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STUDY OF THE MARINE CORPS
TACTICAL SYSTEMS SUPPORT ACTIVITY

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JOB

This report was prepared under contract number M00027-77-C-0060 during the period of August, 1977 to July, 1978. The research was to analyze and report on the Marine Corps Tactical Systems Support Activity. Mr. James W. Pipher of the Management Systems Office at MCDEC was the Project Officer for the Marine Corps. The Chairman of the Marine Corps Study Advisory Committee was Colonel N. F. Schnippel, Jr. of the Research, Development and Studies Division at HQMC. The Contracting Officer for the Marine Corps was Mr. Steven Slavsky, I&L (LBC) at HQMC.

The Project Director for J. A. Reyes Associates, Inc. was Louise Woerner. Research analysts were assigned from JAR staff as their expertise was required. Stan Jorgensen, Ph.D., and Ralph Walker were the principal analysts and writers. David Vesty did the cost analysis. Gloria Jones was the administrative assistant.

The analysis and recommendations presented in this report were developed by J. A. Reyes Associates, Inc. and do not necessarily reflect the official view of the United States Marine Corps.

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First we would like to offer our special commendations to the Study Advisory Committee for this project: Col. N. F. Schnippel, Jr., Asst. D/CS for RD&S, Chm.; Capt. G. M. Bogess, INT, HQMC; Lt. Col. W. T. Bosserman, AAM, HQMC; Mr. W. R. Bray, I&C, HQMC; Maj. D. H. Calhoun, C³ Division, Development Center, MCDEC; Maj. J. V. Hoekstra, RD&S, HQMC (who acted as Chairman in the absence of Col. Schnippel); Maj. A. R. Moore, R&P, HQMC; Mr. J. W. Pipher, Management Systems Office, MCDEC; Lt. Col. J. G. Schamber, C⁴ Division, HQMC; Mr. S. Slavsky, I&C (CBC), HQMC; Lt. Col. M. Steinberg, I&L (LMC), HQMC. During the course of the research Col. D. C. Daly, RD&S-40, HQMC became head of the committee and his help is greatly appreciated. The guidance of the SAC proved invaluable in the conduct of this research.

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I. EXECUTIVE SUMMARY

I. EXECUTIVE SUMMARY

This is the Final Report of Contract Number M00027-77-C-0060 between the United States Marine Corps (USMC) and J. A. Reyes Associates, Inc. (JAR). The contract was to study the Marine Corps Tactical Systems Support Activity (MCTSSA) and was accomplished in three phases. Phase I was a description of the systems acquisition process. Phase II was a data collection task covering resources available at Quantico and Pendleton. Phase III was to analyze the process and information on activities related to the Marine Corps systems acquisition process and propose recommendations regarding that mission. The first two tasks have been reported: Phase I on 20 December 1978, and Phase II on 10 April 1978. This Final Report constitutes the Phase III report.

↘ The purpose of this research was to determine how MCTSSA should be organized, and where it should be located to best accomplish its stated mission within the Marine Corps and Department of Defense systems acquisition process, as described in the Marine Corps Development and Education Command Order, (MCDECO) P5400.4C.

The United States Marine Corps allocates extensive resources for MCTSSA to use in the accomplishment of its mission. The extent of the allocation of resources to this function is an indicator of the significance given to this activity within the Marine Corps. ↘ MCTSSA's mission mandates responsibility for nearly all aspects of the research, development, test, evaluation, and software support of new and existing Marine Corps tactical data systems. The only excepted areas are basic laboratory research, generally conducted by the Navy, and the actual material production of prototypes and production models.

This means that MCTSSA's responsibilities begin in the advanced exploratory phase of the research, development, testing and evaluation (RDT&E) cycle. They continue through the three developmental and operational testing stages: laboratory testing, field testing in a controlled environment, and operational testing in the Fleet Marine Force (FMF). Finally, MCTSSA is responsible for maintaining configuration control and interoperability standards for fielded tactical data systems. MCTSSA's mandate necessitates the assignment of highly trained personnel and sophisticated RDT&E equipment. The extent of these resources is gauged by the manpower, material, equipment and operating dollars assigned directly or through projects.

MCTSSA is the largest RDT&E activity in the USMC. The MCTSSA table of organization (T/O) authorizes three hundred and eight officers and enlisted billets. This is 41% of all Marine personnel involved in the systems acquisition process. Ninety-six officers are stationed at MCTSSA, making the proportion of officer personnel significantly higher (39%) than in the Marine Corps as a whole (11%). Thirty-nine of the personnel assigned to MCTSSA have advanced degrees, making MCTSSA the command with the highest percentage of officers with advanced scientific training in the Marine Corps. MCTSSA's T/O guarantees full staffing and first choice in the selection of officers and enlisted personnel.

The Marine Corps extends nearly 4 million dollars annually for the operation and maintenance of MCTSSA (\$3.9 million RDT&E budgeted for FY/79). This does not include the value of the resources used to support MCTSSA's mission, estimated at 74 million dollars (1978), which includes four million in buildings, five million in computer hardware and peripheral equipment and 65 million dollars in other test equipment.

A. ASSUMPTIONS

The assumptions on which the research was based were specified in the contract between the Marine Corps and Reyes Associates, namely that:

- The test bed concept of simulation (rather than hardware prototype) testing of tactical communications and computer systems will continue as a USMC responsibility.
- The current MCTSSA mission and functions will continue for the foreseeable future (5 to 10 years), perhaps with shifting emphasis among the functions.
- Future MCTSSA functions may include more maintenance support of fielded systems, and more responsibilities in configuration management.
- For the purposes of this study, the only possible alternative MCTSSA site is Quantico, Virginia.
- The Amphibian Vehicle Test Branch (AVTB) will probably remain at Camp Pendleton regardless of any decision concerning a possible relocation of MCTSSA. The AVTB need not be considered, therefore, in this study.

In addition to the assumptions specified in the contract, there are some additional assumptions JAR made for the cost analysis. The following assumptions were considered in the calculation of the cost estimates, unless otherwise specified:

- Based on Col. R. M. Proudfoot's (CO, MCTSSA) estimate that MCTSSA in ten to twelve years "will double its present size,"¹ a factor of .3 has been added to current resource requirements to project anticipated needs in 1981, the earliest year a relocation could occur.
- Inflation is adjusted at an annual rate of 6%.

¹ J.A. Reyes Associates, "Phase Two of the Study of the Marine Corps Tactical System Support Activity, " 10 April 1978, USMC Contract No. M000-27-77-C-0060, p. II-2.

- Costs and benefits are evaluated in terms of potential expenditures or savings to MCDEC/Development Center.
- Normal operating costs, unless specifically identified as changing, are assumed to be equal at the existing and proposed location for each activity.
- No base termination costs are assumed.

B. FINDINGS

Our research resulted in a series of findings and observations regarding the current operation of MCTSSA. These findings, discussed more extensively later in this report, are that MCTSSA is not closely controlled by the officers outside the activity responsible for managing the systems acquisition and support process. Contributing to this problem in management control are:

- MCTSSA's west coast location which leaves it 3,000 miles from the Washington-Quantico area where the responsible program managers reside.
- MCTSSA's position in the systems acquisition process at the end of the Headquarters, MCDEC/Development Center, chain of command which places it under three layers of overlapping command and management authority, and subjects it to the influence of informal communications from both Headquarters and MCDEC.
- The heterogeneous functions MCTSSA is tasked with performing which contributes to the difficulty of exercising management control over the Activity. The diversity in MCTSSA's tasking results from the fact that it is responsible:
 - for responding to the demands of sponsors and managers of numerous systems now being developed and upgraded; and,
 - for responding to FMF needs when fielded tactical data systems software malfunction.
- Work directives going into MCTSSA say what needs to be done (in general terms) and when the work should be completed. But they say nothing about which work is most important (priorities) or what resource commitment is recommended:
 - time and resource commitments to tasks are left to the discretion of MCTSSA managers; and

- priorities are determined by informal lines of communication and influence between Headquarters, MCDEC/DC, and MCTSSA. Since these lines are not part of any written message system, their effects on MCTSSA cannot be traced and evaluated.
- ° There is no reporting system now at MCTSSA that generates the continuous flow of information necessary if responsible east coast managers are to control resources at MCTSSA and direct the work done there:
 - only limited information on management decision-making at MCTSSA along with some evidence of its consequences appear in formal documents coming out of MCTSSA. There is nominal information on the reasoning behind these decisions and relationships among them.
 - the problem solving strategies of project teams operating at MCTSSA are not reported out of MCTSSA through formal channels.
- ° The continuous rotation of key personnel in the overall RDT&E management process contributes to existing communication and control problems--and therefore to the uncertainties about MCTSSA's performance.

It is true that the work progresses at MCTSSA despite the communications and control problems associated with its operations. However, deadlines set by Acquisition Sponsor Project Officers (ASPO's) at Headquarters (HQMC) for Marine Tactical Command and Control Systems (MTAACS) have not been met. The burden in this area will increase if MCTSSA is to keep pace with current MTACCS Masterplan scheduling. At the same time, software support tasking at MCTSSA is expected to double in the next decade. Meanwhile, the cost constraints under which the Marine Corps RDT&E effort must operate are forcing the Corps to be increasingly discriminating, in cost/benefit terms, among its development programs.

The anticipated increase in demands on MCTSSA resources place MCTSSA in a position where the existing configuration must expand, or it must be divided into more functionally specialized units. Cost constraints

reinforce the need for tighter control over existing programs and closer evaluation of their respective costs and benefits.

These findings, based on primary and secondary data collection and analysis, resulted in the conclusion that MCTSSA is not successfully accomplishing its mandate within given time frames and that future increases in tasking to MCTSSA would likely lead to even further inability of the activity to accomplish the systems development and support activities to which it is assigned.

These findings are the basis of the analysis performed in Phase III. The analytical framework for the study, set out in both Phase I and II, encompasses two major analytical factors, location -- the original focus of the study -- and organization or management -- which was determined in the course of the research to be equally or more significant.

The study was, therefore, structured into an analytical matrix, to which systems analysis techniques could be applied.

MANAGEMENT	LOCATION		
Same Organization	<u>Pendleton</u> <u>Option 1</u> Leave as Is	Pendleton & Quantico <u>Option 3</u> Partial Move with No Reorganization	Quantico <u>Option 5</u> Total Move With No Re- organization
Reorganize	<u>Option 2</u> Stay at Present Location and Reorganize	<u>Option 4</u> Move Partially and Reorganize	<u>Option 6</u> Totally Move and Totally Reorganize

C. RECOMMENDATIONS

After the determination that change was needed (the problems listed above are discussed fully in the Phase I and Phase II Reports and are briefly summarized in the following section), an engineering systems analysis was performed within the guidelines described above. It is our conclusion that four of the options are not feasible, but that two of the options offer considerable promise of improvement in the accomplishment of the MCTSSA mission.

1. Option 1

Because of our findings regarding problems in communications, establishment of priorities, and meeting scheduled milestones inherent in the present structure and systems, leaving things as they are (the location at Camp Pendleton and the organization as it is) is not considered a viable option. While this option has no direct costs, significant costs in delays and resources expended would be incurred. It is the conclusion of our analysis, therefore, that Option 1 (leave things exactly as they are and see if MCTSSA improves over time) is not recommended.

2. Option 2

Leaving MCTSSA at Camp Pendleton and applying systems engineering and management techniques to affect organizational improvements is considered a possible approach. This would require minimal costs, since it requires no physical relocation of personnel or physical resources. This alternative also has the advantage of minimal disruptions, a critical consideration with the tight time frames now faced for tactical systems acquisition, particularly for the MTACCS systems.

MCTSSA is now a heterogeneous activity being asked to do a variety of things at once. The diverse functions now performed at MCTSSA, combined with the flexibility in resource allocation built into its task-oriented organization structure, allow for more discretionary decision-making

at the operational level than was ever intended by the Marine Corps. When this discretionary authority is exercised, the decisions are often not conveyed to MCTSSA's absentee managers (ASPO's and DPO's) on the east coast.

If the Marine Corps wants to control an expanding MCTSSA from Quantico, it must organize a system of communications between the commanding officers at the two locations, which can overcome existing problems more effectively. Recommended steps to be taken in exercising management control of MCTSSA from Quantico and Headquarters are discussed in detail in the report.

3. Option 3

A partial move of MCTSSA to Quantico, with no change in organization, is not possible. This option is only conceptual, as in reality any relocation of a portion of MCTSSA would obviously require some adjustments in the management of the activity.

4. Option 4

A partial move, accompanied by some reorganization, is considered to be worthy of consideration by the Marine Corps. This option would be recommended if, on the basis of this study and other available information, the Marine Corps decides that MCTSSA cannot be controlled by absentee managers to the extent desired. In view of the foreseeable doubling of FMF demands on MCTSSA's software support resources, it may be wise to concentrate MCTSSA's resources on the support function and related operational testing. If this decision is made, it follows that the MTACCS Test Bed (now called TSCRB) should be broken out of MCTSSA and brought to the Development Center at Quantico. This option will be discussed in detail later in the report.

5. Option 5

A full move of MCTSSA from Camp Pendleton to Quantico would definitely require some reorganization. The purpose of the move would be to consolidate functions and personnel and to change management systems. Option 5, a total move with no reorganization, therefore, is not a workable choice.

6. Option 6

A total move of MCTSSA from Camp Pendleton to Quantico and a total reorganization was eliminated as a viable option because:

- it is the most costly, with the anticipated dollars required exceeding 17 million;
- many of the resources required for the successful accomplishment of MCTSSA's function are not immediately available at Quantico, e.g., airspace, clear communications frequencies;
- it is the most disruptive, at a time when few disruptions can be allowed. Many new MTACCS projects are entering the systems acquisition process which have milestones that must be met; further, the change would occur at the time the first MTACCS system -- the Marine Integrated Fire and Air Support System (MIFASS) -- is scheduled for the Joint Interoperability of Tactical Command and Control Systems (JINTACCS) testing; and
- it is the most drastic. Although problems were identified in the research, it is not considered necessary to start over completely with a new organization at a new location.

II. FINDINGS

II. FINDINGS

It is the central finding of this study that MCTSSA is not a unified, coordinated activity performing an integrative function in the overall RDT&E activity. That is what was hoped for when the tactical data system support activity at Camp Pendleton was integrated with the development testing function associated with the MTACCS Test Bed. In its present form, MCTSSA remains an essentially heterogeneous activity trying to perform too many unlike tasks at the same time. The result is a diffusion of management responsibility and a dispersion of decision-making authority among Headquarters, MCDEC and MCTSSA.

The roots of the existing situation can be found in the purposes which shaped the present configuration. MCTSSA was established to meet a growing need for a software support resource to serve the needs of the FMF. Recognition of this need prompted the Marine Corps to contract with the Data Systems Division of Litton Systems, Inc., to plan and cost out a facility that would satisfy the growing software support requirement. The Litton study was completed in June, 1969.² In December of that year the Commanding General (CG) MCDEC was asked to take the Litton Plan and turn it into an operational facility located at Camp Pendleton. MCTSSA appeared in name in 1970. In 1973 systems support work began at the present location.

The second purpose shaping the existing configuration grew out of a Marine Corps decision to join the other services in using test bedding techniques to refine the concepts, performance parameters, and costs

²Data Systems Division, Litton Systems, Inc. Marine Corps Tactical Computer Programming Support Activity Study: Final Report (12 June 1969).

of new systems in a relatively inexpensive laboratory environment. Information gained in test bed exercises provides a basis for decisions on whether to move forward with a new system, modify it, or abandon it altogether.

The test bed at MCTSSA, built under a contract with the Hughes Aircraft Company, was completed in 1971.³ Although this facility was located with MCTSSA from the start, it remained under the operational control of the Director of the Development Center until 1976, when operational control was transferred to the Officer in Charge at MCTSSA. As a result of this reorganization, the MTACCS Test Bed was designated as TSCRB within MCTSSA, taking its place alongside the testing, programming support and hardware support branches.

It was hoped that the existing MCTSSA would become a flexible, well-coordinated resource pool contributing to all phases of the systems development and support cycle where the Marine Corps exercises responsibility. The 1977 MCTSSA Command Brief says this of the physical location of diverse functional activities at MCTSSA:

...the collection of all these activities under the coordination of the director of the development center, provides us with an advantage in the systems development effort not enjoyed by any of the other services.⁴

The brief goes on to contrast MCTSSA with the "piecemeal, often organizationally divergent and geographically dispersed"⁵ functional components of development and support systems in the other services.

³The Marine Corps test bed and its functions are described in detail in Hughes Aircraft Company, MTACCS Test Bed System Description (15 June 1973).

⁴Colonel Ronald M. Proudfoot, MCTSSA Command Brief (June 1977) p. 16.

⁵Ibid.

It continues:

In many areas, such as interoperability, standards, and logistic support planning, the ability to centralize our expertise and efforts are fully exploited and provide us with significant benefits.⁶

This is the promise that MCTSSA finds itself struggling to realize.

Our findings indicate that the major factors inhibiting the realizations of Marine Corps expectations are:

- ° An unprioritized mission definition which continues to involve MCTSSA in the whole gamut of RDT&E/O&M activities. MCTSSA's responsibilities can, as things now stand, begin in the exploratory development segment of the conceptual phase of systems development. These responsibilities do not end until a tactical data system has reached the end of its life cycle and is replaced by a new piece of equipment. This fact, combined with anticipated increases in demands on MCTSSA resources, leave the resources at the Activity spread very thin. It forces MCTSSA to try to perform a large number of dissimilar tasks at the same time.
- ° MCTSSA's west coast location leaves it 3,000 miles from the Washington-Quantico area where the rest of the Marine Corps development community is concentrated. As the parent organization, the Development Center controls the formal lines of communication and the flow of funds to MCTSSA. Development Center Bulletin 5400 states, "Responsibility for the specific tasking and establishment of priorities for MCTSSA is retained at the level of the Office of the Director, Development Center only." This line of authority is clear enough. However, the Director of the Development Center and his cognizant C³ Division Head, as absentee managers, have found it difficult to control and direct the day-to-day activities at the distant MCTSSA location.

The mission and location of MCTSSA both contribute to the communication and control problems between MCTSSA and its east coast managers. Problems intrinsic to the existing location and the diverse work directives to

⁶ Colonel Ronald M. Proudfoot, MCTSSA Command Brief (June 1977) p. 16.

which MCTSSA responds have not been resolved by existing management procedures. The most prominent factors here are:

- The inability of either the Research, Development, and Studies (RD&S) Division at Headquarters or the Director of the Development Center (and his cognizant C³ Officer) to exercise strong, centralized management control over the west coast activity through formal communications channels.
- The absence of an integrated management plan that can be used operationally by the cognizant C³ Officer and the CO at MCTSSA to direct and coordinate their responses to new tasking and emerging contingencies at MCTSSA.
- The absence of priorities on the annual and intermittent work directives passing into MCTSSA through RD&S/Development Center Channels.
- The absence of recommendations on resource commitments in these work directives.

Because these questions are not decided in a formal way outside or within MCTSSA, the door is left open to informal influences which have a substantial but unmeasured influence on the direction of activities at MCTSSA.

- There is no reporting system at MCTSSA that generates the kind of information (feedback) required by ASPO's and DPO's if they are to fully exercise their responsibilities. MCTSSA cannot be controlled from the outside unless the responsible officers have sufficient understanding of the through-put process there to be able to monitor the Activity and intervene in a timely and intelligent way.

Analysis of the existing communications and control system in terms of input, through-put, and output reveals the following situation.

A. INPUT

Under existing regulations, all formal communications to MCTSSA must pass through the Development Center. The exception to this rule is tasking originating in the FMF which sometimes passes through the Development Center, and sometimes goes directly to MCTSSA.

Each of the major projects worked on at MCTSSA has a Development Project Officer (DPO) from a division in the Development Center who is responsible, under the provisions of the Marine Corps Systems Acquisition Management Manual and Development Center regulations, for exercising continuous management control of the MCTSSA team working on his project. DPO P3560.1 states that it is the DPO's responsibility "to manage, coordinate and monitor day-to-day RDT&E activity associated with the System Acquisition Program."⁷ While he cannot manage projects formally, through command channels, the DPO is authorized and expected to exert influence informally.

At the same time, the CO at MCTSSA is responsible for exercising supervisory control over all components within his command. He has his own management team to aid him in this.

Above these officers in the chain of command are the Headquarters sponsors of particular programs, the Acquisition Program Sponsors (ASPO's). Under the provisions of the Systems Acquisition Management Manual, the sponsor plays an advocacy role. It designates its own project officer and forms an Acquisition Coordinating Group (ACG) to move its program(s) through the development cycle and into the field. DPO's, while assigned by the CG, MCDEC, are agents of the ACG when working with project teams at MCTSSA.

⁷ DCO P3560.1, Section 1, p. 2.

Overall management responsibility for programs at MCTSSA resides with Headquarters sponsors.

Operations at MCTSSA are currently being directed by three levels of command and management authority which compete for resources through both formal and informal lines of communications. Formal management authority is overlapping and exercised concurrently. Beneath this formal system, informal communications and the influences they carry make things move indirectly, not necessarily in accordance with work directives and task performance documents.

The Systems Acquisition Management Manual calls for "A system of program sponsorship and clearly defined responsibilities of supporting staff and field agencies..."⁸ Instead, MCTSSA receives input from a diffused set of formal and informal sources which constitute a web of partial responsibility and partial control.⁹

B. THROUGH-PUT

The existing formal information system provides MCTSSA's absentee managers and technical directors no clear picture of the decision-making process or operations performed within MCTSSA. Various officers at MCDEC and Headquarters have a good idea of what is going on in particular projects. But this knowledge is fragmented, covering only a small part of the overall activity. Even among the DPO's, who are charged with directing specific project teams, there are officers who candidly admit that they cannot get

⁸MCO P5000-10, Section 1, p.4.

⁹The expected rapid increase in tasking originated in the FMF and passing directly to MCTSSA, or through Headquarters/MCDEC channels, promises to greatly increase the pressure on MCTSSA to respond to inputs.

enough information to follow what is going on, and therefore can exercise no meaningful direction.

When a work directive enters MCTSSA, the Operations/Support Section recommends resources to be committed to the particular task. This recommendation is passed on to the CO who then meets with the Branch Chief who will provide most or all of the resources necessary to perform the given task. Out of this meeting come decisions about when the task will be performed, and the time and resources to be devoted to completing it.¹⁰

No priorities have been established among the diverse missions of MCTSSA to guide this decision-making process. Work directives carry no information concerning their relative importance in any overall plan.

This situation leaves the CO of MCTSSA and his internal management team with a great deal of authority over the coordination and use of the Activity's fluid resource pool. Assessment of the desirability of this situation raises a basic issue associated with the expanded use of the new communication and control technology in tactical situations: How should control be distributed between officers on the scene and higher authorities in the command chain who remain removed from the action?¹¹ It appears that in the case

¹⁰ This sequence is spelled out in Activity Order 5400 1A (25 July 1975).

¹¹ For a discussion of this issue, see Major Kenneth C. Shumate "More Resources for a Commander in an Automated Environment " Marine Corps Gazette 61 (March 1977): 39-48. Major Shumate, who is presently Head of the Operations Analysis Section at MCTSSA, draws out distinctions between the information and perspective of officers on the scene and senior commanders removed from the battle-field context in terms of the comparative advantages of each in optimizing the decision making process.

of MCTSSA too much discretionary authority is exercised at a point too near the operational level in the overall RDT&E management system. The absence of meaningful guidelines coming through formal channels from above contributes to the problem of decentralized decision-making authority.

There is currently no continuous flow of information coming out of MCTSSA and fed back up the formal command channels that makes the decision-making process at MCTSSA and the reasoning behind it intelligible to absentee managers billeted at MCDEC and HQMC.¹² The absence of this kind of information makes it difficult for outsiders to monitor MCTSSA operations. It follows that it is also difficult for the cognizant C³ Division Head and other responsible officers to exercise timely and intelligent management control.¹³

The same problem occurs at the project team level. MCTSSA currently generates no information that portrays the problem solving process followed by project team leaders in carrying their work forward. DPO's and other outsiders responsible for directing the actions of project teams are forced to rely on uncertain informal lines of communication to exercise their assigned management responsibility.

¹²DC Bulletin 5400 (8 August 1972) anticipated this problem in stating, "Due to the complex nature of this (MCTSSA) effort, the cost involved, and its great potential impact on the future of the Corps, it is essential that the greatest care be taken to keep the Director fully informed of progress being made and problems encountered in carrying out instructions issued by the Director." A reliable reporting system within MCTSSA that accomplishes this end still does not exist.

¹³Timing of resource commitments will be especially important in forthcoming interoperability testing where overall coordination authority lies outside the Marine Corps.

C. OUTPUT

The consequences of the internal resource management and technical direction exercised by officers at MCTSSA do show up in the software programming and formal documents produced there. However, months, and sometimes years, can pass between the tasking and the production of final work products. There is little information in MCTSSA's outputs that throws light on the decision-making and operations performed at MCTSSA to produce the product. This information would come too late, in most cases, for use by outside managers in their decision-making and project direction, even if it were present. It would be of no use to the ASPO's and DPO's who might have intervened along the way to speed the work or prevent errors from being built into the output.

Due to the lack of adequate feedback mechanisms generating through-put information, messages passing in and out of MCTSSA do not provide a picture of a continuous developmental process. Information now appears in highly discontinuous form. It conveys the outer form of things, not the internal management and technical direction processes.

The continuous monitoring of MCTSSA's activities by managers at MCDEC and HQMC prescribed by the Systems Acquisition Management Manual and related Marine Corps regulations cannot be exercised on the basis of information now coming out of MCTSSA. Without this monitoring capacity, there is no reliable basis for officers at MCDEC and HQMC to intervene at critical junctures and provide necessary direction or call on assets other than those on hand at MCTSSA, which could be allocated to projects with sufficient notice.

The Monthly Status Reports that pass from the MCTSSA Headquarters to the Director of the Development Center might be expected to provide the missing information. However, they consist of cryptic information on a score of apparently unrelated projects. They speak briefly of what has been done in the past, what phase a project team is now in, and what remains to be done. But they carry only scattered information on managerial decision-making on the organization and use of resources. Real problems seldom surface here.

There is nothing here on the problem-solving strategy employed by officers responsible for the technical direction of projects. One gets no sense of the interaction of internal MCTSSA processes.¹⁴

These findings provide the basis for the recommendations which follow.

¹⁴ Our investigations revealed that these reports are not widely circulated among officers involved with the management of MCTSSA at the Development Center. The reason for this, according to officers consulted, is that the information conveyed is of little or no value to those men with management responsibilities.

III. RECOMMENDATIONS

III. RECOMMENDATIONS

Based on the Phase II Report's analysis of resources at Camp Pendleton and at Quantico available for the successful accomplishment of MCTSSA's mandate within the systems acquisition process (defined in Phase I), two primary recommendations are made with the intent of resolving the problems identified in the Findings Sections of this report:

- that MCTSSA's location remain at Camp Pendleton, and that new management techniques be applied and controls instituted (Option 2) or,
- that MCTSSA be divided, with the support and operational testing function remaining there and the conceptualization and simulation function removed to Quantico (Option 4).

These options are explained in detail in this section. Of the six options presented in the analytical framework, only four are realistic alternatives. Two we would not recommend (Options 1 and 6); and two are considered viable (Options 2 and 4). Options 3 and 5, which require a move, but allow no management changes must be discarded as being only conceptually possible. Any move would necessitate some management changes. Options 1 and 6, which are feasible but not recommended, are discussed first. The report then moves on to an in-depth look at the rationale and implications of the two options recommended for consideration by the Marine Corps. The choice between the two must be made by the Marine corps.

A. OPTION 1

1. General

Option 1, leave MCTSSA exactly as it is, was recommended to us by some officers. Their reasoning is that past problems were caused by:

- the fact that MCTSSA is a new organization and naturally experienced some start-up problems and growing pains,

- the fact that the test bed and MCTSSA at first were under separate commands, and
- the personalities of officers occupying some key positions.

With the consolidation of the test bed into MCTSSA, changes in personnel, and the passage of time, several officers maintain that problems which once existed have been resolved. It was also pointed out that officers assigned a command should have the leeway needed to accomplish their mission, and not be subject to micromanagement from HQMC.

It is true that improvements have occurred, and that officers on the scene must have discretionary authority over assigned resources, in order to accomplish their assignments. However, if the officer in command is to be held accountable for accomplishment of Marine Corps goals, the goals must be specified. If the effect of personalities on program development is to be mitigated to the extent that the mandate will be accomplished no matter who holds the command at MCTSSA, specific guidelines must be established. And if new foreseeable problems, such as new support burdens and the backup of MTACCS programs are to be met and overcome, the design of the management systems and procedures controlling MCTSSA must be improved.

2. Cost Analysis

Under the "no change option" (Option 1) no additional dollars are required. However, we would anticipate large losses in program dollars occasioned by delays that would continue to occur without sufficient and properly timed information to enable HQMC to move away from expensive crisis management.

3. Recommendation

For these reasons, we do not recommend Option 1.

B. OPTION 6

1. General

The exercise of this option would mean a total move of MCTSSA to Quantico, and a total reorganization of the activity. While this option has some merit, the apparent disadvantages overshadow the benefits. For example,

- there would be a major disruption of the systems acquisition process, which we estimate would cause additional time delays of one to three years in the development of MTACCS systems. This is not acceptable, especially since the programs are already delayed, or facing delays because of limits in resources. Outside time schedules, such as those imposed by JINTACCS testing, would be adversely affected, creating problems not only within the Marine Corps, but service wide;
- the resources required for the successful accomplishment of MCTSSA's mission are not readily available at Quantico. Office and facility space would have to be built; and
- airspace at Quantico is limited and inadequate for many tests run by MCTSSA. The airspace problem is further aggravated by the weather conditions on the east coast. The questions of RF hazards and electromagnetic compatibility would have to be studied and resolved. Ranges for guns and missiles are not available at Quantico.

Because of the disruptions and the lack of availability or the poor quality of resources at Quantico, Option 6 is considered unworkable; at best it would be a long term (past 1990) possibility. If some partial move is made, it may be advisable to restudy this issue after the new organization has had time to settle out.

2. Cost Analysis

a. General

The cost of moving the entire MCTSSA facility (excluding AVTB) from Camp Pendleton to the Development Center at Quantico, including first-year expenses, will be in excess of 17 million dollars. Table III-1 summarizes the major factors to be considered and their cost estimates in 1981 dollars. (Specific cost factors not explored in Option Four are discussed in more detail below.) Detailed information on the remaining factors in Option Six may be found in Appendix A.

TABLE III-1

ESTIMATED ONE-TIME AND FIRST YEAR COST OF
OPTION SIX

Costs:

Feasibility Studies	\$ 52,000
Office Space (MILCON)	14,110,120
Housing (including Rations)	242,300
Utilities	148,197
Relocation	2,871,087
ADPE Transport	7,071
Contractor Support Transfer	3,928,800
R&D Test Equipment Transfer	<u>175,672</u>

Subtotal \$17,999,247

Benefits:

Billet Reduction	\$ 338,779
TAD Reduction	<u>260,100</u>

Subtotal 598,879

TOTAL \$17,400,368

b. Preliminary Studies

In considering a move of an activity of MCTSSA's magnitude, preliminary feasibility studies must be performed to determine the implications of a move on available resources.¹⁵ At least two such studies would have to be completed before moving all of MCTSSA. They are an

- Environmental Impact Assessment (EIA), and an
- Electromagnetic Compatibility Study (ECS).

The EIA will cost approximately \$40,000 in 1981 for a move of this magnitude. The ECS would cost the Development Center \$12,000 in the same year. That is, the Development Center would have to spend approximately \$52,000 for feasibility studies if MCTSSA were to move.

c. Housing

If MCTSSA were to move, because of the lack of Adequate BOQ and BEQ housing at Quantico, increased BAQ and Commuted Rations (COMRATS) expenses would incur. Projected to 1981, an increase in BAQ would be necessary for four unmarried officers and 83 single enlisted personnel. Again, based on typical (1st Lt. for officers; Sgt. for enlisted) rank, since it is impossible to anticipate exact requirements, the officers would require an additional \$10,900 in 1981 and the enlisted personnel \$156,000. Fifty-five more enlisted personnel would require COMRATS, at a cost of approximately \$75,400.¹⁶

To adequately assess the amount of TAD money that will have to be budgeted in the early 1980's for this type of support, it is necessary to know at least the number of troops involved and the expected

¹⁵EIA costs based on "Assumptions for Costing Data" (mimeo), Shore Establishment Coordinating Branch, Chief of Naval Operations (Logistics), p. 1. ECS costs based on an estimate from the Electromagnetic Compatibility Analysis Center, Annapolis, MD.

¹⁶The source of these cost data is Capt. H. M. McIlroy, Fiscal Division, HQMC.

duration of their stay while testing. This information is unavailable at this time.

This lack of information is to a large degree a function of the support activity itself. Great flexibility has been exercised in MCTSSA, to take advantage of an established process that changes as it goes. Time required to rectify problems in a system which become apparent during testing have not been recorded. No one at the project officer, DPO, or program sponsor level can estimate required FMF support at this time. It is, however, a cost factor that cannot be glossed over. Some effort should be made to improve this documentation in the future so that additional resources can be estimated.

d. Government Laboratory Support

If MCTSSA were to move to Quantico, government laboratory support from other than the Naval Ocean Systems Center (NOSC) may be necessary. Additional costs to the Development Center would be minimal if MCTSSA at Quantico would require laboratory support. They might include the transfer of the civilian employees working at NOSC currently. The other alternative is to leave the current personnel at NOSC and absorb the additional temporary additional duty (TAD) expenses.

3. Recommendation

Little would be gained by moving the entire MCTSSA activity to Quantico, except disruption of an already stalled system acquisition process, more constraints on live testing capability (e.g., airspace), and a cost of over 17 million dollars in moving and first-year expenses.

C. OPTION 2

1. General

The Marine Corps can leave MCTSSA at its present location and reorganize, instituting new management communications and control techniques to improve the progress of tactical data systems development. If the existing

MCTSSA is to remain at its Camp Pendleton location, however, and especially if it grows as projected by Colonel Proudfoot, CO, MCTSSA, the Marine Corps must take steps to make the activity more manageable.

In the option described below, it is assumed that the management of MCTSSA will continue to reside with the Director of the Development Center and his cognizant C³ Division Chief. If this approach is to be made workable, the quality of formal communication between officers at the two locations must be improved. Information exchanges, especially work directives and MCTSSA responses to these, must be given continuity and more exact definition. The following changes are recommended:

a. Add recommendations on priorities and resource allocation to work directives.

Work directives could bear a clear indication of the priority assigned to the tasks by the tasking authority. They could also be accompanied by recommendations on resources to be committed to the assigned task. This puts the CO at MCTSSA in a position of either complying with a directive, or formally proposing an alternate plan and giving his reasons. These two changes should serve to centralize control of priorities and resource use at MCTSSA.

Decisions on priorities and resource allocation are currently made within MCTSSA by local managers. Under the recommended changes these decisions would be made initially at the Development Center. They would be finalized in the course of a formal dialogue between the tasking authority and the CO of MCTSSA. This shifts control from MCTSSA to the Development Center. It makes final decisions a function of formal conversations between leaders at the two locations.

b. Institute a feedback process within MCTSSA that generates information essential to responsible managers at MCDEC and HQMC.

One finding of this study is that MCTSSA cannot be controlled through the existing chain of command until a reporting system is created within MCTSSA that provides a clear view of through-put. This reporting system should explain the actions and reasoning of officers at MCTSSA tasked with the management and technical direction of systems in the acquisition process. Because of the proliferation of programs at MCTSSA, reporting at the project level on problem-solving strategies of technical directors should probably focus on a few key programs.¹⁷

Without such a feedback process, the activity cannot be monitored and controlled by officers with management responsibility who reside at Quantico. Reporting procedures which could be instituted might be established as described below.

- ° MCTSSA could be directed to generate the necessary information. Its Operations Analysis Section could be tasked with interpreting the management decision-making process from the point of view of the men at MCTSSA responsible for responding to work directives. In reporting to the Development Center, MCTSSA -- which is now mainly oriented to operations -- would be led to more analytic judgements on its decisions and actions.
- ° Alternatively, the reporting could be done by a management analysis team from the RD&S Division at Headquarters, assigned for a set time period considered long enough to complete a report. This group would be located at MCTSSA. In this case, the purpose of the reporting agent would be somewhat different. It would be expected to do for management problems at MCTSSA what teams now used by I&L do when critical malfunctions occur in fielded equipment. This management analysis group would evaluate MCTSSA as a work center. Its mission would be to provide officers with overall RDT&E management responsibilities at MCDEC and Headquarters information necessary to determine

¹⁷ Reporting on key programs such as MIFASS, TCO and MACCS-85 could be the basis of case studies of Marine Corps development efforts. These could be submitted for analysis at the Development Center and integrated into courses at the Education Center. The point, always, is not simply to generate information, but to learn from it, and use it to control future development efforts.

whether MCTSSA in its present configuration can be directed and controlled from outside (through HQMC to MCDEC to MCTSSA). At the end of a set time period, the team would report on the question of whether to expand or divide the existing activity.

If the second approach is adopted, it is recommended that the Officers constituting this team have the following qualifications:

- ° sustained career experience within the RDT&E community, including billets which allowed the officer to see the development process from a variety of positions. "Where you stand depends on where you sit" is a fundamental assumption of organizational theory. Therefore, it is important that the management analysis group be composed of men who have sat in a variety of positions,
- ° appropriate SET MOS's and advanced training in systems analysis and management procedures and techniques,
- ° strong personal motivations to understand the MCTSSA throughput process, and
- ° reporting skills insuring that the team's analysis will be documented clearly enough to provide a second basis for final decisions.

Perhaps officers satisfying these criteria should be chosen from among those who are about to leave the Corps, but retain an intense commitment to the development and effective Marine Corps utilization of the new command and control technology. Such men would be likely to produce a disinterested assessment.

No matter who generates the information, those tasked with responsibility should perform a systematic analysis of management strategies, actions and outcomes. In management science terms, the analysis of strategy, actions and outcomes must regularly be fed back to the responsible problem solver, if his decisions about what to do next are to be based on understanding of the consequences of past actions.

The performance of tactical data equipment developed and operated by the Marine Corps is continually evaluated in the most rigorous, scientific manner. The management information and control systems that direct the course of the MCTSSA have never been examined systematically. If the JAR findings regarding information flow to and from MCTSSA are to be of lasting value, the existing communication and control system needs to be studied and changed by the Marine Corps. The goal of any change would be to help insure that:

The right amount of the right information reaches the right control point at the right time so that information conditions exist which will allow the most effective decision to be made.¹⁸

This is a standard by which success and failure of any management information system can be measured.

c. Provide the officers in charge at the Development Center and MCTSSA with a plan to guide their management of MCTSSA resources.

Authorizing the Development Center to establish priorities and recommend resource allocations at MCTSSA is an important step in controlling the Activity. If fully utilized, the recommended feedback mechanism would provide information necessary to monitor the throughput process at MCTSSA. But these are only tools. If they are to be used effectively, the Marine Corps must decide what it wants out of MCTSSA. This should be written into a working plan and given to the officers in charge at the Development Center and MCTSSA. This plan would provide a common framework for management decision-making at both locations.

The foundations for this plan lie in the various planning exercises now conducted at the Development Center. But unlike these documents, the

¹⁸David H. Li, Design and Management of Information Systems (New York: Science Research Associates, Inc., 1972), p. 2.

plan would be a working instrument designed for the use of officers responsible for managing resources committed to the development and support of tactical data systems.

The RD&S Division at Headquarters is the logical source of such a plan. It would be expected that all general officers at Headquarters would have regular input into its formulation. The planning process should be continuous. It should be flexible enough to adapt to overall policy changes and altered funding levels.

d. Redefine the CO position at MCTSSA as a director's billet.

Another recommended step in improving the communication and control system between MCTSSA, the Development Center, and Headquarters is to make the officer in charge at MCTSSA a Director.¹⁹ His conventional command responsibilities could be turned over to the CG of Camp Pendleton. This would free MCTSSA's officer in charge to concentrate on optimizing the productivity of development and support resources under his control.

This recommendation is based on the distinction between the function of field commands, and the function performed by MCTSSA. The differences in functions dictates differences in effective means of command and control. It can be said that a substantial amount of the work done at MCTSSA can be directed but cannot be commanded.

Inherited command language and reporting formats have not proven an effective means of directing MCTSSA. This language and the existing information system need to be modified to allow the Marine Corps to make use of the idiom and information systems used by teams charged

¹⁹This was originally suggested in the Litton Study of 1969. See Data Systems Division, Litton Systems Inc., Marine Corps Tactical Computer Programming Support Activity Study: Final Report, Section 4, p. 5 A.

with developing and supporting the same advanced technology -- regardless of their institutional affiliations. These originate in the management sciences.

e. Re-examine existing officer career management policies.

In the end the question remains, where will the right men to fill the key billets in the RDT&E process come from? The answer for MCTSSA (and elsewhere) touches on basic career management issues that can only be resolved within the Marine Corps.

A recent study of Marine career management policies set out to answer the following question:

What officer management policies pertaining to classification, assignment, training, and promotion can best provide the grade skill assets to satisfy current billet requirements as well as provide equitable career opportunities for the individual?²⁰

Applying this question to the problem of controlling MCTSSA and making it more productive, we offer the following suggestion:

- ° primary MOS's could be instituted for Marines who want careers as managers and systems analysts.²¹ It follows that key billets in the RDT&E process would be earmarked for officers with manager/analyst MOS's. These billets might include the top positions at MCTSSA, the Development Center and the Education Center. This policy might be extended to open the top positions at MCDEC and in the RD&S, R&P, and I & L Divisions at Headquarters to men with primary managerial MOS's.

Our investigations indicate that the Marine Corps is currently losing (or about to lose) many of its RDT&E officers to early retirement

²⁰The Unrestricted Officer Concept Study (15 July 1977).

²¹MOS's that would probably be affected are 9640, 9654, 9656, 9660 and 9662.

and alternative career opportunities. The recommended manpower policy changes are intended to help rectify this situation. In addition,

- the conventional rotation of men in key billets in the development process could be changed in favor of a policy of keeping the best available operational and management talent on the job until their work is finished. Rotation could be made a function of the forward movement of key systems through development and testing into the field, not a function of an arbitrary 3 year cycle.

Adopting these recommendations would mean a significant change in current Marine Corps personnel policies. It would signal a willingness to adapt to the unique requirements of the new command and control technology. The justification for this break with tradition is that it may be necessary to insure that the development, testing and support of the new command technology lies within the competence of the Corps -- and that the latest equipment is available to officers and men in the field.

A less radical approach would be to maintain the existing MOS structure, but exercise more deliberate control of the sequence of assignments given persons with technical expertise. Through special career planning for technical personnel, these men could be rotated through a project at MCTSSA, MCDEC AND HQMC, with field assignments in between, so the assignment pattern would not be detrimental to their career.

This process of rotation would provide needed continuity, and also bring new personnel with FMF experience into the systems acquisition process on a regular basis. This should help to insure that the technology which is developed would be usable as well as state of the art technically.

2. Cost Analysis

Implementing the changes in the internal organization of MCTSSA at its current location, as recommended above, will have no significant impact

on overall costs to the Development Center. Some cost factors may be identified, but are considered negligible. Costs of the reorganization recommended in Option 2 are described in detail below.

a. Add priorities and resource allocation recommended to work directives.

If the MCTSSA-generated feedback system proposed in this recommendation is carried out, additional costs to the Development Center for operating MCTSSA could be near zero. This recommendation assumes that the Operations Analysis Section (or other existing units) can allocate the manpower necessary to perform the management analysis task. The extent to which this internal group can synthesize and record useable information for MCDEC personnel will, to a large degree, dictate the amount of manpower necessary for this function. As pointed out above, this feedback loop is not trivial and could require a moderate level of effort. If the internal unit's workload is heavy at present, it may have to acquire another employee from other sources within Headquarters (MCTSSA), one of the functional branches, or from the outside (military or civilian). It is anticipated that the worst case from a costing standpoint would occur if an additional employee has to be hired from the outside, at a cost of \$22-28,000 (1981 dollars) annually.

If the RD&S feedback alternative is developed, no costs will be added, excluding the TAD of the management team itself. This amount will be a function of the duration of the analyst team's stay at Pendleton.

b. Provide written guidance on overall priorities.

Again, minimal cost will accrue to the Development Center if this recommendation is followed. TAD expenses between CDSA and RD&S may increase very slightly if both groups are tasked with composing a short-term plan. Consideration should also be given to the encouragement of these personnel to take management science courses to facilitate the management analysis thought process. This will create

additional training costs. The benefits of this recommendation will far outweigh the costs since the efficiency of the system acquisition process is bound to improve with more specific control and coordination at the Development Center level.

c. Project management orientation

Costs accumulated in either the development of primary MOS's or more specialized career development planning for technical project managers would be absorbed in HQMC manpower planning and have virtually no impact on allocations made through MCDEC. If either primary MOS's or more extensive technical career planning develop, manpower personnel at the MCDEC level presumably would have to be brought up to speed on the new manpower policy. These costs would involve some TAD, orientation seminars, and disruption of the ongoing workload. There are also some potential opportunity costs, however, that should be noted:

- ° if Marine Corps personnel are not given some choices in management and technical disciplines, as well as in command, the retention rate of personnel will decrease. New personnel, who are less senior, may not be as effective as managers of the acquisition of tactical data systems. Therefore, there would be continuing retraining costs required to place persons in adequate positions on the learning curve to direct the programs of the team leader on higher levels. 22.

3. Recommendations

The following advantages and disadvantages are associated with exercising Option Two.

²²Note: This manpower plan is designed to place the best personnel at MCTSSA, which may not be the best approach for the rest of the Marine Corps.

a. Advantages

The recommended changes are intended to expand Marine Corps control over MCTSSA and make its resources more productive by:

- careful front end planning, exercised continuously, at the Headquarters level,
- using work directives to formalize priorities and establish resource commitments for tasks MCTSSA is asked to perform.
- initiating a reporting system at MCTSSA that continuously feeds back information on critical aspects of the throughput process to officers with management responsibility at Quantico and Headquarters, and
- changing the designation and character of the top positions at MCTSSA and altering manpower policies to accommodate the need to hold on to and give key assignments to experienced manager/analyst specialists.

These recommendations are aimed at creating a formal, systematic mechanism for controlling the MCTSSA activity which will be less affected by informal influences and, therefore, better able to consistently achieve the Activity's mission.

b. Disadvantages

The assumption on which all the recommendations rest -- that the existing MCTSSA configuration positioned as it is in the chain of command can be adequately controlled -- may not be valid. That is, the results of recommended changes may be disappointing, because of intrinsic structural problems.

D. OPTION 4

1. General

We propose for consideration a move of MCTSSA's Concepts and Requirements Branch to the Development Center. Interoperability personnel at MCTSSA should follow the test bed to its new location. The remaining

components of MCTSSA would be designated at Test and Support Center whose mission would be to provide software support for existing tactical data systems and to conduct operational testing of new and altered systems.

a. The rationale for the TSCRBI/OB move to Quantico

One rationale for this move is that the test bedding phase of the concepts and requirements definition process is a function distinct from the operational testing and software support functions of MCTSSA and need not be at the same location. If relocated to Quantico, TSCRBI would interface with components in the Development Center whose primary mission is a conceptualizing function that:

- identifies existing and projected threat levels;
- defines long and mid-range plans which point the way to a growing capability to meet and overcome threats;
- develops doctrine, tactics and techniques, and
- writes General Operational Requirements (GOR's) and the more specific Required Operational Capabilities (ROC's) that define specific command and control capabilities.

It is the function of TSCRBI to carry the conceptualizing process a crucial step forward toward operational capability. Exercises and analysis conducted in this operationally-oriented laboratory environment produce refined technical descriptions of equipment that can be built, specifying capabilities and the cost of buying and maintaining it. As a logical next step in the conceptualizing phase that precedes it, test bedding determines whether or not an idea of a new system can be translated into an affordable operational capability.

At the same time, the test bedding process acts as a stimulus to continued conceptualizing that generates ideas of new capabilities.

The 1973 Hughes Aircraft Company MTACCS Test Bed System Description says this about the relationship between the test bedding and conceptualizing functions:

The MTACCS Test Bed effort is not one solely directed at equipment specification but, far more significantly, at the generation of the recommendations for the doctrine, tactics and techniques, procedures, and organization to support a totally integrated command and control system for all Marine Landing Forces. 23

Relocating the test bed at the center of the Marine Corps development community provides no guarantee that this kind of interaction will occur in support of the Marine Corps requirement for a growing operational capability. On the other hand, the Development Center location with its easy access to Marine Headquarters, Navelex, and the Marine in-house think tank (Potomac General Research Group), provides the conditions for this to occur.²⁴ Implicit here is the assumption that in the systems definition process there is no substitute for a meeting of minds through personal contact and conversation.

A second rationale for the proposed move that speaks in more concrete terms to a pressing need is that bringing TSCRB to Quantico puts an end to the current pattern of uncertain, absentee management by DPO's

²³ Hughes Aircraft Company MTACCS Test Bed System Description, Section One, page 4.

²⁴ There is also a natural complementarity between MTACCS Test Bed exercises and TWSEAS exercises now occurring at the Education Center, Quantico.

in the early concepts and requirement definition stage. With the circuit followed by DPO's shortened to Quantico-Headquarters-Navelex, it is anticipated there would be a significant increase in their control over programs passing through the test bedding stage of development.

Thus, the first tangible benefit of the proposed move would be closer management control and technical direction of TSCRB project teams by DPO's assigned this responsibility. This should contribute to the timely passage of MTACCS programs to the MSARC II decision point.

It should be noted that two major considerations influencing the original decision to locate the MTACCS Test Bed at Pendleton no longer stand as reasons for keeping it there. It was anticipated that live input would be used in test bed exercises. Live input has not in fact been used and there are no existing plans to use it. Secondly, at the time the location decision was made (1969), Southern California was the center of interoperability testing for tactical data systems. With the establishment of the JINTACCS Test Bed at Fort Monmouth, this has changed.²⁵

The reason for bringing interoperability personnel with the test bed to Quantico is that interoperability must be established at the front end of the development process. The basic documents substantiating interoperability are Technical Interface Concepts, Technical Interface Plans, and Inter-Agency Interface Designs. This documentation is established in the test bedding phase of the development cycle. With the JINTACCS Test Bed now at Fort Monmouth, New Jersey, the proximity of Quantico to this facility becomes another important consideration in favor of the proposed move.

²⁵ Memo 46/3/GLW;th, 30 September 1969. From CG: MCDEC to CMC, HQMC, Re: MCTSSA, designation of.

Our research found differences of opinion among Marine officers on whether the verification of interoperability in the operational testing of new and upgraded equipment that would continue at MCTSSA requires the presence of interoperability specialists at that location. If they were needed, the consensus is that it would be for rather short periods because interoperability at this point is insured primarily through written specifications.

Traveling to Camp Pendleton should not impose problems for IOB personnel who presently spend most of their time at Headquarters or other locations anyway. On the other hand, the proximity of the MCTSSA interoperability personnel relocated to Quantico to the C⁴ Division at Headquarters, which is responsible for interoperability standards, should cut travel costs and improve effectiveness. The comparative closeness of the JINTACCS interoperability center at Fort Monmouth, New Jersey, should have a similar effect.

In terms of timing, the proposed move should be undertaken when it would be least disruptive to the work of the test bed. Existing program development schedules suggest 1981 as a possible target date.

b. Positioning and control of TSCRB and interoperability personnel at the new Quantico location

It seems clear that the interoperability personnel moved from MCTSSA to Quantico should be integrated into the C³ Division.

The most advantageous location of the test bed is less certain. Alternatives include:

- Placement under C³, at least, for the duration of the MTACCS testing phase. The Chief of C³ is already the cognizant officer acting for the Director of the Development Center in the tasking and management of the test bed. DPO's who are

usually assigned to C³ are currently responsible for the day-to-day management of TSCRB Project Teams. This action is considered the best short term option, given the present preoccupation of test bed resources with the development of MTACCS systems.

- ° Placement within the Concepts, Doctrine and Studies Activity at the Development Center. CDSA is the main conceptualizing agency in the DC. Its responsibilities extend from long range planning, to the writing of ROC's and review of documentation produced by TSCRB exercises. This is possibly the best long term solution.
- ° Making the test bed an independent agency under the Director of the Development Center.

c. The new configuration at MCTSSA

We recommend that the components of MCTSSA which would remain at Camp Pendleton be designated a Test and Support Center. Its mission should be defined in the following order of priority:

- ° Configuration control and maintenance of software in fielded tactical data systems.
- ° Support of FMF operational testing of new and upgraded tactical data systems.
- ° The upgrading (shared with the PDA) and operational testing of existing tactical data systems.
- ° The IOT&E and OT&E of prototype and initial production models of new systems.
- ° The DT/IOT&E of new systems when these tests cannot, for practical purposes, be separated.
- ° Residual resources not committed to the above missions could be used for developmental testing. In these cases, it is recommended that PDA managers responsible for the development effort write the special fitness reports for Marine Corps personnel involved, and that members of DT teams not participate in the OT&E of the same system(s).

The result of these changes is to narrow and prioritize the definition of the mission and functional responsibilities of MCTSSA. As a Test and Support Center, MCTSSA would be clearly positioned at the center of the test and evaluation and the systems support phases in the overall RDT&E/O&M cycle.

The primary responsibility of the Center would be to maintain the integrity of the software configuration in operational tactical data systems currently in use in the FMF. It would be tasked with quick response in cases where programming malfunctions.

The new Center would also stand at the receiving end of the RDT&E process, applying user standards in the testing and evaluation of new and upgraded systems. It would perform this task by assisting FMF in operational testing, and in field tests conducted at Pendleton.

This mission definition does not deny access to MCTSSA resources as a means of responding to developmental testing requirements. It does set conditions which are intended to:

- ° guard against any drift towards the recognition of developmental testing as a primary responsibility; and
- ° isolate developmental testing from the other tasks performed at the Center.

MCTSSA, defined as a Test and Support Center, becomes a source of standards in software programming which are to be applied equally to fielded systems and systems which are about to pass into the hands of FMF units. It is responsible for insuring that:

- ° operational standards and documentation of existing fielded software are maintained and performance is improved whenever advances in the state of the art allow; and

- upgraded and new equipment does what it is supposed to do. This means exposing new technology to rigorous testing under field conditions to verify that it can be relied on under battlefield conditions.

It is understood that the Marine Corps Operational Test and Evaluation Activity (MCOTEA) would retain its distinctive testing and validation role.

Defined as a Test and Support Center, MCTSSA would resume the mission that was anticipated when it was originally formed and located at Camp Pendleton. In the words of the Litton Study which defined the new facility, its organization and its mission in 1969:

As its primary task, it (MCTSSA) will provide software support for the Fleet Marine Forces' tactical data systems. Additionally, it will have the ability to support some phases of the development cycle for new tactical data systems.²⁶

The rationale for a return to this conception of MCTSSA is an immediate need to clarify the MCTSSA mission and concentrate its resources to meet the quantum leap in software support tasking anticipated in the near future.

Fielded computer-aided tactical systems now supported by MCTSSA include:

- Tactical Air Command Central (TACC), AN/TYQ-1
- Tactical Air Operations Central (TAOCC), AN/TYQ-2
- Tactical Data Communications Central (TDCC), AN/TYQ-3
- TAOC Training Device, 15A19

²⁶Data Systems Division, Litton Industries, Marine Corps Tactical Computer Programming Support Activity Study: Final Report, Section 4, p. 2A.

- Automated Direct Air Support Central (DASC), AN/UYQ-4
- Tactical Warfare Simulation Evaluation and Analysis System (TWSEAS)

Among the new systems to be fielded in the early 1980's and supported by MCTSSA are: AN/TSP-59 radar, AN/TPS-27 Radar Course Directing Central and the Position Location Reporting System (PLRS). It is the anticipated fielding of these systems and others in the 1980's that forms the basis for predictions that the demands on MCTSSA's software support resources will double (and perhaps triple) in the next decade.²⁷

d. Control of the new MCTSSA configuration

Under the original Litton plan it was anticipated that MCTSSA would be positioned alongside the Development and Education Centers as an equal under the CG, MCDEC. Subsequently, of course, MCTSSA fell under the Development Center, and its development responsibilities for new MTACCS systems were expanded so they now overshadow the support mission. It is feasible for the new Test and Support Center to be re-established as a separate center reporting directly to the CG, MCDEC. This would resolve the communications and control problems associated with the HQMC-DC-MCTSSA chain and leave MCTSSA under the RD&S Division. If the new center and Headquarters are to be directly linked, two sources of control seem feasible. One is the C⁴ Division; the other is the Installations and Logistics (I&L) Division.

- Reporting to C⁴ at Headquarters
 - In terms of correlation and compatibility of functions, the C⁴ Division seems the proper agency to exercise control of the new Test and Support Center.
 - It has overall responsibility for the fielding and operational integrity of the new command and control technology.

²⁷ MCO 4130.2 provides a statement of policies and procedures which define MCTSSA's software support responsibilities.

- Reporting to I&L at HQMC
 - The support function of the proposed MCTSSA mission places it within the sphere of responsibilities that falls to I&L. I&L, through its designated APO's,²⁸ is now responsible for formulating an Integrated Logistics Plan for each new tactical data system.

Reinforcing the argument for I&L control is the fact that current MCTSSA systems support tasking originates in the FMF passes through I&L. The exception to this is the quick response tasking that passes directly from FMF to MCTSSA.

2. Cost Analysis

Partially relocating MCTSSA by moving TSCRB and IOB, as recommended above, will incur moderate costs to the Development Center. The estimated one-time and first-year cost of providing the space and other material resources to support the test bedding and interoperability functions at Quantico in 1981 is in excess of \$800,000. The estimated cost of moving the personnel and equipment is approximately \$725,000.

Elements of savings that would be expected to reduce operating costs from such a move include:

- eliminating personnel and resource duplication,
- travel expenses, and
- value to an expanding MCTSSA of the buildings and office space left at Pendleton.

Potential costs and savings are presented in full in Table III-2. Specific cost factors are discussed in more detail below.

²⁸It is recognized that all APO's are not from I&L.

TABLE III-2

ESTIMATED ONE-TIME AND FIRST YEAR COST OF OPTION FOUR

Costs:		
Office Space (MILCON)	\$682,438	
Utilities	5,262	
Shielding	125,000	
Relocation	299,785	
ADPE Transportation	864	
Contractor Support Transfer	<u>420,000</u>	
Subtotal		\$1,533,349
Benefits:		
Reduction in Billets	\$113,701	
TAD Reduction	<u>99,695</u>	
Subtotal		213,396
TOTAL		<u>\$1,319,953</u>

a. Office space

Given the current demand on office space at Quantico, finding enough to meet the requirements of TSCRB/IOB may be a problem. Discussion with Col. W. W. Widener, AC/S (Facilities), MCDEC points to the fact that it is exceedingly difficult to plan, from a facilities support standpoint, what will be available for incoming groups to Quantico in the early 1980's time frame. Three alternative sources of office space in 1981 may be considered:

- The Marine Security Guard Battalion
- Concepts, Doctrine and Studies Activity
- New permanent construction (MILCON)

In view of the fact that there is no clear indication at this time how the demand for increased office space for TSCRB/IOB would be

accommodated, both MILCON and renovation possibilities are estimated in Table B-1. To make the cost analysis as accurate as possible, however, the costs of Option Four will consider the MILCON alternative only. (The tables are in Appendix B).

Table B-2 in the Appendix includes the estimated amount of office space that TSCRB/IOB will require and the cost per square feet that will be required to construct or renovate that amount of office space in 1981.²⁹ It should be noted that construction of facilities housing automatic data processing equipment (ADPE) cost significantly more per square foot than typical MILCON for administrative space. This is due to the fact ADPE requires more exacting facilities, including air conditioning from the floor, constant temperature, etc.

Moving TSCRB/IOB would not require providing facilities for a significant amount of non-ADPE hardware (e.g., radars, phase generators, etc.) or maintenance and supply equipment, excluding ADPE-related supplies, which are included in the ADPE cost estimates.³⁰

b. Utilities

Table B-3 in the Appendix depicts the estimated annual cost of utilities (heating, lighting, and normal cooling) for the office space

²⁹All estimates except square footage given in Table III-3 were obtained from MCO P7000.14 Marine Corps Corps Cost Factors Manual, FDR-30/euv 22 May 1978, pp. 4-48-4-54. Space requirements are based on those presented in the "Phase II Study Report of the Marine Corps Tactical Systems Support Activity," J. A. Reyes and Associates, Inc., Contract M00027-77-C-0060, 10 April 1978.

³⁰The ADP cost estimate for construction could be significantly reduced if the planning for the consolidated facility at Quantico includes this space. According to Col. Mathis, Director of the Computer Sciences School at Quantico, this decision would have to be made by Fall, 1978.

(MILCON) required in Option Four.³¹ It presumes that other organizations move into the space vacated by TSCRB/IOB at Camp Pendleton thereby increasing the Development Center's total commitment to utilities.

A factor not included in Table B-3, but necessary in cost planning for ADPE is the cost of mechanical cooling (i.e., compensating for the heat generated by the equipment during operation). It is reasonable to assume, however, that the cost for mechanical cooling at Quantico is approximately the same as it was at Pendleton, thereby causing no cost increase.

c. Security

As discussed in the Phase II Report, the largest security factor with potential impact on cost to the Development Center is TEMPEST shielding of ADPE. Because moving TSCRB and IOB, as recommended here, also involves bringing a considerable amount of ADPE to Quantico, it is possible that shielding may have to be introduced in two separate facilities -- one at Pendleton, the other at Quantico -- to meet security regulations. At first glance, this would seem to indicate a doubling of TEMPEST shielding costs.

This is not necessarily the case, however, according to Mr. Jack Hughes of the Naval Electronic System Security Engineering Center, for the following reasons:

- ° TEMPEST shielding may not be required at either of the computer facilities. The only way to determine the need for TEMPEST is to request a study through the Naval Electronic System Security Engineering Center. In most cases installing TEMPEST (the most costly type of shielding) can be avoided by taking other intermediate measures.

³¹ All estimates, except square footage (see Table B-2), are based on actual energy utilization at Quantico according to Mr. Wayne Burke, Energy Program Coordinator (Facilities), MCDEC.

- Even if the initial study determined that TEMPEST (or any other shielding) is necessary in one of the facilities, that action likely would have had to occur regardless of location. Therefore, no additional costs would accrue to the Development Center.

If it is determined that both facilities require shielding, then the opportunity cost of having divided the original MCTSSA computer facility will impact the level of commitment to MCTSSA from the Development Center. Again, the worst case (TEMPEST required in both locations) would increase costs to the Development Center by approximately \$125,000. This event is highly unlikely, but is included in the analysis.

d. Billeting

The integration of TSCRB and IOB into the Development Center will result in the reduction of total billets necessary to execute their functions. Inherent in the separate locations of MCTSSA and MCDEC are areas of functional overlap that could be more streamlined. The cost savings from this integration would be a benefit to the Development Center.

Since IOB has a unique function within MCTSSA, requiring substantial contact with other facilities, it is anticipated that this branch would remain intact. TSCRB, on the other hand, while no less unique than IOB, could possibly be trimmed of the more administrative functions within the branch, if integrated into the Development Center as recommended. These billets and their value might include those presented in Table III-3.

TABLE III-3

EXAMPLE BILLET REDUCTION IN OPTION FOUR

<u>Position</u>	<u>Rank</u>	<u>Annual Standard Composite Rate</u> ³²
Branch Chief	Col.	\$ 44,374
Head Analyst	Lt. Col.	37,777
Analyst	Maj.	<u>31,550</u>
TOTAL		\$113,701

This report by no means recommends the elimination of these particular billets. This reduction demonstrates the type of elimination of duplication that could be effected by implementing Option Four.

e. Housing

Unlike the situation of finding enough office space to accommodate TSCRB/IOB, housing these personnel at Quantico would cause no additional costs to the Development Center. This is not due to the abundance of housing (married and bachelor) at Quantico, but rather the lack of housing at Pendleton. Specifically, the influx of new TSCRB/IOB personnel to Quantico will not increase the number of people drawing basic allowances for quarters (BAQ).³³

³²Includes basic pay, basic allowances for quarters and subsistence, incentive and special pay, and miscellaneous expenses from MCO P7000.14, FDR-30/eav, 22 May 1978, p. 2-12.

³³The source of this information is Gy. Sgt. Paquette, Administrative Section, MCTSSA.

f. Relocation

Relocation (i.e., moving and PCS) expenses, if Option Four is undertaken, will have to be absorbed by the Development Center. A partial relocation of this nature is categorized as operational since travel is limited within CONUS between permanent duty stations. Table B-4 (Appendix B) summarizes the relocation costs for the projected number of personnel involved in 1981. Other relocation costs include the actual cost of moving, temporary housing, realtors' fees, etc.³⁴ Both PCS and other costs are for typical personnel -- officers' costs are based on those for a married First Lieutenant with two children, enlisted costs are based on costs for a married Gunnery Sergeant with no children, civilian costs are based on the expenses for a married civilian with 1.6 children.

g. ADPE Hardware

As mentioned above, the implementation of Option Four also implies co-locating the ADPE necessary to support TSCRB's mission. According to Maj. Conklin, TSASB, MCTSSA, this would cause no serious problems. This present configuration involves the networking of two PDP 11/70's. The TSCRB/IOB move would involve removing one PDP 11/70 and the peripherals associated with it. Removing this unit, however, will require MCTSSA to procure an additional 88K of memory to compensate for the disruption of the network at an estimated cost of \$70,000 in 1981.

Less costly, but no less important, the ADPE hardware itself must be transported.

³⁴PCS costs based on MCO P7000.14, FDR-30/eav, 22 May 1978, Marine Corps Cost Factor Manual, pp. 2-23 -- 2-26. Other relocation costs based on "Assumptions for Costing Data," (Mimeo), Shore Establishment Coordination Branch (OP-402), Planning Division, Chief of Naval Operations (Logistics), p. 3.

Table B-5 (Appendix B) indicates the estimated cost of transporting this equipment to Quantico, adjusting for growth. It is anticipated that moving, transporting, and bringing the system back up would take no more than two months.³⁵

h. Other R&D test equipment

According to Capt. L. V. Songne, TSSB, MCTSSA, a TCRB/IOB move would not require the transportation of other large R&D test equipment.

i. Contractor support

Moving TSCR/IOB to Quantico also would bring along a considerable amount of contractor support. According to Mr. Martin Anderson, Assistant Project Manager (MCTSSA), Computer Sciences Corporation, contractor support involves 32 people assigned to TSCR and 10 to IOB. This support will account for one-half or approximately \$675,000 in Basic Ordering Agreements (BOA) this year.

Although BOAs will be made with Planning Research Corporation in the near future, it is assumed that PRC will follow CSC's policy of renegotiating the agreements to cover relocation costs of their employees, plus a 5% add-on to cover administrative work. Making the highly improbable assumption that all employees would relocate in 1981, the cost of transferring contractor support under Option Four would approximate \$420,000.

j. Motor vehicles

According to Capt. R. N. Roman, MCDEC Motor Transport Officer, the vehicles at Quantico under his direction could accommodate up to an

³⁵Equipment description and quantities from Maj. Conklin, TSASB, MCTSSA. Shipping weights from Mr. Mike Zitzman, Digital Equipment Corporation. Transportation costs based on estimate from Mr. Logan, Transportation, I&L, HQMC.

additional 20,000 miles per month. It is not anticipated that TSCRB/IOB would demand motor transport usage of that magnitude.

k. TAD

Travel and per diem support represent a potential cost savings to the Development Center if Option Four is implemented. TSCRB and IOB TAD is considerable, given the amount of interface these branches require to fulfill their missions.

For the purposes this study, only the interchange between the Washington area and Pendleton is considered for TSCRB. In the case of IOB, the locations identified are those where the majority of meetings involving IOB participation are held.

Table B-5 (Appendix B) summarizes the estimated annual cost savings from TAD in Option Four.³⁶ In either case, the number of TADs reported is the expected number to be issued in 1981. Air fare information records the differences in originating from San Diego or Washington, D.C.

3. Recommendations

The following advantages and disadvantages are associated with the exercise of Option 4.

a. Advantages

The recommended changes under Option Four rest on the assumption that the communications and control problems associated with MCTSSA cannot be resolved without dividing and partially relocating the existing organizational configuration. The recommendations offered resolve or mitigate the following problems:

³⁶TADs from the Fiscal Offices at MCDEC and MCTSSA. Air fare from the Official Airline Guide, Reuben H. Donnelley Corporation, 1 July 1978.

- an overly heterogeneous mission definition and tasking pattern;
- unduly diverse and unnecessarily roundabout communications and control lines that leave MCTSSA subject to competing influences while its internal processes and decision-making remain obscure to its absentee managers; and,
- a location problem which isolates the TSCRB/IOB components of MCTSSA from the Marine developmental community on the east coast.

The changes are intended to concentrate like functions, converting the existing multi-faceted activity into two distinct centers. They also make lines of communication and control shorter and more direct.

The effect of these changes is to focus Marine resources on the requirements definition and acceptance testing and support phases of the life cycle of tactical data systems. This defines the Marine Corps as a source of the unique requirements for its particular missions and as a user of developed systems.

These changes are consistent with the traditional battlefield and battle-ready orientation of the Marine Corps. They are also consistent with the fact that the Corps' small size and the cost constraints under which it is forced to operate dictate a lean, efficient developmental program that concentrates on doing what is essential while leaving other tasks to the Navy and private industry.

b. Disadvantages

It can be said with justification that the recommended changes weaken Marine Corps capabilities in the developmental testing area. One answer to this objection is that simulated environment developmental testing can be done at Quantico. If a live environment is required, testing could be moved to Camp LeJeune, North Carolina. The second, perhaps more persuasive, answer is that it may be wise for the Marine Corps to curtail its involvement in and resource commitment to

developmental testing. On this subject, the Systems Acquisition Management Manual says: "DT&E is conducted by the material producer and the principal developer or development agency of the developing service."³⁷

This means a PDA in one of the other services (usually the Navy) or private industry. The Marine Corps needs to be involved in the development testing phases of RDT&E. But it is arguable that a monitoring role is appropriate here, and that hands-on involvement is unnecessary.

³⁷MCO p. 5000.10, Section 6, p. 6.

APPENDICES

APPENDIX A
TABLES FOR OPTION SIX

TABLE A-1

ESTIMATED COST OF ACCOMMODATING ADDITIONAL
OFFICE SPACE IN OPTION SIX

<u>Type</u>	<u>Square Feet</u>	<u>Unit Cost \$/S. Ft.</u>	<u>Unit Size Cost Adj.</u>	<u>Adj. Unit Cost</u>	<u>Total Cost</u>
<u>Administrative</u>	149,500	52.36	.9	47.12	\$ 7,044,440
<u>ADP</u>	9,360	78.54	1.0	78.54	735,134
<u>RDT&E</u>	304,200	21.42	.9	19.28	5,864,976
<u>Maintenance/ Supply</u>	7,410	57.12	1.1	62.83	465,570
TOTAL					\$14,110,120

TABLE A-2

COST ESTIMATE OF ANNUAL ENERGY
UTILIZATION IN OPTION SIX

<u>Type</u>	<u>Square Feet</u>	<u>Energy Consumption (10⁶ BTU/Yr)</u>	<u>Fuel Oil Consumption (Gal.)</u>	<u>Fuel Oil Delivered (@ 75% Efficiency)</u>	<u>Unit Energy Cost (\$/Gal.)</u>	<u>Total Cost</u>
<u>Administrative</u>	149,500	13,455	89,700	12,125	\$.42	\$ 47,092.00
<u>ADP</u>	9,360	842.4	5,616	7,020	.42	2,948.00
<u>RDT&E</u>	304,200	27,378	182,520	288,150	.42	95,823.00
<u>Maintenance/Supply</u>	7,410	666.9	4,446	5,557	.42	2,334.00
<u>TOTAL</u>	<u>470,470</u>	<u>42,342.3</u>	<u>282,282</u>	<u>352,852</u>		<u>\$148,197.00</u>

TABLE A-3

ESTIMATED PCS/RELOCATION COSTS FOR
UNIT MOVE IN OPTION SIX

	<u>Projected Number</u>	<u>Total PCS</u>	<u>Total Other Relocation</u>	<u>Total</u>
<u>Officer</u>	117	\$388,440	\$ 409,149	\$ 797,589
<u>Enlisted</u>	242	207,636	931,942	1,139,578
<u>Civilian</u>	52	0	933,920	933,920
TOTAL	411	\$596,076	\$2,275,011	\$2,871,087

TABLE A-4

COST ESTIMATES FOR ADPE HARDWARE
TRANSPORTATION IN OPTION SIX

Manufacturer	Model	Weight (tons)	Quantity	Total Ship- ping Weight (tons)	Unit Cost Transporta- tion Cost (\$/ton)*	Total Cost
DEC	PDP 11/70	.43	2	.86	315	\$271
DEC	PDP 11/40	.2	1	.2	315	63
DEC	RPO 6	.3	2	.6	315	189
DEC	RKO 5	.055	2	.11	315	35
DEC	T 10	.075	6	.45	315	142
DEC	LA 36	.05	3	.15	315	47
DEC	CR 11	.03	2	.06	315	19
DEC	LPO 4	.35	2	.7	315	220
DEC	LOP 6	.25	1	.25	315	79
DEC	VT 50 series	.025	18	.45	315	142
DEC	VT 55 series	.075	7	.525	315	165
Sperry-Univac	AN/UYK 7	.3	1	.3	315	95
Sperry-Univac	AN/UYK 20	.12	1	.12	315	38
Sperry-Univac	CP808	1.12	1	1.12	315	353
Sperry-Univac	1540	.77	8	6.15	315	1937
Sperry-Univac	1840	.21	4	.84	315	265
CDC	844	.355	2	.71	315	224
Calcomp	340A	.34	4	1.36	315	430
4Cs	SIMTRACCS	1.15	2	2.3	315	725
Subtotal						\$5439
Projected Growth Factor						x 1.3
TOTAL			69	17.255		\$7071

*Air-ride van -- includes 3,000 mile transportation distance.

TABLE A-5

PROJECTED NON-ADPE HARDWARE TRANSPORTATION
COSTS IN OPTION SIX

<u>Model Type</u>	<u>Weight (Tons)</u>	<u>Quantity</u>	<u>Total Weight (Tons)</u>	<u>Unit Transportation Cost S/Ton*</u>	<u>Total Cost</u>
TYQ1	33.6	1	33.6	315.	\$ 10,584
TYQ2	51.9	1	51.9	315.	16,348
TYQ3	8.4	1	8.4	315.	2,646
TPS22	10.7	1	10.7	315.	3,370
TPS59	16.3	1	16.3	315.	5,134
TPS63	3.6	1	3.6	315.	1,134
PU712	2.0	15	30.0	315.	9,450
PU742	5.0	12	60.0	315.	18,900
Subtotal					\$ 67,566
Estimation Factor					X 2
Projected Growth Factor					X 1.3
TOTAL					\$175,672

*Includes 3,000 mile transportation distance.

TABLE A-6

ESTIMATED COST SAVINGS FROM BILLET
DUPLICATION IN OPTION SIX

<u>AREA</u>	<u>ENTIRE MCTSSA</u>		
<u>Administration</u>	<u>Position</u>	<u>Rank</u>	<u>Annual Standard Composite Rate*</u>
	<u>Add:</u>		
	Unit Diary	Sgt.	-12,266
	Personnel Clerk	Cpl.	-10,497
	<u>Delete:</u>		
	First Sergeant	1st Sgt.	20,311
	Training Officer	Lt.	21,695
	Training NCO	Gy. Sgt.	17,188
	<u>Subtotal</u>		<u>36,431</u>
<u>Supply</u>	<u>Delete:</u>		
	Supply Officer	Capt.	27,039
	Sup. Admin./OC	M. Sgt.	30,310
	Sup. Admin. Man	GS-4	13,559*
	Sup. Admin. Man	Cpl.	10,497
	Gen. Warehouseman	S. Sgt.	14,468
	Gen. Warehouseman	Sgt.	12,266
	Gen. Warehouseman	L. Cpl.	8,795
	<u>Subtotal</u>		<u>106,934</u>

*Includes basic pay, basic allowances for quarters and subsistence, incentive and special pay, and miscellaneous expenses.

TABLE A-6

ESTIMATED COST SAVINGS FROM BILLET
DUPLICATION IN OPTION SIX
(Continued)

<u>Fiscal</u>	<u>Delete:</u>		
	Fiscal Officer	Maj.	31,550
	Fiscal Chief	Gy. Sgt.	17,188
	Fiscal Clerk	Cpl.	10,497
	Fiscal Accounting Clerk	GS-9	22,478**
	Subtotal		81,713
<u>Branch</u>	<u>Delete:</u>		
	Branch Chief	Col.	44,374
	Head Analyst	Lt. Col.	37,777
	Analyst	Maj.	31,550
	Subtotal		113,701
	TOTAL		338,779

**Costs to USMC for civilians, including base pay, overtime and holiday (when applicable), life insurance, health benefits, terminal leave, workmen's compensation, retirement and training.

TABLE A-7

ESTIMATED ANNUAL COST SAVINGS FROM
DC/PENDLETON TAD IN OPTION SIX

<u>Origin/ Destination</u>	<u>Annual TADs Issued *</u>	<u>Roundtrip Airfare</u>	<u>Per Diem Expenses**</u>	<u>Average Car Rental</u>	<u>Total</u>
<u>Quantico/ Pendleton</u>	146	\$ 71,540	\$ 30,660	\$ 21,900	\$ 124,100
<u>Pendleton/ Quantico</u>	27	13,230	5,670	4,050	22,950
<u>Pendleton/DC</u>	133	65,170	27,930	19,950	113,050
TOTAL	406	\$ 149,940	\$ 64,260	\$ 45,900	\$ 260,100

* Based on 1978 projection (TAD through 6/30/78 X 2).

** Assumes 5-day average duration at projected 1981 per diem maximum.

APPENDIX B
TABLES FOR OPTION FOUR

TABLE B-1

ESTIMATED COST OF ACCOMMODATING ADDITIONAL
OFFICE SPACE IN OPTION FOUR

<u>Type</u>	<u>Square Feet</u>	<u>Unit Cost \$/S. Ft.</u>	<u>Unit Size Cost Adj.</u>	<u>Adj. Unit Cost</u>	<u>Total Cost</u>
<u>Administrative</u>	11,830 (11,830)*	52.36 (7.14)**	1.04 (1.0)	54.45 (7.14)	\$644,195 (84,466)
<u>ADP</u>	4,875 (4,875)*	78.54 (78.54)*	1.0 (1.0)	78.54 (78.54)*	38,288 (38,288)*
<u>RDT&E</u>	N/A				
<u>Maintenance/ Supply</u>	N/A				
TOTAL					\$682,438 (122,754)

* The numbers in parentheses refer to the space requirements and costs of renovating existing office space.

**Administrative space preparation (e.g., minor construction/alteration, including telephone installation).

TABLE B-2

COST ESTIMATE OF ANNUAL ENERGY
UTILIZATION* IN OPTION FOUR

<u>Type</u>	<u>Square Feet</u>	<u>Energy Consumption (10⁶ BTU/Yr)</u>	<u>Fuel Oil Consumption (Gal.)</u>	<u>Fuel Oil Delivered (@ 75% Efficiency)</u>	<u>Unit Energy Cost (\$/Gal.)</u>	<u>Total Cost</u>
<u>Administrative</u>	11,830	1,064.7	7,098	8,872.5	\$.42	\$3,726.00
<u>ADP</u>	4,875	438.75	2,925	3,656.2	\$.42	1,536.00
<u>RDT&E</u>	N/A					
<u>Maintenance/Supply</u>	N/A					
<u>TOTAL</u>	16,705	1,503.45	10,023	12,528.7		\$5,262.00

*Includes heating, lighting and normal cooling.

TABLE B-3

ESTIMATED PCS/RELOCATION COSTS FOR
OPERATIONAL MOVE IN OPTION FOUR

	<u>Projected Number</u>	<u>Total PCS</u>	<u>Total Other Relocation</u>	<u>Total</u>
<u>Officer</u>	34	\$112,710	\$119,068	\$231,778
<u>Enlisted</u>	3	2,355	11,772	14,127
<u>Civilian</u>	3	0	53,880	53,880
TOTAL	39	\$115,065	\$184,720	\$299,785

TABLE B-4

ESTIMATED ADPE HARDWARE TRANSPORTATION COST IN OPTION FOUR

<u>DEC Model</u>	<u>Description</u>	<u>Weight (Tons)</u>	<u>Quantity</u>	<u>Total Shipping Weight (Tons)</u>	<u>Unit Transportation Cost (\$/Ton)*</u>	<u>Total Cost</u>
PDP 11/70	CPU w/ 1x10 ⁶ bytes of memory	.43	1	.43	\$ 315.	\$135.45
RPO 6	disk drives	.3	2	.6	315.	189.00
LP0 4	1200 lpm printer	.35	1	.35	315.	110.25
T 10	tape drives	.075	3	.225	315.	70.90
CR 11	card reader	.03	1	.03	315.	9.45
LA 36	console/printer	.05	1	.05	315.	15.75
VT 50 series	CRTs	.025	8	.2	315.	63.00
VT 55 series	graphic terminals	.075	3	.225	315.	70.90
Subtotal						<u>\$664.70</u>
Projected Growth Factor						<u>X 1.3</u>
TOTAL			20	2.110		\$864.10

*Air-ride van -- includes 3,000 mile transportation distance.

TABLE B-5

ESTIMATED ANNUAL COST SAVINGS FROM TAD IN OPTION FOUR

Origin/Destination	Annual TADs Issued*	Round Trip Air Fare Savings	Per Diem Expenses**	Average Car Rental	Total
Pendleton/Quantico	16	\$ 7,840	\$ 3,360	\$ 2,400	\$13,600
Pendleton/DC	86	42,140	18,060	12,900	73,100
Washington Area/ Pendleton	***				0
	Subtotal	\$49,980	\$21,420	\$15,300	\$86,700
Pendleton/Brussels	10	3,570	0	0	3,570
Pendleton/Monmouth	22	9,425	0	0	9,425
Pendleton/DC	16	7,840	3,360	2,400	13,600
Pendleton/San Diego	-16	-7,840	-3,360	-2,400	-13,600
	Subtotal	\$12,995	0	0	\$12,995
	TOTAL	\$62,975	\$21,420	\$15,300	\$99,695

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*Based on 1978 projection (TAD through 6/30/78 x 2).
 **Assumes 5-day average duration at project per diem maximum.
 ***Data not available.



DEPARTMENT OF THE NAVY
HEADQUARTERS UNITED STATES MARINE CORPS
WASHINGTON, D.C. 20380

IN REPLY REFER TO
RDS-41-drp
OCT 15 1979

From: Commandant of the Marine Corps
To: Distribution List
Subj: Marine Corps Tactical Systems Support Activity
(MCTSSA) Study

1. The primary objectives of the subject study were to determine how MCTSSA should be organized, and where it should be located to best accomplish its mission.
2. The objectives of the study were met in that an analysis was conducted for six different options which considered various organization and location mixes. Only Option 2 and Option 4 were considered to be viable due to fiscal constraints or due to the impracticability of the other options.
3. Option 2 was selected. This option leaves MCTSSA's location at Camp Pendleton, and new management techniques are applied. Three of the five recommendations (pages III-7 through III-13) under Option 2 have been implemented. Recommendation a. (page III-7) and recommendation d. (page III-II) were not approved.
4. A copy of this letter will be affixed inside the front cover of each copy of the subject study prior to its distribution.

A handwritten signature in cursive script, appearing to read "W. H. Fitch".

W. H. FITCH
DEPUTY CHIEF OF STAFF FOR RD&S

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