This shows that in translating TSD to FFP, individuals are influenced by the way they perceive conditions (of pay, and benefits of whatever nature) in their own and referenced occupations.

CONCERNING THE FORCES

103. Rank Structure. The organizational requirements of the three elements of the forces differ in the number of supervisory levels needed to give most effective command and control. As a result, a rank structure which is common to all cannot be optimum for each.

104. The present structure contains more ranks than can be used effectively in any of the three environments. The excess is greatest in the case of ships and submarines.

105. This excess of supervisory strata limits both organizational effectiveness and morale. A rank structure which more closely suited the requirements would make for smoother command and control and would improve morale.

106. Because of differences which are organizationally and environmentally dictated, some ranks are equivalent in name only in the three service elements.

107. Pay Considerations. Individuals reach conclusions about fair pay for military work differently than for work of a non-military nature. For that reason, in the design of pay systems, military personnel cannot validly be treated simply as civilians in uniform.

108. Pay and rank structures need to be related: anomalies of pay against rank will be considered inequitable by military personnel.

109. Service personnel tend to feel exploited when they are assigned to fill positions established at higher rank than their own: they believe they deserve the pay of the position. Their immediate subordinates say it makes work more difficult for them. The study found the practice to occur frequently, especially in the naval units. The comments of those involved left no doubt that the practice is detrimental to morale.

110. The study found no evidence to justify the use of the present three-level Pay Field arrangement for tradesmen. Nor was there conclusive evidence to support two fields. Additional study using time-span methods would appear worthwhile.

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TIME SPAN OF DISCRETION

1. Accountability for the work of his subordinates is a requirement of any true manager. To satisfy that requirement, a manager must assure himself of the continued adequacy of their work. He does this through periodic reviews whose frequency may differ: the more confidence he has in a subordinate's work, the less frequently will he review it; the less that confidence, the more often will a review be made.

2. Individual subordinates are able to 'sense' the level of work which they are required to perform and to know if that level is either too high or too low for them. If they feel it to be consistently at too low a level, they tend to become bored; if it remains too high, they show symptoms of worry and depression.

3. The proponents of the time-span method of work-level measurement contend that the amount of discretion which a manager allows his subordinate to use is the factor which determines the level of work 'sensed' by that subordinate. More specifically, they claim that the sensation of 'level' is a direct function of the maximum length of time during which a manager permits his subordinate to exercise independent judgment in the pursuit of a task. This has been called the "Time-Span of Discretion" of the work role and has been defined by Elliott Jaques as follows:

"The longest period of time which can elapse in a role before a manager can be sure that his subordinate has not been exercising sub-standard discretion continuously in balancing the pace and quality of his work."

The units of time employed in TSD measurement are hours, days, weeks, months or years, as appropriate.

4. Jaques has identified two different types of work roles; the technique of TSD measurement differs for the two. The first is the 'Single-Task' role in which a subordinate performs tasks, one at a time, in the order in which they are assigned. In this case the subordinate's exercise of discretion is limited to decisions about the method and speed with which each task is to be performed. In such a role, a manager may review the work during the progress of a task, immediately upon its completion, or at some later time. The review may be a direct one by the manager, or it may be accomplished indirectly on the basis of information obtained from others. Whatever mechanism is used to perform the review, the TSD of a single-task role is found by determining the longest period of time which the manager is prepared to let elapse between the start of any task and his review of it.

5. The second type is the 'Multiple-Task' role. In it the subordinate carries responsibility for a number of concurrently existing tasks. In this case, part of the job is to 'program' the progression of each task so that all are completed 'on-time', and in an acceptable manner. For this type of role, TSD is established by that task to which the manager assigns the longest unreviewed target-completion time.

6. The above discussion describes, in a rudimentary way, the main principles of time-span measurement: a detailed description of the techniques can be found in Jaques' Time-Span Handbook.

7. In practice, the measurement of TSD can prove to be rather more difficult than might, at first, appear to be the case. However, the sum of the training and experience required to use the method effectively is not greater, and is probably

ANNEX A (Cont)

less, than is needed to assure the successful application of conventional job evaluation techniques. Certainly the total time required of manager, subordinates and analyst is less for time-span analysis than for job evaluation methods.

TRAINING AND TECHNICAL SUPPORT ROLES

1. A total of 36 work-roles in a training and technical support facility were examined. The ranks involved were Private through Major. The measured values of TSD ranged from 24 hours to 2 1/2 years.

2. The sample size exceeded two in only four ranks; in the case of four ranks it consisted of a single work-role. In these circumstances, a listing of TSD by military rank could identify the work-level of some of those interviewed. Because all who participated in the study had been assured that their anonymity would be protected (para 14), no such listing is given.

3. A systematic progression of TSD by military rank was found for commissioned officers. The TSD of their work tended to be higher than that of other similar ranks encountered in the study. This is a reasonable result. Most of these officers were specialists who worked on systems and software development with persons from other NATO countries. The nature of the work made it essential that their immediate superiors give them much independence. This is reflected in the high TSDs found for their work-roles.

4. No systematic upward progression of TSD with rank was found for NCOs, most of whom were in training functions. Corporals tended to have TSDs of the same order as Warrant Officers. This result matched the opinions of all involved. The Training Officer said that all his NCOs did the same job, whatever their rank. The senior NCOs admitted that their juniors did the same as themselves. Corporals and MCPLs claimed their work equalled that of senior NCOs in training functions, and felt they should be paid accordingly.

5. The number of work-roles studied in this facility was too small to permit the sort of analysis used for the other groups. Furthermore, a listing of the results could serve to identify some individuals. However, the TSD data obtained for these work-roles confirmed the assessment of all those involved about the level of work performed. This supports the validity of TSD as a measure of military work. The lack of TSD progression with military rank for NCOs supports those of junior rank who claim they deserve extra pay when serving in a training establishment.

WORK SUITABILITY QUESTIONNAIRE

NOTE The purpose of the questionnaire was explained before the manager was asked to complete it - it was needed to help interpret the results of the study, not to judge the individual. A man might do poorly in one job for which he was unsuited, but do well in another he was matched to. The questionnaire was intended to measure the degree to which Work-Matched-Man.

QUESTIONNAIRE

How well does his present work match 's capabilities and talents?

- A. Very well
- B. Moderately well
- C. Adequately
- D. Rather poorly
- E. Very poorly

WEIGHT-OF-WORK QUESTIONNAIRE

I would like to know how you feel about the amount and difficulty of the work in your present job. Please check whichever one of the five following statements you believe, on the average, best describes your feeling about your work:

- A. My work is very light
- B. My work is a little light
- C. My work is about right
- D. My work is a little heavy
- E. My work is very heavy

If your work feels heavy some or all of the time, please indicate which of the following factors you believe to be most responsible for the heaviness:

- (a) Difficulty of the work
- (b) Occasional large amounts of work
- (c) Constant high volume of work

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| 13. ABSTRACT Time-Span of Discretion (TSD) proved to be a statistically valid indicator of military work-level and could be measured in most work-roles. Where measurement was not possible, problems of organization or management were found. The TSD data provided information about the forces. The present rank structure has more levels than can be used effectively by any of the three service elements. Some ranks are equivalent in name only, in the three. Because of environmentally dictated organizational differences, a common rank structure in the forces cannot be optimum for each environment. Individuals reach conclusions about fair-pay for military work differently than for civilian work. Consequently, it is not valid to treat military personnel simply as civilians in uniform for pay considerations. Morale suffers when rank and pay structures do not match, or when service personnel must fill positions established at higher rank than their own. <u>Key Words</u> Time Span of Discretion Felt Fair Pay Rank Structure Morale | | |