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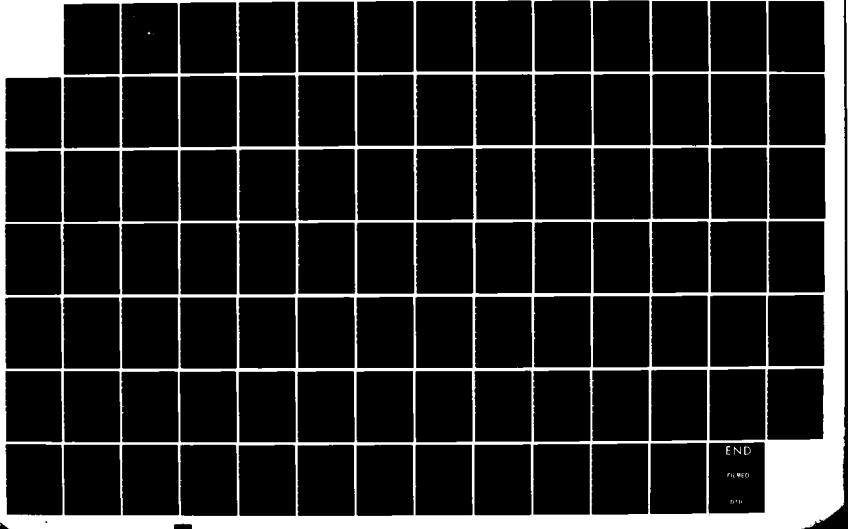

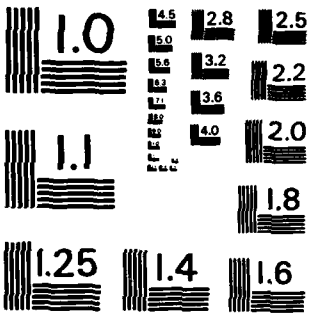

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Monterey, California

THESIS

PLANNING FOR FOLLOW-ON SPARE PART SUPPORT
BY THE NAVAL ELECTRONIC SYSTEMS COMMAND

by

Michael Francis Sule

June 1984

Thesis Advisor: A. W. McMasters

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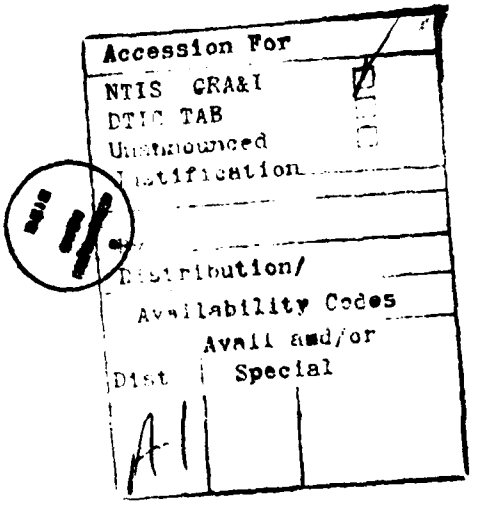

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Planning for Follow-on Spare Part Support by the Naval Electronic Systems Command

by

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Submitted in partial fulfillment of the requirements for the degree of

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ABSTRACT

This thesis addresses the problem of follow-on spare part support and how the Navy Electronic Systems Command (NAVELEX) plans for this support. Current NAVELEX policies, procedures, and practices which impact on follow-on spare part support are analyzed and evaluated. NAVELEX has recently changed its policy from, in effect, not planning for follow-on support to an aggressive program to pursue competitive reprocurement for repair parts whenever possible. Specific recommendations are made to improve NAVELEX's policy and planning for follow-on support. These recommendations may be applicable to other DoD activities.

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LIST OF ABBREVIATIONS

AL	Acquisition Logistician
BOSS	Buy Our Spares Smart
COG	Cognizance
CNM	Chief of Naval Material
CRC	Contractor Recommended Code
DoD	Department of Defense
FAR	Federal Acquisition Regulation
HSC	Hardware Systems Command
ICP	Inventory Control Point
ILS	Integrated Logistic Support
ILSM	Integrated Logistic Support Manag r
ILSP	Integrated Logistic Support Plan
LAR	Logistic Assessment Review
LCC	Life Cycle Costs
LEM	Logistic Element Manager
NAVELEX	Naval Electronic System Command
NAVELEX DET MECH	Naval Electronic Systems Command Detachment Mechanicsburg
NAVMAT	Naval Material Command
NAVSUP	Naval Supply Systems Command

NSN	National Stock Number
OEM	Original Equipment Manufacturer
OLSS	Operational Logistic Support Summary
OMB	Office of Management and Budget
PD	Program Director/Project Director
PM	Program Manager/Project Manager
PMC	Procurement Method Code
PSICP	Program Support Inventory Control Point
R & D	Research and Development
SAIP	Spares Acquisition Integration with Production
SEE	System Effectivenss Engineer
SPCC	Ships Parts Control Center
SVI	Single Vendor Integrity

I. INTRODUCTION

A. BACKGROUND

This thesis is a follow-on study that relates to other studies recently completed at the Naval Postgraduate School and coordinated by Professor Alan W. McMasters. Two studies motivated the research for this thesis. The first of these studies, completed by Lt. Roy A. Hallums, Jr. [1], provided details concerning the Navy Ship Parts Control Center (SPCC) and Naval Electronic Systems Command (NAVELEX) interface as related to the reprocurement of 7G cognizance (COG) electronic repairable items. That study highlighted problems associated with the transfer of technical data for spare parts from the Hardware Systems Command (HSC), NAVELEX, to the procuring activity; in this case the Inventory Control Point (ICP), SPCC.

A critical element in the acquisition process for 7G COG material is the requirement for accurate technical descriptions of the items to be procured. The responsibility for providing this data lies with NAVELEX. If this data is inaccurate, incomplete or not available, SPCC's procurement alternatives are severely limited. For example, SPCC may be forced to go back to the original equipment manufacturer (OEM) for follow-on procurements. From the Navy's point of view, this

situation is not desirable because the OEM contractor has no incentive to provide follow-on procurements at competitive prices.

The second study was conducted by Lt. Daniel R. Smoak.[2] That study examined the management of multiple models of electronic equipment at NAVELEX. It also highlighted the problems encountered by SPCC when procurement technical data is inaccurate, incomplete or missing.

Both of the studies mentioned above provided specific recommendations and conclusions designed to improve the information flow between NAVELEX and SPCC and to improve the availability and quality of spare part technical data necessary for reprocurement purposes.

B. PRIMARY RESEARCH QUESTION

The ability of the ICP to effectively provide follow-on spare and repair part support for systems procured by the HSC appears to be directly influenced by decisions made by the project manager (PM) early in the life cycle of the system being procurred. Therefore, it is the PM at the HSC who must plan for follow-on spare and repair part support.

The primary research question of this thesis is; "How does the PM and the HSC plan for follow-on spare

and repair part support?" This question is related to initial provisioning because initial provisioning policies can directly impact on follow-on support. For example, the system acquisition strategy may call for total life cycle spare and repair part requirements to be procured as a part of initial provisioning. However, initial provisioning is usually only a preliminary step in a series of logistic support decisions to ensure follow-on support.

C. SCOPE OF THE RESEARCH

As was the case in the studies mentioned above, the scope of this thesis is limited to one HSC, namely, NAVELEX. Other studies, including the ones previously mentioned have adequately documented the problems experienced by the ICP when inadequate planning for spare or repair part support is provided by the HSC. Therefore, it is not the intent of this thesis to reemphasize these problems. Rather, this thesis will concentrate on the policies and decisions that are made at the HSC (NAVELEX) that may result in the problems that have been identified by Lieutenants Hallums and Smoak, as well as other studies with regard to spare and repair part support.

D. PREVIEW

Chapter II provides an overview of military system acquisition concepts with an emphasis on planning for follow-on support. Current Department of Defense (DoD) initiatives will be identified and summarized. Chapter III will then present a detailed examination of DoD acquisition management techniques and studies which specifically relate to the problem of follow-on repair and spare part support, hereafter referred to as spare part support. Chapter IV will summarize specific NAVELEX policies and procedures that relate to planning and defining strategies for follow-on support. Chapter V will analyze these NAVELEX policies, and examine their impact and effectiveness on follow-on support. Potential problem areas will be identified. Chapter VI will conclude with specific recommendations.

II. SYSTEMS ACQUISITION CONCEPTS

A. INTRODUCTION

The purpose of this chapter will be to provide an overview of concepts dealing with the system acquisition process within the Department of Defense (DoD). Specific detailed DoD policy and procedures for major systems acquisitions can be found in DoD Directive 5000.1[3] and DoD Instruction 5000.2[4]. These instructions provide the backbone of all defense related weapon systems acquisition concepts and techniques. This chapter will address major concepts such as life cycle cost (LCC) and integrated logistic support (ILS) that guide the progress and planning of systems acquisitions within DoD.

Emphasis will be placed on where follow-on spare parts support fits in with these concepts. Characteristics of well-planned follow-on spare parts support will also be discussed. Finally this chapter will review current DoD and Navy concerns about planning for follow-on spare part support.

B. LIFE CYCLE COST (LCC)

Life cycle cost (LCC) includes all costs associated with the entire life cycle of a system. These costs include research and development (R&D) costs, production and construction costs, operation and

maintenance costs and system retirement and phase-out costs. Spare/repair part follow-on support is a subset of operations and maintenance costs which also include costs of sustaining operations, test and support equipment maintenance, personnel and maintenance support, transportation and handling, facilities, modifications and technical data changes.[5]

Because of the paucity of funds to support all aspects of each DoD project, "the challenge to the program manager is to reduce system lifetime costs, achieve an acceptable military performance, and meet operational capability schedules--all simultaneously." [6:3-50]

C. INTEGRATED LOGISTIC SUPPORT (ILS)

ILS has been defined as "a management function that provides the initial planning, funding, and controls which help to assure that the ultimate consumer (or user) will receive a system that will not only meet performance requirements, but one that can be expeditiously and economically supported throughout its programmed life cycle."[5:13] The key word and phrase in this definition are "planning" and "economically supported". Planning implies that ILS considerations should be a part of the earliest stages of a project's life cycle. The phrase "economically supported

throughout its programmed life cycle" indicates that ILS has economic impacts in all stages of the life cycle of a system.

D. CONFIGURATION MANAGEMENT

Configuration management includes "the necessary management functions required to ensure that compatibility is maintained between all elements of a system whenever any single given element is changed for any reason."[5:276] A worthwhile objective of configuration management is to standardize, as much as possible, the internal components of similar systems. If the true configuration of a system is not specified or similar systems have different configurations, follow-on spare part support could be severly hampered because incorrect parts or incorrect numbers of parts may be procurred for backup or no parts may be available for follow-on support depending on the extent of the loss of configuration management control.

E. ATTRIBUTES OF WELL-PLANNED FOLLOW-ON SUPPORT

Management of life cycle costs, planning for ILS and intense configuration management are the foundation of good follow-on spare part support. If one of these elements is missing or otherwise ineffective, follow-on support is likely to be non-existent or ineffective at best. With each of these elements, plans should be

made to minimize the risks of not having the correct spare part when required. The challenge is to anticipate the potential sources of these risks at the beginning of the life cycle. Many times it is counter productive to system supportability to try to fix, or "band-aid" the follow-on support after problems occur or are discovered. This type of reaction often leads to exorbitantly priced parts. Examples of this type will be discussed below.

An important attribute of effective follow-on spare part support is the ability of the ICP to continually procure the required parts for system support. A significant amount of planning must be done to ensure that the weapon system's parts can be easily reprocured for follow-on support. The PM must consider the level of detail or specifications required that will facilitate the ICP's procurement of the parts. In addition, the PM must ensure these specifications are provided to the ICP.

Another attribute of good follow-on spare part support is that a plan has been developed to offset any degradation to supportability brought on by obsolescence. This is of real concern, especially for electronic spare/repair parts. Changing technology is always a factor in electronic equipment. What is new

today may be old tomorrow. It is often difficult to have a plan in mind to compensate for obsolescence. Nevertheless, obsolescence should be considered and alternatives should be developed and evaluated, preferrably in the earliest phases of the system's life cycle.

F. CURRENT CONCERNS

How the military services procure spare parts and the amount of money that is being paid to contractors for these parts is of general public concern. Because the Reagan Administration has increased the defense budget while holding the line on other governmental agencies and programs, defense outlays are being looked at very closely. It is even more imperative that DoD resolves the problems and/or situations which result in exorbitant prices for spare parts.

In a recent Congressional hearing about DoD procurement practices for spare parts, a Congressman, who was concerned and frustrated with the exhorbitant prices DoD components were paying to contractors for follow-on spare parts made the following comment to a DoD official, "Your record of moving from sole source to competition is horrible. The American public is fed up...they want somebody to do something about it. The proof of the pudding is the eating thereof...I assure

you that we are going to be looking over your shoulder."[7:2] The language is direct and to the point. The Congress, DoD and the Navy have recognized severe problems brought about by some of the methods negotiated between DoD and government contractors to procure spare parts. Classic examples that highlight these problems are the four-cent diode that cost the Navy $110 or the sixty-seven cent bolt that was price at $17.59, or even the $15 claw hammer that was marked up to $435.[8] The Secretary of Defense has recently outlined a ten-point program to fight price abuse. [See Appendix A].

DoD has researched the problems and situations which result in exorbitant prices and the majority of findings result in similar conclusions and recommendations. Simply put, the military services must ensure competition is an active player in spare part procurement. To this end, the Navy has implemented Project BOSS (Buy Our Spares Smart). "Project BOSS is an effort to monitor and coordinate actions that address specific problems and systemic weaknesses in the material acquisition process. The focus on the broad issue of acquisition instead of the narrower topic of procurement is essential to highlight

the fact that the procurement process is tied extensively to other functional disciplines."[7:2]

The approach BOSS is taking is likely to have a significant impact on the way PMs do business in the future. Currently, there are over 100 BOSS initiatives in progress. The Navy has recognized the importance of this program and has reallocated funds in excess of $35 million to add 550 civilian positions and over 200 man-years of contractor effort to support the program.[7] While the author was doing research for this thesis, it was evident that BOSS initiatives were beginning to have an effect on the way PMs at NAVELEX were doing business, albeit the full effect of the BOSS program or even the its name was not known or understood by PMs that were interviewed.

G. SUMMARY

This chapter has attempted to set the stage for the research and analysis that is to follow throughout the rest of this thesis. It began by identifying system acquisition concepts that are necessary to understand before research conclusions can be evaluated. These concepts look at system acquisition from a strategic overview perspective.

Finally, this chapter has emphasized that the concern for spare part support is a topical issue which

has many people actively examining an entire spectrum of issues. Although this thesis was not born of any of of these issues per se, it cannot help but be influenced by them to some degree.

III. SUPPORT PERSPECTIVES AND STUDIES

A. INTRODUCTION

In order to better evaluate how NAVELEX plans for follow-on spare part support, it may be beneficial to review the methods by which other DoD components have dealt with this issue. In particular, it is worthwhile to define and analyze the alternative methods for follow-on support. In addition to reviewing support methods, this chapter will also review the issue of competitive versus sole source spare part support. This is by far one of the most influential factors in current DoD policy decisions. Several recent studies have examined the issue and have come up with varying conclusions. These conclusions will be summarized.

B. ACQUISITION METHODS

1. Single Vendor Integrity (SVI)

Single Vendor Integrity (SVI) is a logical and direct approach to spare part support. Simply stated, SVI requires that there be only one acceptable source for each repair part and that each repair part will be exactly the same for each weapon system produced. Usually, choice of the vendor for the repair part would

be left to the discretion of the primary contractor. SVI appears to be very appealing to a PM who is managing a system with, (1) limited application and, (2) a short life cycle. Probably the SVI concept is used more often by default than by design. Lack of forethought or lack of sufficient funding in the early stages of system acquisition, has resulted in the unintended or unplanned use of SVI by DoD components. It may be a "quick and dirty" way in which the PM may solve his logistics support problems, but clearly it does not have a cost advantage to a customer that maintains extensive repair and maintenance facilities that are strongly reinforced with large quantities of repair parts.

Moore, in an article on SVI, has highlighted some advantages and disadvantages from the perspective of the purchaser of an SVI system.[9] Moore makes the point that when logistics support costs represent a significant portion of the total system cost, using SVI would reduce provisioning costs such as costs associated with spare parts, training, technical manual requirements and maintenance. Moore also states that SVI is generally not compatible with Defense system acquisition because Federal Acquisition Regulations (FAR) require multiple source competitive situations to

eliminate, as much as possible, problems associated with sole source procurements.

SVI has some serious disadvantages, especially when total life cycle costs are considered. Production costs are increased by requiring the SVI source to locate contractors to provide various parts of the system in a coordinated and timely fashion that is consistent with the overall milestone plan of the DoD component. The SVI contractor may take advantage of the customer by arbitrarily raising costs for spare parts. Because backup or wholesale inventories are not held by the SVI customer, there is no protection against the SVI source ceasing to be interested in providing support. In addition, the source may refuse to sell technical information about the spare parts to the customer. When this happens, the customer is denied the capability to second- source his spare parts. Finally, SVI severely limits the flexibility of the customer to consider and implement design changes since the SVI contractor would have no incentive to make production changes and could demand large amounts of money from the customer to implement them.

In spite of these disadvantages, because SVI has short run appeal and seemingly resolves the logistics problem for the PM with no "up-front"

investment costs, it continues to be a follow-on support method used by NAVELEX and many other components of DoD.

2. Phased Provisioning

"Phased provisioning is a management technique used to defer procurement of selected spare and repair parts during initial support of weapon systems, support systems and end items of equipment while still supporting the operation of the weapon system."[10] Phased provisioning has existed within DoD since 1963 with the issuance of DoD Instruction 4140.19.[11] The only serious application of this concept was by the Air Force in the 1960s for the F-111 aircraft. Despite pressure to use phased provisioning and attempts to do so, the Navy has had only two applications of phased provisioning; the A-7A program and the F-14 program. Neither of these systems remained with the phased provisioning concept throughout the production phase of the acquisitions.[10]

Contractor support of some form or another usually is preferred by the Navy. "Navy managers believe that the maintainence of separate records of phased provisioning items in buffer stock results in administrative costs that are higher than a comparable form of contractor support."[10:2-7]

Phased provisioning will be examined here because this provisioning technique does have some impact on follow-on spare part support; both positive and negative.

Through phased provisioning, "Some or all of the initial procurement of the selected items may be deferred until the final production run when (1) the latest in-service experience and test data are available, thus allowing for better provision decisions, (2) the design of the system is more stable, thus lowering the risk of engineering changes that require retrofit and (3) the service has had time to develop firm operational and maintenance program and deployment plans, thus reducing uncertainties concerning the scope of the project and maintenance requirements."[10:1-2]

DoD Instruction 4140.19 indicates that the following item characteristics favor phased provisioning:

-High cost items

-Insurance items

-Items designated for or likely to need design change

-Items with new or unique design or operating characteristics for which spare requirements cannot be computed with reasonable assurance of accuracy

-Items with production leadtimes over six months

-Items not commercially available or unavailable in the supply system.[11]

Phased provisioning could have a beneficial impact on system acquisition by lowering total life cycle costs. It could also have a beneficial impact on follow-on spare part support by better defining support requirements. However, because phased provisioning ends when the production has been completed, it does not seem to deal with the question of follow-on support after the production phase. Without additional planning, the DoD component could find itself locked into the OEM for follow-on support. This situation is similar to the SVI concept. The costs avoided during the phased provisioning could be incurred during the operations and maintenance phase of the system life cycle because the OEM has no incentive to hold either his costs or prices down at that time. The benefits of phased provisioning, although not elminated, could be substantially reduced.

3. Spares Acquisition Integrated with Production (SAIP)

The Spares Acquisition Integrated with Production (SAIP) concept is to produce and procure items to serve as spares at the same time as items to be installed as initial components of weapons systems. The SAIP concept's major appeal is that it presumes to lower total life cycle costs by "(1) avoiding redundant set-up costs by reducing the number of separate production orders, (2) taking advantage of economies of scale by increasing the average production lot size per order, and (3) taking greater advantage of learning." [12:iii] It also follows that these spares parts are available earlier, and that it is possible that enhanced readiness could result.

SAIP can be viewed as the antithesis of phased provisioning. Where phased provisioning would emphasized deferring the decision to procure spare parts as far into the production phase of system acquisition as possible, SAIP would stress the benefits that accrue by procuring spare parts early in the production phase of the system acquisition. However, there is always the question of obsolescence caused by technological and engineering changes that could result and which phased provisioning is supposed to reduce. Research has been initiated to determine if SAIP spare

parts were prone to more engineering changes after production. Arthur and Fisher[13] set out to determine the impact of using a SAIP program by using a Mann-Whitney U test to determine if there was a significant difference between the number of approved engineering change proposals processed for SAIP spares and spares ordered in the conventional manner. The result of this test was "that the SAIP population of parts was not significantly less design stable than the non-SAIP population."[13:29]

Although SAIP appears to be a good way to plan for follow-on spare part support, it still relies heavily on the prime contractor. Thus the purchasing military service component must contend with many of the same problems identified by SVI and phased provisioning.

A comparison of the three procurement techniques that have been discussed is summarized in Table 3-1.

TABLE 3-1

EVALUATION OF PROCUREMENT TECHNIQUES*

Desired Actions	Techniques		
	SVI	Phased Provisioning	SAIP
1. Defer procurement of unstable design items	Yes	Yes	No
2. Defer procurement due to program uncertainity	Yes	Yes	No
3. Lower unit price of spares	Perhaps	Perhaps	Yes
4. Buy spares in proper configuration	Yes	Yes	Yes
5. Hedge against overprocurement	Yes	Yes	No
6. Hedge against underprocurement	Perhaps	No	No
7. Continued spare part support after production	Yes	No	No

An important concept to keep in mind is that follow-on spare part support extends beyond the

---

*The majority of this data is extracted from Lengel's study titled "Phased Provisioning". (See reference [10])

production phase of systems acquisition. Therefore, if phased provisioning or SAIP is used to enhance early supply support, additional thought must be given to supply support after the production phase is complete.

C. PLANNING FOR FOLLOW-ON SUPPORT

DoD has developed techniques to enhance cost effective follow-on support for spare and repair parts. Three of these techniques are breakout, procurement method coding (PMC) and integrated logistic support plans (ILSPs).

1. Breakout

Breakout is a process by which parts are identified that are currently bought sole source from a prime contractor which could actually be bought directly from a subcontractor or even competitively from numerous sources.

Because of the growing complexity of weapon systems and the limited funds available for system acquisition project support, DoD has become increasingly dependent on prime contractor support. Efforts are currently being made to reverse this trend and enhance breakout opportunities in the Navy. However, some prime contractors have been reluctant to support the Navy's effort to explore breakout possibilities.

Many times when the Navy attempts to enhance competition through breakout initiatives, contractors claim that their technical data are proprietary or that the data are available only at an extremely high price. This type of resistance emphasizes the necessity of requiring breakout as a part of the initial systems acquisition contract. It is at this time that the contractor has the most incentive to provide the required data at the lowest price. Fortunately, not all breakout efforts after the initial system acquisition have been unsuccessful. For example, "GE, the prime contractor for a clearance guage, told SPCC that it would take 30 days to prepare a quote and 36 to 40 weeks for delivery of the guage. SPCC...was able to determine that the guage was a 'buy' item for GE and solicited quotes from two sources. The award was made to Patriot Toolmakers, Inc., at $1656 each with a 90-day delivery. Based on the last price paid to GE...(SPCC) saved $8,861.58 and improved delivery time by 162 days."[7:4]

2. Procurement Method Coding (PMC)

Procurement method coding (PMC) is the application of a numeric code which identifies the optimum method of procurement of an item recommended to the contracting officer. (See Appendix B) The

assignment of the code is based on the Government's ability to obtain competitive bids for making the item (referred to in acquisition as "competing the item") currently available as well as actual market experience. The intent of PMC is to provide a hedge against restricting the source of supply for spare parts. PMC can be considered as a subset of the breakout process.

Early in the provisioning phase of a weapon systems life cycle, the contractor may be contractually required to provide a Contractor Recommended Code (CRC) signifying the recommended method of reprocurement of spare parts. Based on this recommendation the DoD component activity assigns the PMC. Concurrence with the CRC is not automatic. The DoD component must consider the downstream ability of the Government to compete the item. These decisions are often criticial to effective follow-on support and minimum life cycle costs. Based on the PMC decision, the DoD component will then procure the necessary specification, designs, drawings, processes, etc. necessary for reprocurement.

PMC can be an effective tool, but it must be applied conscientiously and with an eye towards the future. One Air Force study concluded "Currently the PMC process appears to suffer from a futurity complex

which gives insufficient attention to tomorrow's issues today. The result is more problems tomorrow."[14:30]

3. Integrated Logistic Support Plan (ILSP)

The Integrated Logistic Support Plan (ILSP) is the cornerstone for insuring that a weapons system can do what it was designed to do after it is produced. As the name implies, this management tool coordinates and plans for logistic support.

The ILSP is divided into several segments. In particular, a major segment deals with supply support. In this segment, plans should be defined to facilitate both initial provisioning and follow on spare part support. The ILSP, as used by NAVELEX, will be discussed in detail in the next chapter.

D. THE QUESTION OF SOLE SOURCE VERSUS COMPETITION

Because the issue of relying on a sole source for replenishment of spare parts is a topical issue and because it has had a signficiant impact on NAVELEX policies, a discussion as to whether or not competition in the area of follow-on spare part support really does have a beneficial impact on life cycle costs is in order.

Rear Admiral Joseph P. Sansone, Deputy Chief of the Naval Material Command (NAVMAT) for Contracts and Business Management, was quoted in 1984 as saying, "If

we have and own the necessary drawing rights and technical data, and they're current, we can save an additional 20-25 percent if we can compete the procurement."[15:19] Savings figures like those expressed by Rear Admiral Sansone are bandied about almost daily. There is a great deal of research that supports this conclusion. The results of three recent studies will be summarized.

Study 1: " Competition in the Acquisition of Replenishment Spare Parts", by Captain Steve J. Zamperelli, USAF [16]

This study was undertaken as a result of another empirical study that indicated that spare parts prices do not always decrease as a result of competition. The objectives of this study were to provide evidence to support or refute the expectation of price reductions as a result of competition and to identify unique characteristics of spare parts that might influence the degree of the impact of competition. Four years of procurement history data for replenishment spare parts was used for the research. The two major conclusions resulting from this research were: 1. "The introduction of competition into the acquisition process generally led to a reduction in unit price."[16:104] and 2. "Unit

prices increased for items that transitioned from competitive back to sole source acquisitions."[16:105]

Study 2: "A Comparative Analysis of Sole Source Versus Competitive Prices in the Acquisition of Weapon System Replenishment Spare Parts", by Edward J. Brost, Air Force Institute of Technology [17]

The objective of this study was to determine the effects of competition on weapons systems replenishment spare parts. Thirty-six replenishment spare parts with sufficient procurement history were used to perform multiple regression analysis and parametric statistical tests. Price changes were attributed to inflation, order quantity and competition. The results of this study were:

"1. The introduction of competition into the replenishment spare parts acquisition process does not guarantee lower prices;

2. For many items, competition accounts for a portion of the price change, but the effect of competition is just as likely to result in price increases as price decreases; and

3. Price changes are similar among commodity groups and are not influenced by the number of solicitations." [17:90]

Study 3: "Sole Source and Competitive Price Trends In Spare Parts Acquisitions", by Charles H. Smith and Charles M. Lowe, Jr., Army Procurement Research Office [19]

This study presented empirical data for consideration in making savings forecasts. One of the questions posed by this study was "Is the rate of decline in price more rapid under competitive procurement than under sole source procurement?" [18:1] Thirty-nine helicopter spare parts were used for the data in this study. One screening factor for these items was that they had to have been procured at least three times in the sole source mode and subsequently procured at least three times in the competitive mode. This study confirmed other studies that indicated that there is a savings from competitive procurement. With respect to the first competitive procurement after sole source procurements, "A reasonable percentage savings estimate is likely to be between 15% and 25%..."[18:9]

The studies summarized above are typical for studies that have been done in the area of competitive reprocurement. The vast majority of research does support the premise that competition does result in cost savings. However, as seen by the results in Study 2 above, there is some disagreement. What is missing

from these studies is an analysis of exogenous factors relating the spare parts being analyzed;. factors such as technological vulnerability, complexity and applicability.

It is a generally accepted premise throughout DoD that competition reduces costs associated with replenishment spare parts. It is in this environment that NAVELEX must deal with the problem of follow-on support.

E. SUMMARY

This chapter has summarized some of the acquisition techniques and strategies used throughout DoD to facilitate follow-on support including SVI, phased provisioning, SAIP, breakout, PMC and ILSP. No one technique by itself can assure cost efficient and effective follow-on spare part support. The key to any assurance in this area is early planning and the quality of the data. Intertwined with these techniques is the question of competition, which for the time being must be viewed as the best policy for procuring follow-on spare parts.

IV. NAVELEX POLICIES AND PROCEDURES

A. INTRODUCTION

In this chapter NAVELEX policies and procedures, as they relate to ILS, will be reviewed. This chapter, by definition, will deal with "how things are supposed to be." Sections of this chapter will reference appendicies included at the end of this thesis which present the details of various supply support aspects of NAVELEX ILS policies.

B. ILS POLICY

NAVELEX Instruction 4000.6D, "Integrated Logistic Support (ILS); policy and responsibilities"[19] is the governing document regarding ILS policy at NAVELEX. It is based, in part, on DoD Directive 5000.2 which was mentioned in Chapter 2. ILS policy and monitoring responsibilities are vested with NAVELEX 08, the Life Cycle Engineering and Platform Integration Directorate because "The most effective and efficient organizational approach for conducting ILS in NAVELEX is to separate the development of ILS policy and monitoring for application of policy from actual performance of day-to-day ILS"[19:2] This policy does have its drawbacks, however. Many project managers feel that their relationship with NAVELEX 08 is merely

advisorial one and view NAVELEX 08 as a step away from reality.

Because of this split between the policy makers and reviewers, and the project managers (PMs) or project directors (PDs), NAVELEX has required project managers to include in their organizations acquisition logisticians (ALs) to serve as an interface with NAVELEX 08. Some ALs are organized in a staff function from which several PDs/PMs share a pool of ALs. More typically, however, the AL is assigned and works directly for the PM. ALs will be discussed in detail in the following section.

The project manager is assigned the overall responsibilty and accountability for ILS planning, funding and execution. The ILS plan is documented with an ILSP and an Operational Logistic Support Summary (OLSS). These documents will also be discussed in a following section.

Each NAVELEX project has an Office of the Chief of Naval Operations (OPNAV) sponsor. Currently, NAVELEX has approximately 670 systems in production phases and approximately 300 systems in pre-production stages.[20] The OPNAV sponsors or the Chief of Naval Material (CNM) has the authority to reduce the PM's planned logistic

support. If this happens, procurement actions continue with no further review.

As indicated above, NAVELEX 08 monitors the progress of ILSPs within NAVELEX. To accomplish this task, NAVELEX has established the position of the NAVELEX 08 ILS Manager (ILSM). The ILSM has two main responsibilities:

"a. To the Deputy Commander or Project Manager to ensure that timely, thorough, and complete logistic support is provided for acquisitions;

b. To the Deputy Commander for Life Cycle Engineering and Platform Integration Directorate (ELEX 08), to ensure that acquisition logistics planning and execution is in compliance with policy, regulation, directive, and guidance, and is of the highest quality".[19:6-1]

In addition to the ILSM interface, formal Logistic Assessment Reviews (LARs) are scheduled at least 60 days in advance of major decision points, or milestones, in the acquisition life cycle. LARs are critical reviews designed to evaluate the sufficiency of logistic planning and activity. LAR policy will also be discussed in a following section.

C. ACQUISITION LOGISTICIAN (AL)

As noted above, acquisition logisticians are assigned to each project. The AL's prime responsibility is "to accomplish the planning/development and execution of logistic support for a given acquisition throughout its life cycle."[19:5-1] The AL, it would follow, would be the person who could answer the thesis question, "How does NAVELEX plan for follow-on spare part support?" In fact NAVELEX Instruction 4000.6D states, "The AL provides the link between the design and downstream cost drivers, such as...spares replenishment."[19:5-2] However, based on interviews with several ALs at NAVELEX, this is not always the case. Some ALs even disagreed that they had any impact on follow-on spare part support. The reasons for this anomaly are varied, but two predominate reasons have become obvious; (1) The AL positions assigned throughout the PM/PD organizations are of recent design. The people filling these positions are sometimes both new to the organization and new to the Navy. In short, some ALs do not understand the Navy supply system and how they, as ALs, impact on it[20], (2) There is a general perception in the project offices that follow-on spare part support is not as much the responsibility of the

PM/PDs as it is the ICPs. This attitude and perception is currently mirrored by the ALs. Nevertheless, ALs have strong potential and can be invaluable in terms of effective follow-on spare part support.

D. INTEGRATED LOGISTIC SUPPORT PLANS (ILSPs) AND OPERATIONAL LOGISTIC SUPPORT SUMMARIES (OLSSs)

As explained in Chapter III, an ILSP is a management tool that outlines the plan for logistics support. Most ILSPs cover the entire life cycle of a system. However, within NAVELEX, the ILSP covers the conception and formulation phase, the demonstration and validation phase, the full scale engineering development phase and only the initial portion of the production and deployment phase. During this latter phase, an Operational Logistic Support Summary (OLSS) is developed and the ILSP becomes defunct. Figure 4.1 summarizes the major milestones and required ILS documents as listed in NAVELEX Instruction 4000.10A.[21:1-2] This instruction provides guidance for the development and preparation of ILSPs and OLSSs.

FIGURE 4-1

NAVELEX SYSTEM ACQUISITION ILS DOCUMENTS

Acquisition Milestone	Phase	ILS Document
0	Concept Formulation	General ILSP Formulation
I	Demonstration and Validation	ISLP Ready For Approval
II	Full Scale Engineering Development	ILSP Revision
III	Production and Deployment	ILSP Revision Initial OLSS
	Deployment/Operation	OLSS Revision As Required

Copies of draft ILSPs and OLSSs are forwarded to SPCC and the NAVELEX Detachment in Mechanicsburg, Pennsylvania (NAVELEX DET MECH) and other distributees for comment, as appropriate. These comments are then incorporated into the ILSP or OLSS. The impetus behind the OLSS is to provide a strongly user-oriented document that provides summary information and references.

NAVELEX 08 has prepared a "Checklist for Reviewing Supply Support Portions of Integrated Logistic Support

Plans (ILSPs) and Operational Logistic Support Summaries (OLSSs)"[22]; a portion of which is included as Appendix C to this thesis. The checklist identifies specific topics and questions to be answered for each paragraph of the supply support sections. The checklist is a detailed and comprehensive management tool. However, as will be seen, it is not strictly adhered to when ILSPs and OLSSs are prepared.

E. LOGISTIC ASSESSMENT REVIEW (LAR)

As indicated in Section B of this Chapter, Logistic Assessment Reviews (LARs) are critical reviews designed to evaluate the sufficiency of the logistic plan. NAVELEX Instruction 4000.13[23] establishes the policies, procedures and requirement for LARs. LARs are to be held (1) in advance of each key milestone of Figure 4-1, (2) at the request of the acquisition code, NAVELEX 08, or from higher authority and (3) at least once every 18 months. The LAR audit team is composed of NAVELEX 08 Logistic Element Managers (LEMs)*, System Effectiveness Engineers (SEEs) and other personnel as appropriate. The audit team members use

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*A LEM is an individual responsible for the management of a specific logistic support element, e.g., Contract Engineering, Technical Services, Level of Repair Analysis, Supply Support, Technical Data, etc.

checklists that are prepared for each of the first three milestones of the acquisition cycle. The checklist section for "Supply Support" for each of the phases is included as Appendix D of this thesis. The PM/PD must receive NAVELEX 08 certification as a result of the LAR before proceeding with the next phase of the system acquisition or milestone reviews by higher authority.

F. COMPETITIVE SPARE PARTS ACQUISITION

Recently, NAVELEX has taken agressive action to influence follow-on spare part support for 7G COG material. Often attempts by the SPCC to procure follow-on spare part support on a competitive basis prove futile because SPCC lacks the technical specifications to assist in this process. Therefore, the Navy is forced to buy spare parts on a sole source basis at inflated prices. Many times, what is needed are Level 3 engineering drawings and associated lists. "Engineering drawings and associated lists prepared to this level shall provide engineering definition sufficiently complete to enable a competent manufacturer to produce and maintain quality control of an item to the degree that physical and performance characteristics interchangeable with those of the original design are obtained without resorting to

additional product design effort, additional design data, or recourse to the original design activity."[24:2]

In recognition of the ICP's lack of technical documentation, NAVELEX 08 reviewed 158 hardware contracts. Only 22 percent of the contracts required the contractors to deliver Level 3 drawings. As a result of this finding, NAVELEX 08 set forth new policy which states:

"Level 3 drawings are required to support competitive reprocurement of spare parts. Since it is often more economical to procure this data from the OEM before the hardware contract is closed out, it is requested that addressees review their contracts which do not include Level 3 drawing requirements and initiate action as appropriate to ensure that technical data to support competition will be available for spare parts reprocurement. It is further requested that addressees ensure drawings are reviewed for technical accuracy and completeness prior to acceptance."[25:1]

Although NAVELEX contracts do require contractors to provide technical data to facilitate spare part procurements, there are many problems that exist in the way that this is accomplished. The technical data is generally sent to the Electronic Systems Department at

SPCC where it is filed by drawing or part number on computer cards. "Engineering technical data for competitive procurements is accepted by SPCC with no review for technical accuracy... When the requirement to reprocure a given item occurs, the technical packages are frequently found to be of insufficient quality (inaccurate, inadequate, incomplete), forcing the Government into sole source acquisition or reverse engineering."[25:4-1]

To alleviate these problems, NAVELEX intends to establish a technical data repository, separate from SPCC, designed for the express purpose of maintaining technical documentation for SPCC's reprocurement requirements. In addition, PMs/PDs will be required to review the technical drawings for accuracy and adequacy before they are filed by the respository.[26] Based on urgings from NAVSUP, NAVELEX also intends to extend this policy to NAVELEX managed 2Z COG material.[26]

G. SUMMARY

This chapter has summarized NAVELEX's formal policies as they relate to ILS, specifically ILSPs, OLSSs, the LAR, ALs and competitive acquisition. It is evident that much has been written that relates to follow-on support, and in particular to spare part follow-on support. It appears that NAVELEX has a sound

basis from which to plan for follow-on spare part support. The primary concern in the next chapter will be how NAVELEX employs these policies and procedures to plan for follow-on spare part support.

V. ANALYSIS AND REVIEW OF NAVELEX POLICIES, PROCEDURES AND PRACTICES

A. INTRODUCTION

In this chapter, the NAVELEX policies and procedures and practices presented in Chapter IV will be analyzed. Questions such as, "Are these policies adequate?" and "How can they be improved?," will be raised and answered. In addition, variances from these policies and procedures will be discussed.

B. REVIEW OF SAMPLE ILSPs

As indicated in Chapter IV, NAVELEX has directed that its PMs prepare ILSPs and/or OLSSs depending on the acquisition life cycle phase of the project. Specific guidance for the preparation of these documents is included as Appendix C of this thesis. According to NAVELEX Instruction 4000.10A, "The ILSP is a dynamic planning document written to identify ILS tasks required for acquisition, and how and when such tasks will be accomplished. The ILSP contains the basis for specific actions by Navy activities and for developing ILS requirements placed in contractual documents.... The ILSP provides the foundation for coordinated action on the part of the AL, Integrated Logistic Support Manager (ILSM), Logistic Element Managers (LEMs) and the contractor and shows the manner

in which each of the applicable elements of logistic support is to be obtained, integrated with other elements and sustained throughout the system's life cycle."[21:5-5]

The ILSP is meant to be a comprehensive document which should have significant impact of the life cycle of the project. The NAVELEX Desk Guide Checklist for the Supply Support Portions of the ILSP and OLSS (Appendix C) also underlines this significance. However, NAVELEX ILSPs currently in effect provide only token concern for supply support matters and even less concern for follow-on spare part support.

Five NAVELEX ILSPs were reviewed for various sytems currently in development including the AN/URD-10(V) Direction Finder Set[27], the AN/SLQ-17A(V)2 Counter-measure Set[28], the AN/UYQ-34(V) Processor Display System[29], the AN/WSC-6(V) Satellite Communications Set[30] and the Joint Tactical Information Distribution System[31]. All five of these ILSPs contained sections on Supply Support ranging from two to eight pages. Four of these ILSPs did not address follow-on support. The one that did optimistically stated: "Plans will be developed, not later than two years before production shutdown of the main contractor, for the post-production support of the

system for the remainder of its operational life."[31:75]

Without exception, these ILSPs stated that repair part support is the responsibility of the ICP (SPCC) without acknowledging the impact that the ILSP and the PM/PD has on the SPCC's ability to provide follow-on supply support. Questions such as (1)"Does the plan state whether the contractor will be required to supply any/all spare parts as necessary, repair components/modules as necessary, or supply only unique non-standard items while standard items are drawn from the supply system?"[22:1-6], (2)"Has phased provisioning been considered?"[22:1-7], and (3)"Have arrangements been made for reprocurement drawings (DoD-D-1000, Level 3) to be provided to the Program Supply Inventory Control Point (PSICP) when it is considered cost effective to breakout the support items for competitive procurement?"[22:1-8], are not addressed in the ILSPs although they appear in the NAVELEX Checklist for the Supply Support Portion.

NAVELEX needs to emphasize the necessity for adequate provisions for follow-on support when reviewing ILSPs at Logistic Acquisition Reviews (LARs). LARs provide the best point in NAVELEX systems

development to enforce the policies and procedures outlined in applicable NAVELEX instructions.

C. EDUCATION OF THE ACQUISITION LOGISTICIAN

The role of the acquisition logistician (AL) was defined in Chapter IV, i.e., the logistic engineering and support interface for each NAVELEX project. Also, it was pointed out that ALs do not understand the Navy supply system. In addition, some ALs themselves are not aware how the PM/PD impacts on the ICP's ability to provide follow-on spare part support.[33] Some ALs see the follow-on support issue as SPCC's problem, indicating that the fault is SPCC's for not being in touch with the project manager.[34]

The AL position is an extremely important addition to NAVELEX's PM/PD organization and it is a significant step in the right direction to ensure the logistical success of NAVELEX projects. However, personnel in an AL billets must be provided with a strong foundation and understanding of the Navy supply system.

Currently NAVELEX provides ALs with a short, but intensive, training course. However, more logistics engineering training could substantially improve the ALs' performance. Prior experience with logistics issues in the systems acquisition process would also significantly enhance the capabilities of NAVELEX ALs.

D. EVALUATION OF RECENT POLICY EMPHASIS

The recent NAVELEX policy concerning competitive spare parts acquisition, i.e, the requirement for Level 3 drawings, creates a potentially costly additional expense, especially for those projects currently under contract. For NAVELEX projects in the production stage, contractors have little or no incentive to offer their drawings at a competitive price. As was discussed in Chapter IV, the best time to go after data such as Level 3 drawings is before a prime contractor has been selected. At this early time, contractors would have an incentive to hold their prices down.

The PMs/PDs would like to comply with this new policy. However, they may not be able to afford the additional expense. As the PM/PD considers trade-offs, the Level 3 drawing requirement will be one of the trade-offs. The recent policy requiring Level 3 drawings does not address the question of funds to support this policy.

There are other impediments to the Level 3 drawing requirement. Some contractors already faced with a contractual requirement informally have made it known that what they will provide may not be all that DoD-D-1000B requires.[34] Another impediment to this policy is that NAVELEX has no historic cost data with

which to ascertain what a reasonable price for Level 3 drawings might be.[35] Finally, the question of what types of items should have Level 3 drawings is vague. The new policy leaves the determination of what Level 3 drawings should be purchased to the PM/PD. However, if the PM/PD doesn't procure the drawings, the policy states further that, "the rational for this decision is requested."[25:1]

Decisions such as those required of the PM/PD by this new policy, especially in the early stages of a project's life cycle, are extremely difficult. The NAVELEX policy encourages the procurement of Level 3 drawings if there is any question as to whether they may ever be required. However, the policy memorandum goes on to state, "drawings should not be purchased in those cases where high reliability for a specific repair part results in very low demand and, therefore, little or no reprocurement action is expected."[25:2] Interestingly, some PMs/PDs are interpreting the policy to mean procurement of Level 3 drawings for every non-National Stock Number (NSN) designated repair or spare part.[36] Such an interpretation could actually raise life cycle costs.

The new policy also seems to be at odds with the Federal Acquisition Regulation (FAR) which states:

"Technical data and computer software is expensive to prepare in the required form and to maintain and update. Every effort, therefore, should be made to avoid placing a requirement upon a contractor to prepare and deliver data or software unless the need is postively determined."[37:9-502]

Finally, the new policy does not address the obsolescence of spare parts and components, a problem of significance when dealing with state-of-the-art weapon systems. Currently NAVELEX has no policy that addresses this problem.[36] Often the problem of obsolescence is taken care of in the course of natural events. Suppose some electronic system is expected to be replaced quickly because of technological advances. Follow-on spare parts would therefore not be a problem because total life cycle requirements are bought all at once. In other cases, by the time NAVELEX and the contractor have negotiated a contractual agreement for Level 3 drawings for spare parts, the equipment has become obsolete. Such was the case with the AN/GSE-39 Electronics Terminal.[20]

Despite the criticism raised with regard to the new policy of competitive spare parts acquisition, the policy does represent a determined effort to resolve problems experienced by the ICP when procuring

follow-on spare part support. It also provides a partial answer to the basic question of this thesis, i.e., "How does NAVELEX plan for follow-on spare part support?"

NAVELEX should further refine its new policy for requiring Level 3 drawings by providing specific guidance to project managers to aid in the determination of what spare parts require level 3 drawings (e.g., based on anticipated levels of demand). In addition, NAVELEX should evaluate the effect of the policy in terms of additional costs for each system acquisition. Specific funds should be identified to support the policy. If NAVELEX determines that no funds are available, NAVELEX may have to suspend its policy until funds can be obtained via the budgeting process. Finally, NAVELEX needs to examine the problem of obsolescence of spare parts and develop plans as a part of ILSPs which would ensure that follow-on support would not be adversely affected by obsolescence.

E. ACQUISITION CYCLE BREAKDOWN

The DoD acquisition life cycle can be depicted as a continous process as indicated in Figure 5-1.[38:4] This smooth and continuous process reflects the ideal situation. The acquisition life cycle at NAVELEX, however, is more accurately depicted in Figure 5-2.

Sometime during the deployment and operation phase, the continuity of the acquisition cycle breaks down. There are several reasons for this break down. Some of them are discussed below.

1. Program Manager's Incentives

A NAVELEX program manager's incentives are many and they are complex. However, there appears to be little or no incentive to minimize life cycle costs beyond the production phase. The PM/PD feels more allegiance to his program sponsor, usually OPNAV, rather than to NAVELEX. As mentioned in Chapter IV, the sponsor has the authority to reduce plans for logistic support. It is significant to note that the sponsor, being a part of a more senior command and being the controller of the purse strings for NAVELEX projects, presents an interesting dilemma for the PM/PD. Because the sponsor is interested in results, i.e., providing new hardware to the Fleet, this also becomes the major concern for the PM/PD and the overriding factor in any cost trade-off the PM/PD must make. With limited funds and with pressure to get the project into production, follow-on support suffers in the wake of hardware trade-off decisions. This pressure often results in a weapon system entering the fleet with severe supply support problems. Such was

Figure 5-1
(Extracted from Office of Management
and Budget (OMB) Pamphlet on Planning Circular A 109)
MAJOR SYSTEM ACQUISITION CYCLE

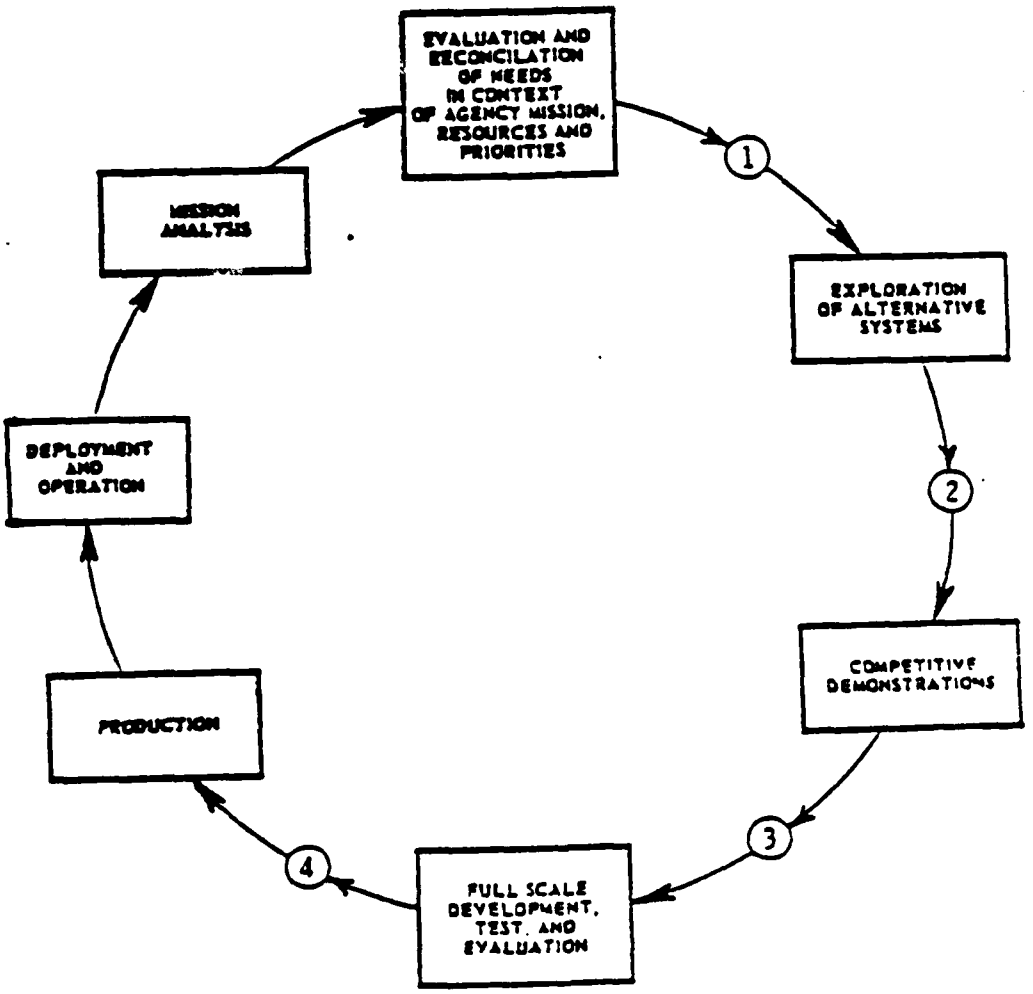
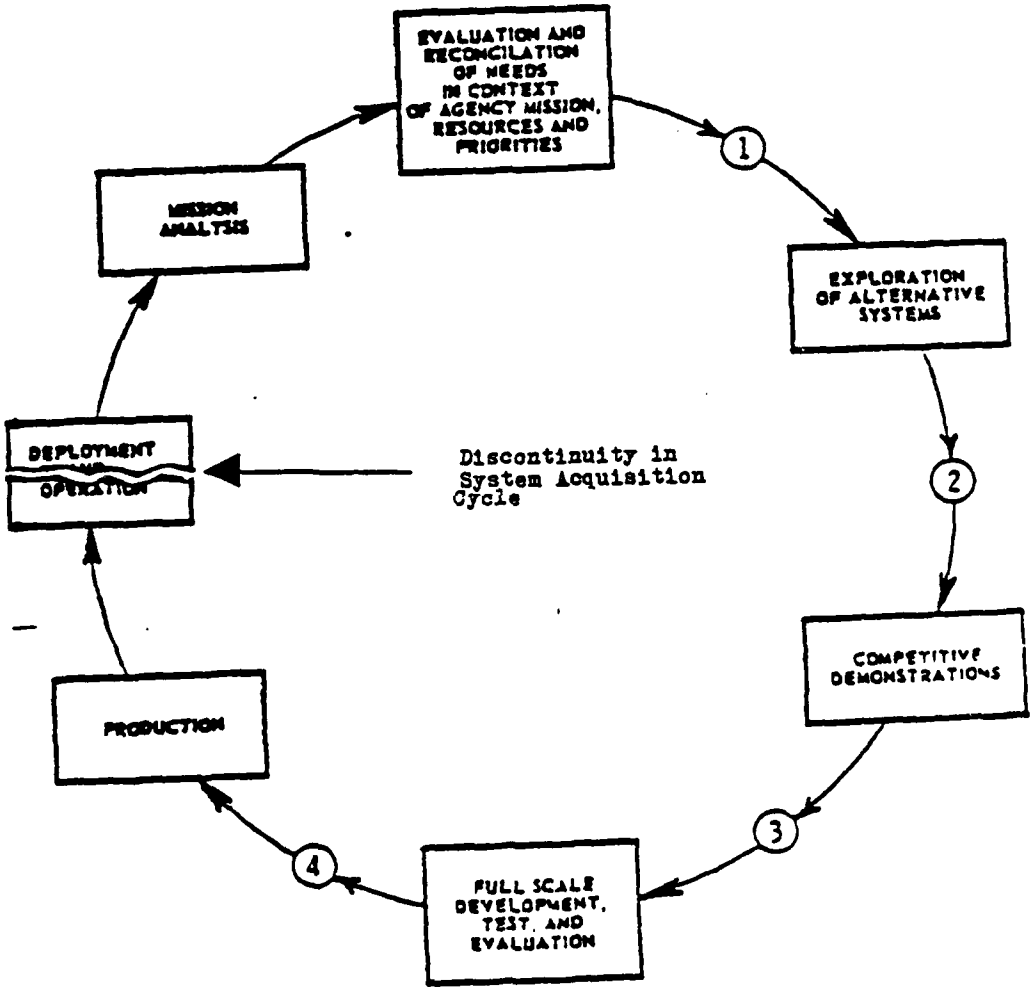


Figure 5-2

MAJOR SYSTEM ACQUISITION CYCLE



the case with AN/SLQ-32 Electronic Countermeasures System.[20]

Because of the PM's/PD's relatively short association with the total life of the system he is working on, typically three years out of a lifetime of ten to fifteen years, he is evaluated on what he can accomplish during his assignment for the project. Problems that may to arise in the future as a direct result of trade-off decisions in the early phases of the project have no impact on the PM/PD making those decision. He therefore has no incentive to resolve them. His incentive is to delay them in favor of immediate and quantifiable results.

It is also a fair criticism to note that the PD/PM has no incentive to save money by aggressive management of the hardware portion of the contract with intentions of supplementing or funding logistic support elements that have not been previously addressed because of lack of funds.[35] This situation occurs because cost avoidance does not result in additional funds available to the PM/PD. The bottom line appears to be that PMs/PDs have no incentive to manage hardware costs carefully because there is no hope of transferring these funds to logistic support elements.

2. Perceived Differences in PM's/PD's and NAVELEX's and SPCC's Responsibilities

As previously indicated, project managers are seldom one person throughout the entire life cycle of a system acquisition. As a consequence, long range planning appears to have almost no benefit to the current program manager. Some critics of this situation maintain that many of the problems that are experienced by the ICP could be alleviated if the program manager was held responsible and accountable for the entire life cycle of the system being acquired or, if this is not feasible, decisions that impact on follow-on spare part support should not be made by the program manager.[39]

Other facets of the discontinuity are the real and perceived differences in responsibilities between the HSC and the ICP. After production and deployment, the project manager more or less is likely to feel that follow-on support is entirely upto the ICP. As indicated in one of the paragraphs above, some ALs have this perception and believe it to be correct. Furthermore, because two distinct commands are involved, i.e., NAVELEX and SPCC, it is easier for the PM/PD to give up the logistics support of his project. When the ICP finds itself in a situation wherein

signficant man hours are expended trying to overcome obstacles not planned for by the ILSP or acquisition strategy, this problem is seen by NAVELEX as separate and not attributable to the HSC.

3. Internal NAVELEX Policy and Guidance

As mentioned in Chapter IV, NAVELEX policy requires a different ILS documents before and after the production and initial deployment phase of the system acquisition. Whereas the ILSP is developed and maintained through the production phase, only an OLSS is required after this phase. The requirement of different documents, in itself, does not necessarily create the discontinuity in the system acquisition cycle, but it does emphasize separate and distinct phases in the life cycle rather than emphasizing the continuing relationship between the early life cycle phases and the operational phase.

NAVELEX should emphasize the overall responsibility of the PM/PD for the entire life cycle of NAVELEX projects. In doing so, incentives should be developed to encourage the PMs/PDs to plan for and acquire logistic support, in particular support for follow-on spare parts. NAVELEX should also ensure that the goals of PMs/PDs include minimum total life cycle costs. Perhaps a PM/PD should also be evaluated on the

planning he does for future logistics support. Finally, NAVELEX should evaluate the effect of the OLSS on the project's ILSP. Because of the requirement for an OLSS for the operation and maintenance phase of the system's life cycle, the PM may not adequately plan for this life cycle phase in the ILSP.

F. SUMMARY

This chapter has analyzed current NAVELEX polices, procedures and practices as they impact on follow-on support. In addition, the position of the AL was analyzed for potential improvements. Finally, the system acquisition cycle was examined and a basic discontinuity in the life cycle was identified and the reasons for it were discussed. The NAVELEX procedures and practices do have some weaknesses that require attention. However, from an overall perspective NAVELEX policies do provide the structure for a strong foundation for future cost effective spare part follow-on support. It is evident from the management attention and supplemental professional publications such as the NAVELEX Logistics Procedures Manuual[40] and the NAVELEX Desk Guide-Checklist for Reviewing Supply Support Portions of ILSPs and OLSSs, that where no attention had been given to follow-on spare part support in the past, strong emphasis now exists.

Follow up at LARs is required to ensure that NAVELEX policies are followed by PMs/PDs.

VI. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

A. SUMMARY

Chapter I indicated that this thesis sought to answer the question, "How does NAVELEX and its PMs plan for follow-on spare part support?" This question came as a result of previous thesis work which studied the impact of NAVELEX PM/PD decisions on SPCC. Rather than continue to identify problems confronting the ICP, this thesis concentrated on the source; namely, NAVELEX.

To assist in laying the groundwork for this study, Chapter II reviewed current system acquisition concepts that are important considerations for the PM/PD during the systems acquisition cycle. Chapter III summarized procurement techniques available to the program manager. It was noted that some of the more current and popular procurement techniques dealt mainly with spare part support only through the production phase of a system's life cycle, but that some of the other techniques currently being pursued, such as breakout and procurement method coding, were effective tools for follow-on spare part support after the production phase. The question of sole source versus competition with regard to follow-on spare procurement was addressed by looking at recent studies in this area.

In Chapter IV current NAVELEX policies and procedures for follow-on spare part support were reviewed. Chapter V evaluated these policies and practices and offered some improvements.

B. CONCLUSION

Until recently, NAVELEX did not emphasize planning for follow-on spare part support. As a consequence, SPCC faced serious problems in trying to provide follow-on spare part support. Very recently, NAVELEX has developed policies that specifically require program managers and project directors to plan for better follow-on support. One specific step was to implement contractual action to procure Level 3 drawings to permit competitive reprocurement of follow-on spare part support. Another important step that NAVELEX has taken was to require ALs for each NAVELEX project to enhance logistics support. NAVELEX has also developed checklists for ILSPs and OLSSs and has developed and published a Logistics Procedures Manual to help the PM to plan and acquire logistic support for his project.

C. SUMMARY OF RECOMMENDATIONS

1. Recommendation 1

NAVELEX needs to provide adequate funds to support its new policy for improving follow-on spare

part support. The new policy requiring Level 3 drawings does not address how a project manager will be funded if a program is already in the production phase. The imposition of the new policy on weapon systems already in the production phase, or even in earlier stages under contract, places the government in an unfavorable bargaining position, especially when historic cost data is not available to compare with a contractor proposal. In addition, the program manager may have no expertise in determining what items require Level 3 drawings, causing a decision to be made to buy Level 3 drawings by default. NAVELEX should provide specific guidance to its PMs/PDs so that the PM/PD knows when he should procure Level 3 drawings.

2. Recommendation 2

Acquisition Logisticians should have a better understanding both of the Navy supply system and the impact that PM/PD decisions have on follow-on spare parts support. This understanding will come only with time and experience and additional training. This training and experience could be readily available if AL billets were filled with Supply Corps officers who have had graduate education oriented toward the professional requirements of the AL billets.

3. Recommendation 3

A great deal more supply support planning than is evidenced in current NAVELEX ILSPs is needed. Current NAVELEX guidance in the form of checklists and instructions is adequate but not utilized. Strong emphasis on ILSP supply support considerations should be emphasized at Logistic Acquisition Reviews. In addition, NAVELEX should develop policy regarding protection of spare parts from obsolescence to avoid inadequate follow-on support. The policy should ensure that plans for obsolescence are addressed in each project's ILSP.

4. Recommendation 4

The existing discontinuous system acquisition life cycle creates problems with follow-on spare part support. Policies and procedures should stress the continuity of the system acquisition cycle and the interrelationship of each phase or actions and decisions made in previous phases of the project.

5. Recommendation 5

Further research should be conducted in the area of sole source verses competitive procurement of follow-on spare part support. Recent studies generally favor competition. However, it seems plausible that in some cases sole sourcing may be more cost effective;,

e.g., when a system has limited application and a short life cycle. Other exogenous factors that indicate competition is a better alternative in the sense of life cycle costs should be identified.

APPENDIX A

Secretary of Defense
TEN POINT PROGRAM TO FIGHT PRICE ABUSE

[Extracted from "The Navy Answer to Spare Parts Pricing Problems" The Navy Supply Corps Newsletter, Jan-Feb 1984]

1. Offer incentives to increase competitive bidding and reward employees who pursue cost savings.

2. Take stern disciplinary action, including reprimand, demotion and dismissal, against employees who are negligent in implementing Defense Department procedures.

3. Alert Defense contractors to the seriousness of the problem and ask them to take disciplinary action when necessary and rewad employees when appropriate.

4. Competition Advocates already in place in the services must challenge orders that are not made competitively or appear to be excessively priced. Procurement offices must heed the advice of the Competition Advocate.

5. DoD will refuse to pay unjustified price increases. The Defense Contract Audit Agency will work with contract Administration offices to strengthen spare parts pricing procedures and assist in negotiations of major spare parts purchases.

6. Reform of basic contract procedures must be accelerated.

7. Take steps to obtain refunds in instances where we have been overcharged.

8. If alternative sources of supply are available, DoD should cease doing business with those contractors who are guilty of unjustified and excessive pricing and who

refuse to refund any improper overcharges. If such sources are not available, they must be developed rapidly. Suspension or debarrment should be accomplished within 30 days of indictment or conviction of a contractor.

9. Audits and investigations of spare parts will continue.

10. The many corporations not involved in spare parts overcharging should not be maligned because of the failures of a few.

APPENDIX B

PROCUREMENT METHOD CODES

Procurement Method Code	Explanation
0	Not established.
1	Items screened and found to be already competition.
2	Items screened and determined for the first time to be suitable for competitive procurement. A replenishment item will be included in this group only when the identification of PMC 2 is supported by the procurement history of the item. The alternative identification is PMC 1.
3	Items screened and found to be procured directly from the actual manufacturer or vendor, including a prime contractor who is the actual manufacturer.
4	Items screened and determined for the first time to be suitable for direct purchase from the actual manufacturer or vendor rather than the original prime contractor for the end items which these parts support. A replenishment item will be included in this group only when the identification as PMC 4 is supported by the procurement history record of the item. The alternative identification is PMC 3.
5	Items screened and determined not suitable for competitive procurement or direct purchase and which, therefore, continue to be procured from a prime contractor who is not the actual manufacturer.

APPENDIX C

SUPPLY SUPPORT CHECKLIST (Checklist for Reviewing Supply Support Portions of ILSPs and OLSSs")

(Extracted from NAVELEX Desk Guide)

CHECK LIST

PARAGRAPH NUMBER ILSP	PARAGRAPH NUMBER OLSS	SUBJECT REFERENCE(S)	RESPONSIBILITY IDENTIFIED	SCHEDULE ADDRESSED
7.3	5.3	SUPPLY SUPPORT		
7.3.1	5.3.1	Supply Support Objectives		
7.3.1.1	5.3.1.1	Supply Support Concepts/Levels		
x	x	Is full Navy Supply Support planned for the early deployment period? If not, why not?		
x		Have supply support problems in baseline (predecessor or similar) hardware been assessed and solutions proposed for supply support of equipment addressed in the ILS Plan? NAVMATINST 3000.2		
x		Will the configuration baseline be firmly established to support provisioning at 36 months before full Navy Support Date?		
x		Have the Material Support Date (MSD) and Navy Support Date (NSD) been projected/established and coordinated with the Program Support Inventory Control Point (PSICP)?		
x		Is there a requirement for a Maintenance Repair Part (MRP) option in the hardware development and acquisition contract? If not, why not?		
x	x	Is support for a training facility(ies) from the supply system required and identified?		
x	x	Is the supply support for training units the same as for shipboard installations?		
x	x	Has the basis for provisioning and Source, Maintenance and Recoverability (SM&R) coding been identified such as a special maintenance philosophy in accordance with Logistic Support Analysis (LSA)/Maintenance Engineering Analysis (MEA)/Level of Repair Analysis (LORA)/Supply Support Analysis Data (SSAD) or to meet an approved Operational Availability (A_o) objective?		
x	x	Has the level/degree of support required been defined for organizational, intermediate, and depot level in accordance with the capabilities stated in the maintenance plan?		
x	x	Are Maintenance Assistance Modules (MAMs) required? Is the requirement documented in accordance with NAVMATINST 4000.40A?		
x	x	Are allowances to be developed in accordance with current directives? If not, has OPNAV (Op-41) approval been obtained? OPNAVINST 4441.12A OPNAVINST 4000.57D OPNAVINST 4000.82 OPNAVINST 4000.83		
x	x	Are technical overrides (TORs) required? Is the requirement documented in accordance with current directives? OPNAVINST 4441.12A		

PARAGRAPH NUMBER ILSP	PARAGRAPH NUMBER OLSS	SUBJECT REFERENCE(S)	RESPONSIBILITY IDENTIFIED	SCHEDULE ADDRESSED
x		Do transition plans exist for any aspects of supply support which change in responsibility during the life of the program? Do transition plans for contractor supply support assure the Navy will receive an agreed upon quantity of stock at the time of transition?		
x		Are procedures established to revise supply support based on program or configuration changes?		
7.3.1.2	5.3.1.2	Supply Support Validation		
x		Since it is sometimes impractical to obtain supply support data from live sources during the Test and Evaluation period, have such aspects been simulated or otherwise analyzed and predicted? (Mean Logistic Delay Time)		
x		Were the observed results compared with required Operational Availability (A_O) in the equation $A_O = \frac{MTBF}{MTBF + MTTR + (\text{Supply and Other Logistic Delay Time})}$ NAVMATINST 3000.2		
x		Does the plan specify how supply support evaluation and acceptance will be conducted, and what use will be made of the resulting data?		
x		Will supportability requirements be met in Approval for Service Use (ASU) requests? OPNAVINST 4720.9D NAVMATINST 4720.1 NAVELEXINST 4000.9C		
x		Will parts usage data be collected and analyzed during the development period and fed back into Provisioning Technical Documentation (PTD), Supply Support Analysis Data (SSAD) and Program Support Data (PSD)?		
x		Will implementation of planned supply support meet the Operational Availability (A_O) objective established for the equipment? How is this demonstrated through the use of Supply Support Analysis Data (SSAD)? SECNAVINST 5000.39 NAVMATINST 3000.2 NAVELEXINST 4000.X ENCL (9)		
x		Are supply support milestones consistent with responsibilities assigned in paragraph 7.3.2/5.3.2 and objectives in 7.3.1/5.3.1? NAVELEXINST 4000.10A		

PARAGRAPH NUMBER ILSP	PARAGRAPH NUMBER OLSS	SUBJECT REFERENCE(S)	RESPONSIBILITY IDENTIFIED	SCHEDULE ADDRESSED
7.3.2	5.3.2	Supply Support Responsibilities		
7.3.2.1	5.3.2.1	Program Support		
x	x	Has the Navy Ships Parts Control Center (SPCC) been designated as the Program Support Inventory Control Point (PSICP)?		
x		Has a PSICP member been assigned to the ILS Management Team (ILSMT)?		
x		Is the Principal Development Activity (PDA) assigned and the PDA role established? NAVELEXINST 4000.10A		
x		Does the plan provide guidance/direction for assistance/action expected from the PSICP in support of Support and Test Equipment (S&TE)? Special Purpose Test Equipment (SPTE)? General Purpose Test Equipment (GPTE)? Facility Support?		
7.3.2.2	5.3.2.2	Early Supply Support NAVMATINST 4105.1A SPCCINST 4105.1		
x		If Navy Supply Support is not planned for initial deployment, what early support concepts as defined and authorized by NAVMATINST 4105.1A are planned for use and has formal agreement been accomplished with SPCC?		
x	x	If contractor support is to be provided prior to the NSD, does the ILSP require that interim repair parts kits be shipped with but separate from the system/equipment, be consigned to the NSA/SUPSHIPs/supply officer as appropriate, be accompanied by a Preliminary Allowance List (PAL), a deck of NAVSUP Forms 1114 (one for each repair part) and a deck of NAVSUP Forms 1109 (one for each repair part)?		
x		Are the contractor tasks identified?		
x	x	Are contract performance criteria specified (e.g., supply response time for replenishment of onboard repair parts, repairable turn-around time for depot repairables)?		
x	x	Are contract provisions made to enable diversion of critical items in short supply from production to operational ships if needed?		
x	x	Has duration of contractor support period been defined?		
x	x	Does the plan state whether the contractor will be required to supply any/all spares/parts as necessary, repair components/modules as necessary, or supply only unique non-standard items while standard items are drawn from the supply system?		
x		Does the plan specify the Navy activity that is responsible for negotiating with the contractor for parts?		

PARAGRAPH NUMBER ILSP	PARAGRAPH NUMBER OLSS	SUBJECT REFERENCE(S)	RESPONSIBILITY IDENTIFIED	SCHEDULE ADDRESSED
x		Have Basic Ordering Agreements (BOAs) been established with the contractor for spares/parts?		
x		Have funding arrangements been made for the contractor's service?		
x		Is there a plan to transition from contractor support to Navy support?		
7.3.2.3	5.3.2.3	Navy Support		
x		Will interim support methods be utilized? DID UDI-V-21041		
x	x	Are requirements for an Interim Repair Parts List (IRPL) established? MIL-STD-1375 MIL-STD-1561 UDI-V-22863		
x	x	Has NAVELEX Interim Support role been established?		
x	x	Has contractor role been established?		
7.3.2.4	5.3.2.4	Provisioning and Allowances DODD 4140.40 OPNAVINST 4423.4		
x		Can certificates of identicality (COI), certification of prior submission (CPS) or statements of prior submission (SPS) be used in lieu of PTD submission?		
x		Have provisioning requirements been defined in accordance with MIL-STDs-1561 and 1552? Are these requirements integrated with data to be provided by Data Sheet H of MIL-STD-1388-1 and accompanying LSA-36 Provisioning System output reports?		
x		Has a Provisioning Requirement Statement (PRS) been prepared?		
x		Will Source, Maintenance and Recoverability (SM&R) codes correspond to A_o requirements, Level of Repair (LOR) decisions, LSA results, and the Maintenance Plan? OPNAVINST 4410.2 NAVSUPINST 4423.14A		
x		Has phased provisioning been considered? DODI 4140.19 MIL-STD-1517		
x		Does the plan require the standard Provisioning Parts List (PPL) (DI-V-7002) and Supplementary Provisioning (DI-V-7000) to be provided to the PSICP? If so, is there a requirement for Supplementary Provisioning Documentation (drawings, etc.) (DI-V-7000) to accompany the PPL?		

PARAGRAPH NUMBER ILSP	PARAGRAPH NUMBER OLSS	SUBJECT REFERENCE(S)	RESPONSIBILITY IDENTIFIED	SCHEDULE ADDRESSED
x		If standard provisioning is to be obtained, has there been an evaluation of the need for, or is there a requirement for one or more of the following: Long Leadtime Item List (DI-V-7004)? Repairable Item List (DI-V-7005)? Tools and Test Equipment List (DI-V-7007)? Common and Bulk Item List (DI-V-7008)? Provisioning Screening (DI-V-7016)? Interim Support Item List (DI-V-7006)? Provisioning Parts List Index (DI-V-2022)? Post Conference Provisioning List (DI-V-2172)? Post Conference List (DI-V-7011)?		
x		Has the Short Form Provisioning Parts List (SFPPL) (DI-V-7003) been considered/invoked for short leadtime, off-the-shelf, minor procurements? If so, have Manufacturer or Commercial Manuals (DI-V-7001) and Supplementary Provisioning Technical Documentation (DI-V-7000) been cited to provide drawings/descriptive data to accompany the SFPPL?		
x		Have provisioning conferences been established and the purpose for each defined?		
x		Have arrangements been made for reprocurement drawings (DOD-D-1000, Level III) to be provided to the PSICP when it is considered cost effective to breakout the support items for competitive procurement?		
x		Does the ILSP clearly establish that each contract or order for follow-on equipment and design changes will specify complete requirements for PTD? Also, that the PRS states the necessary requirements to insure that only configuration "difference" will be documented?		
x		Is the ILSP clear on the fact that all requirements for provisioning the equipment apply equally to its associated special support and test equipment?		
x		Are procedures established for assigning Item Mission Essentiality Codes (IMECs)? NAVELEXINST 4000.X ENCL (1)		
x		Are procedures identified to ensure parts needed to satisfy Maintenance Requirements Cards (MRCs) are provisioned as planned maintenance items?		
x		Will provisioning efforts accommodate supply support needs of intermediate and wholesale levels of supply as well as consumer level? DODI 4140.42 OPNAVINST 4423.5		
x		Will provisioning efforts accommodate supply support needs of organizational, intermediate and depot maintenance levels?		
x		Will demand rate factors used in provisioning adequately reflect differing parts usage rates at organizational, intermediate and depot maintenance levels?		
x		Will provisioning efforts accommodate supply support needs of interservice hardware applications? NAVMATINST 5000.10A		

CHECK LIST

PARAGRAPH NUMBER ILSP	PARAGRAPH NUMBER OLSS	SUBJECT REFERENCE(S)	RESPONSIBILITY IDENTIFIED	SCHEDULE ADDRESSED
x		Has Primary Inventory Control Activity (PICA) been identified? Is interservice support role established and agreed to? NAVMATINST 4000.38A NAVMATINST 4790.23A		
x		Has Secondary Inventory Control Activity (SICA) been identified? Is interservice support role established and agreed to?		
x	x	Are Allowance Parts List (APL), Allowance Components List (ACL) and Allowance Equipage List (AEL) numbers assigned and identified? Are Logistic Support Status Codes (LSSCs) assigned and identified? How will APLs, AELs and ACLs be produced and distributed? How will updates be managed and resulting documentation distributed? How will updated supply support documents be incorporated into Coordinated Shipboard Allowance Lists (COSALs)? Are procedures identified to establish and maintain configuration status accounting records at SHCC in order that supply support allowances can be properly computed?		
x		Have any Intra/Interservice Agreements for supply support been coordinated and accepted?		
7.3.2.5	5.3.2.5	Repairables Management OPNAVINST 4400.9 NAVMATINST 4400.14A UDI-E-21065		
x	x	Are normal repairable turn-in procedures to be used in accordance with NAVSUP Publication 485 and the Master Repairable Item List (MRIL) (NAVSUP Publication 4107-M)? If not, are special procedures identified?		
x		Are designated overhaul points (DOPs) recommended and assigned for all depot repairable items? Are assigned depots certified?		
x		Are repair contracts established? Do repair contracts contain contractual specifications for repair turnaround time (RTAT), quality control (RFI rates), repair costs and attrition rates?		
x		Is supply support to meet DOP requirements being provided?		
x	x	Are repairable items in the Master Repairable Item List (MRIL)? If not, what action is being taken to include them?		
x		Are Depot Maintenance Interservice Support Agreements (DMISSAs) required? If so, are they established?		
7.3.2.6	5.3.2.6	Residual Material		
x	x	Are responsibilities for handling residual and excess material identified? DOD 4140.26M DD Form 1348-M-3		

PARAGRAPH NUMBER		SUBJECT	RESPONSIBILITY	SCHEDULE	
ILSP	OLSS	REFERENCE(S)	IDENTIFIED	ADDRESSED	
7.3.2.7	5.3.2.7	Supply Support Material Management			
x	x	How will outfitting material be provided to installation sites?			
x	x	How will outfitting material be turned over to the designated recipient (supply officer) at installation sites?			
x	x	How will the supply officer acknowledge receipt of outfitting material?			
x	x	How will outfitting material be verified against allowances? How will outfitting shortages/discrepancies be satisfied?			
x	x	How will outfitting material be integrated with site stocks/inventory or operating space items?			
x	x	What action is to be taken on outfitting excesses?			
x	x	How will inventories and stock records be updated to reflect stock number changes corresponding to updated allowance parts lists? NAVSUPINST 4441.21A			
x	x	Do parts warranties apply? How will sites know which parts have warranties? What procedures apply to warrantied parts?			
7.3.2.8	5.3.2.8	Test and Evaluation (T&E) Support			
x		Has the plan addressed the types of test and evaluation supply support kits to be provided?			
x		Does the plan specify how quantities of these kits are to be determined (generally only one set to each testing activity unless the time sequencing of tests will allow more than one activity to use the same set)?			
x		How is T&E spare and repair part usage to be replenished? Will the NAVELEX designated engineering activity participate in T&E supply support requirements determination? If not, why not?			
x		Is it planned that residual T&E spares in excess of site allowance requirements will be absorbed into the supply system?			

PARAGRAPH NUMBER ILSP	PARAGRAPH NUMBER OLSS	SUBJECT REFERENCE(S)	RESPONSIBILITY IDENTIFIED	SCHEDULE ADDRESSED
7.3.2.9	5.3.2.9	Installation and Check-Out (I&C) Support DID DI-V-7006 MIL-STD-1375		
x		Has the Interim Support Item List (ISIL) DID (DI-V-7006) been utilized to define and specify installation and check-out data and data format?		
x		Has the plan addressed the types of installation and check-out kits to be provided?		
x		Does the plan specify how quantities of these kits are to be determined (generally only one set to each installing activity unless the time rate of installation will allow more than one activity to use the same set)?		
x		How is I&C spare and repair part usage to be replenished? Will a NAVELEX engineering support activity participate in I&C determination? If not, why not?		
x		Is accountability for I&C spares established? Is it planned that residual I&C spares will be absorbed into the supply system?		
7.3.3	5.3.3	Special Requisitioning Procedures		
x	x	Are normal requisitioning channels to be used in accordance with NAVSUP Publication 485? If not, are special procedures identified? OPNAVINST 4614.1E NAVSUP Publication 437		
7.3.4	5.3.4	Funding NAVELEXINST 4000.6C ENCL (3) NAVMATINST 4420.2 NAVELEXINST 4000.X NAVELEXINST 4400.9		
x		Are funding requirements and responsibilities for supply support identified in accordance with NAVELEXINST 4000.10A ENCL (4)? Are they consistent with supply support planning?		
x		Are Program Support Data (PSD) sheets addressed for programming and budgeting of spare and repair parts?		

APPENDIX D

Checklist for Logistic Assessment Reviews

[Extracted from NAVELEX INST 4000.13]

DEMONSTRATION AND VALIDATION PHASE

SUPPLY SUPPORT

1. Are any other military services involved?
2. When will the FSED contract be awarded?
3. Is contractor support planned for this phase?
4. Is Logistic Support Analysis being utilized for the program?
5. Is there an ILSP? Does it include supply support planning?
6. Does the current contract include support for the Advanced Development Model?

FULL SCALE DEVELOPMENT

SUPPLY SUPPORT

1. Does the ILSP include supply support planning?

2. Does the current contract contain any provisioning data items?

3. Is LSA included in the contract requirements?

4. Is another military service involved in this phase or in the planned production phase?

5. When is the projected production contract award?

6. Have Program Support Data (PSD) sheets been developed and submitted to ELEX 8123?

7. Is contractor supply support being accomplished to support the Engineering Development Models?

8. Has the draft production contract been circulated to the Logistic Element Managers?

9. Are Maintenance Assistance Modules (MAMs) required? Have they been approved through a Life Cycle Cost Analysis? Have they been budgeted for through PSD sheets?

10. Will the EDMs be used as production systems after TECHEVAL/OPEVAL?

11. Is more than one contractor involved in this phase?

12. Is the method of support for the follow-on production contract set in place? (Will interim support be required, will Installation and Checkout spares be required, is Early Supply Support (ESS) being negotiated with SPCC, is the normal provisioning process being utilized to meet the Preliminary Operational Capability (POC) date?

13. Have SPCC and NAVELEX DET MECH been involved in any ILSP reviews or ILSMT meetings?

14. If there are other military services involved, who is the Primary Inventory Control Activity (PICA)? Who is the Secondary Inventory Control Activity (SICA)?

15. Is there a need to develop a joint service supply support plan?

PRODUCTION AND DEPLOYMENT

SUPPLY SUPPORT

1. Do the PSD sheets property identify equipments scheduled for procurement in the correct fiscal years?

2. Are the PSD sheets accurate?

3. Is interim support by NAVELEX planned and budgeted for?

4. Have INCO spares been procured if required?

5. When is the projected Navy Support Date?

6. Has this equipment been through a FSD phase?

7. Are there any intra/interservice requirements?

8. Is contractor supply support being utilized? How long will it last?

9. Does the ILSP or OLSS include provisioning planning milestones? i.e., PTD deliery, tech coding, files loading, Provisional Item Order (PIO) buy, procurement lead time, delivery of spares, Preliminary Operational Capability, etc.

10. Does the production contract contain adequate Provisioning Technical Documentation (PTD) requirements?

11. Are Level 3 reprocurement drawings being procured? If not, why?

12. Is this equipment planned to be supported by the DoD supply system?

13. Is contractor life cycle supply support planned?

14. Are follow-on reprocurement contracts planned?

15. If initial contractor supply support is planned, how will the transition to full Navy support occur?

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