REPORT OF THE DEFENSE SCIENCE BOARD 1980 SUMMER STUDY PANEL ON INDUSTRIAL RESPONSIVENESS

JANUARY 1981

OFFICE OF THE UNDER SECRETARY OF DEFENSE
FOR
RESEARCH AND ENGINEERING
WASHINGTON, D.C. 20301

DEFENSE SCIENCE BOARD 1980 SUMMER STUDY

on

INDUSTRIAL RESPONSIVENESS

January 1981

Office of the Under Secretary of Defense for Research & Engineering
Washington, D.C.

OFFICE OF THE SECRETARY OF DEFENSE
WASHINGTON, D.C. 20301

FENSE SCIENCE
BOARD

2 February 1981

MEMORANDUM FOR THE SECRETARY OF DEFENSE
DEPUTY SECRETARY OF DEFENSE

THROUGH THE UNDER SECRETARY OF DEFENSE FOR RESEARCH AND ENGINEERING

SUBJECT: Report of Defense Science Board Summer Study on Industrial Responsiveness - INFORMATION MEMORANDUM

The attached report of the Defense Science Board Summer Study on Industrial Responsiveness was prepared under the Chairmanship of Robert A. Fuhrman.

The objective of the study was to investigate the state of industrial responsiveness to support current acquisition needs. An added task involved an investigation into inflation factors in weapon systems; this was more thoroughly addressed in a follow-on effort the findings of which validate conclusions in the attached DSB report.

The Task Force's principal finding is that since this area was last reviewed by a DSB panel (Nov 1976) it has been given little effective attention by the DoD and Congress. Meanwhile, the ability of industry to respond to defense needs has deteriorated and costs continue to increase. Other findings are that the instability in programs has often made Defense business less attractive to industry than commercial work, and many disincentives exist which discourage the capital investments needed to reduce costs, improve productivity and enhance industrial responsiveness.

This DSB effort became the subject of testimony before the House Armed Services Committee (HASC) and led to the formation of a special Defense Industrial Base Panel chaired by Congressman Ichord. The HASC report is entitled "The Ailing Defense Industrial Base: Unready for Crisis."

In summary, this DSB report has helped focus attention on problems with one of the nation's most important assets. But, this is only an initial step which we strongly feel must be sustained at the highest level if improvements are to be made. We are giving dedicated attention to assisting in implementing the recommendations contained in the report. I recommend you review the Executive Summary.

Norman R. Augustine
Chairman

OFFICE OF THE SECRETARY OF DEFENSE
WASHINGTON, D.C. 20301

FENSE SCIENCE
BOARD

December 19, 1980

Mr. Norman R. Augustine
Chairman
Defense Science Board
Room 3D1034, The Pentagon
Washington, D.C. 20301

Dear Mr. Augustine:

You will find attached the final report of the Defense Science Board Task Force on Industrial Responsiveness. As you are aware, a preliminary report was submitted on September 3, 1980, and has been rather widely distributed. This report expands on the information in the preliminary report and provides additional background. The findings and recommendations are essentially the same, but several have been modified for clarity. Attached is a brief statement of our recommendations and an indication of the agency or office which we believe should have implementation responsibility. The only substantive change in the final report is in the estimate of cost increases in weapon systems. It now appears that our concern on the statistical validity of the sample was well founded. Later information indicates that such cost increases may approach 20%. However, the findings on the impact of understating inflation factors are quite valid.

Several of the areas that were investigated led only to implicit recommendations. For example, the lack of organizational focus for industrial base matters suggests attention is needed, but we made no organizational recommendations. Other findings without explicit recommendations are:

- Dependence on off-shore sources
- Personnel shortages
- Inflationary planning factors

On a more positive note, we in the Task Force have been most gratified with the response to our preliminary recommendations and the actions that have been started in DoD and Congress. It is clear that we touched on matters of great concern, and as was said in the briefings, the time was right for some changes. It is my hope that the momentum can be sustained.

At the San Diego briefing, Dr. Perry raised two questions which he asked be addressed in the final report:

> What is a reasonable philosophy on which the DOD should base its surge program?
>
> How do we make a trade-off between buying at the most efficient production rate, and the desire to maintain a "hot" base?

These questions are of such significance that they are worthy of something more than a perfunctory answer. The Task Force addressed a different set of issues and cannot provide a thoughtful response. I suggest that these are subjects which you may wish to consider for further studies.

Finally, I wish to express my appreciation for fine work and dedication of the Task Force, not only for the efforts in San Diego, but for the continued support in "carrying the message."

Sincerely,

R. A. Fuhrman

cc: E. G. Fubini (w/o attachment)

Subject Area	Recommendation	Responsible Office
Stability	Modify current legislation, regulations and practices to permit greater use of multi-year contracts.	DUSDR&E - Acquisition Policy
Encourage Investment	Index progress payments to prime interest rate.	DUSDR&E - Acquisition Policy
	Expedite government paying cycle.	Service Materiel Cmds.
	Increase use of milestone billings and advanced funding. Delegate authority to head of procuring agency.	DUSDR&E - Acquisition Policy
	Enforce consistent application of tailored Economic Price Adjustment (EPA) clauses.	DUSDR&E - Acquisition Policy
	Ensure that primes flow down EPA clauses to subs.	Service Materiel Cmds.
	Ensure that recent profit policy changes are implemented at all levels.	DUSDR&E - Acquisition Policy
	Establish incentives for full-scale development contractor to make productivity investments by assuring him a significant portion of the production of a successful development.	DUSDR&E - Acquisition Policy
	Support Executive Branch and Congressional actions to stimulate capital investment.	Secretary of Defense
Improving Productivity	Increase emphasis on Manufacturing Technology program. Fund at 1% of procurement budget.	Service Materiel Cmds.
	Phase out obsolete machine tool base.	DUSDR&E - Acquisition Policy
	Upgrade the government-owned machine tool base, particularly for munitions by a one-time 25% investment and selective modernization at 5% per year.	DUSDR&E - Acquisition Policy

Subject Area	Recommendation	Responsible Office
Industrial Preparedness Program	Restructure the current Industrial Preparedness Planning Program	DUSDR&E - Acquisition Policy
War Reserve Munitions and Critical Spares	Increase priority for WRM stocks and spares.	Secretary of Defense
	Combine spares and end item quantities and procure them under one contract.	DUSDR&E - Acquisition
Strategic and Critical Materials	Support actions by FEMA to utilize Title III of Defense Production Act to develop strategic and critical material sources.	FEMA and DUSDR&E - Acquisition Policy
	Include materials availability considerations in DOD Materials R&D program.	DUSDR&E - Research & Technology
	Support actions by GSA and FEMA to rotate and upgrade national stockpile.	GSA and FEMA
Defense Priority System	Place emphasis on proper application of Defense Priority System.	DUSDR&E - Acquisition Policy supported by Department of Commerce
Defense Management - General	Ensure that National Defense needs are properly considered in application of non-defense government regulations.	

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DSB TASK FORCE
ON
INDUSTRIAL RESPONSIVENESS

EXECUTIVE SUMMARY

SCOPE AND OBJECTIVES

The basic guidance for the Task Force was contained in a memorandum from Dr. Perry to the Chairman, Defense Science Board, dated 20 May 1980 (Appendix A). The guidance was later supplemented in several discussions with Dr. Perry. Emphasis was to be placed on improving the present state of industrial responsiveness to support current acquisitions. The subcontractor and vendor base was a major concern. Particular attention was to be paid to decreasing lead times, and the "surge" question was to be of secondary priority.

Dr. Perry added a significant task on the first day of the Summer Study meeting. He asked the Task Force to investigate whether inflation factors for defense equipment were different than those of the general economy. Fairly extensive data was developed but there was a question as to its statistical validity. A summary of the data is included in this report, but the Task Force recommended a separate study. Such a study is in process.

The guidance memorandum asked that the Task Force concentrate on actions that could be accomplished within the Defense community such as:

Multi-year procurement concepts.

Profit policy adjustments.

Loan guarantees.

Off-load of manufacturing bottlenecks to allies.

Advance buy/stockpiling of long lead time components.

The loan guarantee item was later expanded to the broader issue of improved cash flow.

Finally, the Task Force was asked to review actions taken since the 1976 Defense Science Board Study on "Industrial Readiness Plans and Programs."

APPROACH

Task Force members were selected on the basis of representing various sectors of the industry, and who had experience as both prime and subcontractors. Several of the members had previous experience in senior level government positions. Dale Church, Deputy Under Secretary, Acquisition Policy, was the Task Force sponsor and participated in the San Diego meeting.

Members of the Task Force, using the resources of their companies, developed background data on the subject areas. Two special surveys were conducted of lower-tier contractors and suppliers. In order to develop a data base, a number of interviews were conducted with officials of DOD, Federal Emergency Management Agency, OMB, Congress, National Security Council and industrial associations. Former Defense officials were also interviewed to establish how the current situation developed.

The Task Force met in Washington prior to the Summer Study meeting and was briefed by OSD, the Services, FEMA, the Department of Commerce, the Bureau of Mines, and the National Security Council. During the San Diego meetings, several other briefings were received. Appendices H and I list the briefings received and interviews conducted. Appendix J is a listing of background material asssembled for the Task Force's use.

MEMBERS AND STAFF OF THE TASK FORCE

Members	Organization	Title
Robert A. Fuhrman Chairman	Lockheed Missiles & Space Company	President
John H. Richardson Vice Chaiman	Hughes Aircraft Co.	President
Dr. Richard D. DeLauer	TRW	Executive Vice Presldent
Dr. Matthew Sutton	Honeywell Defense Systems Division	Vice President and General Manager

Member	Organization	Title
Gregory B. Barthold	ALCOA	Manager, Tech. Programs
Dr. Jacques S. Gansler	TASC	Vice President
Jerry Junkins	Texas Instruments Equipment Group	Vice President, Group Manager
Wallace Brown	Department of Commerce	Director, Office of Industrial Mobilization
Richard E. Donnelly Executive Secretary	OUSDR&E (AP)	Deputy Director, Production Resources
Dale W. Church Executive Sponsor	OUSDR&E (AP)	Deputy Under Secretrary, Acquisition Policy
Staff Support		
James F. Drake	Hughes Aircraft Co.	Corporate Director, Advanced Program Plans
Robert G. Gibson		Consultant
Robert R. Irwin	TRW Systems & Energy	Assistant to the Executive Vice President
Major Assistance		
Donald D. Malvern	McDonnell Aircraft Co.	Executive Vice President
Charles P. Downer	OUSDR&E (AP)	Director, Defense Industrial Resources Support Office

Donald D. Malvern, Executive Vice President, McDonnell Aircraft, provided substantial input from his organization, with particular emphasis on lead time problems.

MAJOR FINDINGS

The principal factors affecting the responsiveness of the Defense industry are discussed in some detail in the body of the report. In brief, the Task Force found that:

- Productivity in the defense sector has been lagging, in large part because of low levels of capital investment compared to U.S. manufacturing in general.

- The larger defense firms -- both primes and subs -- have changed character in the last 10 to 15 years and are now part of multi-market corporations. In the competition for capital, the return on investment for defense markets is not favorable.

- Cash flow problems, tax policies, high interest rates and inflation have all tended to discourage needed investment.

- The instability of defense programs -- single year orders, changing quantities and rates, program stretchouts, and cancellation -- has made the business less attractive, and has led to low investment in productivity.

- Inflation factors being used in DOD planning and budgeting are unrealistic.

- Lead times have increased markedly in the last three years, leading to higher costs.

- The subcontractor and supplier base has decreased.

  - The factors for the loss in the lower tier base include small quantities, annual buys, DOD contracting requirements, high cash requirements, and returns not consistent with risks.

- There is a growing dependence on foreign sources for critical materials, and many parts and components, for example, electronics parts.

- There are now and will be in the future serious shortages of engineers, technicians and skilled blue-collar workers. Current training and education programs are not solving the problem.

- Prime contractors do not routinely "flow down" beneficial provisions of their contracts to subcontractors and suppliers.

- The Industrial Preparedness Planning Program is not adequately defined nor sufficiently limited. There is little realism and no contractual commitment in the "DD1519" process.

- The defense industry has little or no capability to surge production in the short term.

- Each year, the War Reserve Materiel shortfall is essentially extended another year due to lack of funding.

- The DOD Manufacturing Technology program appears to be an effective instrument for increasing productivity. Investment in the program varies widely among the Services.

- There is a lack of focus and emphasis within the DOD on industrial responsiveness and industrial preparedness.

- OSD does not take strong positions or make its views known in the development and application of non-defense government regulations -- which later directly influence defense procurements.

- Continued availability of critical materials is jeopardized by dependence on overseas sources.

- The National Stockpile appears to have some serious imbalances.

- In general, priority ratings under the Defense Priority System are not extended throughout the production and delivery cycle.

- There is no consistent DOD policy or practice on the use of a development contractor for significant production of a successful development.

- The government-owned machine tool base is obsolete.

- Most defense programs do not operate at or near efficient production rates.

RECOMMENDATIONS

The recommendations are divided into two major areas, those that industry should pursue and those that require government initiative. The latter area is further divided into eight subject areas.

Industry

Emphasize a vigorous cost reduction program carried out at all levels and at all cost elements.

Establish practices that encourage a strong supplier base.

- Equitable terms and conditions.
- Reduction of documentation requirements.
- Assistance in acquiring and training people.
- Flowing down beneficial contract provisions.
- Multi-year contracts with EPA clauses.

Work intensely with non-defense industrial segments to create a more favorable capital formation climate.

Department of Defense

Stability

Modify current legislation, regulations and practices to permit greater use of multi-year contracts.

Encourage Investment

Index progress payments to prime interest rate.

Expedite government paying cycle.

Increase use of milestone billings and advanced payments. Delegate approval authority to head of contracting agency.

Enforce consistent application of tailored Economic Price Adjustment (EPA) clauses.

Establish that primes flow down EPA clauses to subs.

Ensure that recent profit policy changes are implemented at all levels.

Establish incentives for the full-scale development contractor to make productivity investments by assuring him a significant portion of the production of a successful development.

Support Executive Branch and Congressional actions to stimulate capital investment.

Improving Productivity

Increase emphasis on Manufacturing Technology Program. Fund at 1% of procurement budget.

Phase out the obsolete, government-owned machine tool base.

Upgrade the government-owned machine tool base, particularly for munitions by a one-time 25% investment and selective modernization at 5% per year.

Industrial Preparedness Program

Restructure the current Industrial Preparedness Planning Program.

War Reserve Materiel and Critical Spares

Increase priority for WRM stocks and spares.

Combine spares and end item quantities and procure them under a single contract.

Strategic and Critical Materials

Support actions by FEMA to utilize Title III of the Defense Production Act to develop strategic and critical material sources.

Include materials availability considerations in DOD Materials R&D program.

Support actions by GSA and FEMA to rotate and upgrade the National Stockpile.

Defense Priority System

Place emphasis on proper application of the Defense Priority System.

Defense Management

Ensure that National Defense needs are properly considered in the development and application of non-defense government regulations.

I. GENERAL

Background

In 1976, a Defense Science Board Task Force conducted a study on "Industrial Readiness Plans and Programs." The purpose of the study was to consider approaches to improving the responsiveness of the industrial base and supporting structure to war and crisis needs. The principal difference between that study and this one is that the 1980 Task Force concentrated on the ability of the base to meet current acquisitions and secondarily on the "surge" capability. The findings of the 1976 Study have a familiar ring. The following are extracts from the Executive Summary:

"The Task Force also questioned whether the defense industrial base is capable of accelerating the production of weapons (e.g., tanks, artillery, tactical aircraft, helicopters, etc.) and many critical consumables and spares beyond peacetime delivery rates within acceptable time frames. The response time for many major weapons systems is on the order of 18 months to two years or more for the first additional delivery over the peacetime rate. Insufficient money is being spent each fiscal year on Industrial Preparedness Measures (IPM) and Industrial Preparedness Planning (IPP) to bring the defense industrial base to the point where it can contribute increased production in support of the forces in the time needed to support possible conflicts. Present and expected War Reserve Materiel (WRM) stocks are inadequate to support certain conflicts of short duration, and the defense industrial base is incapable of accelerating production rates rapidly enough to make the offsetting contribution in that time."

* * * *

"For these and other reasons developed during the study, the Task Force has concluded that the time has come to reenergize our national planning in order to use our position as the pre-eminent industrial and technological nation in the world to adequately support our national security objectives. Industrial preparedness could be used as an effective element in support of the Nation's deterrent posture but is not. Warning signals of enemy intent can frequently be discerned long before strategic or tactical warning can be perceived. The U.S. has essentially three strategic options available to it: 1) to deter strategic war, 2) to deter a theater war with conventional or nuclear weapons, and 3) to conduct military R&D programs which will enable us to maintain a dynamic deterrent. The industrial and economic resources of the U.S. could be employed as an additional means of indicating credible intent to the Soviets and thereby inhibit

their threatened actions. At present, there are no plans or programs by means of which the industrial base could be caused to respond in order to indicate to the Soviets our intention of deterring them from exercising various of their strategic options."

* * * *

"3. Industrial Preparedness Planning

Nearly all existing IPP policies and procedures are incapable of providing for an adequate defense industrial base. The Prime Contractor IPP Schedule (DD1519) is ineffective for major weapon systems, since only very limited vertical planning is actually accomplished."

* * * *

"5. The National Stockpile

The National Stockpile for Strategic and Critical Materials and the DoD Industrial Preparedness program are at best only loosely coupled. This loose coupling, however, seems to be the proper relationship. In the case of planning for the longer duration war, however, there should be increased participation by the DoD in the development of future National Stockpile requirements."

* * * *

"E. RECOMMENDED ACTIONS

1. Department of Defense

- o Initiate a resource analysis study to determine the responsiveness potential of the Defense Industrial Base and of the National Economy to the "Surge" and "Long War" cases.

- o Issue a directive revising the guidance by which Industrial Preparedness Planning is carried out to make it consistent with scenarios, force structure, logistic support requirements, and industrial base capacity.

- o Develop and issue guidance to separate "intent or industrial warning" from "strategic warning" for use of the Defense Industrial Base as an element of deterrence and to improve its responsivenss to industrial warning signals when received.

- o Integrate "Surge" and "Mobilization" planning requirements into current procurements, and develop industrial resource planning capabilities for multiple-program "bottlenecks" in Surge and overall Mobilization planning.

- o Develop plans for making use of the Defense Industrial Base as an element of deterrence.

- o Develop and issue guidance for support to allies, Security Assistance (FMS), and use of foreign sources in relation to logistic support and contribution to the Defense Industrial Base.

- o Initiate procurement (DoD and the Federal Preparedness Agency) and/or obtain industrial "options" for semi-finished material and components and critical long-lead parts for "Surge" capability and selected "Long War" capability.

- o Highlight to the President, the Congress, the JCS, the CINC's, and the Field Commanders the current lack of funding and its consequences for the Short War, Surge, and Long War Capability.

2. Executive Branch

A comprehensive review should be undertaken by the National Security Council of the U.S. industrial base. Such a review should include the following:

- o The strategic environment.

- o Present capability to support emergency/wartime requirements for direct defense, essential civilian and general civilian sectors.

- o Expansion capability under various mobilization criteria.

- o Effects of reliance on foreign production.

- o Interaction between the industrial base and the availability of raw materials and energy.

- o Cost of different preparedness measures.

- o The assumptions underlying the production requirements for direct defense, essential civilian, and general civilian sectors.

- o Recommended courses of action to strengthen the procedures for planning the best use of the total industrial base during emergency or war situations, and for deterrence.

- o Assessment of the need for a standing inter-agency group for guiding industrial base planning."

The conclusions reached and the majority of the actions recommended are as valid today as they were in 1976. Unfortunately, the report was submitted just after the Presidential election, and if there were advocates for taking action, they disappeared when the players changed. The 1980 Task Force found that very little had changed in the four years, with the exception of some improvement in conventional ammunition WRM stocks.

The subject of industrial base and mobilization has not been entirely dormant. Some people have continued to work the problem. Studies of ability to surge have been conducted, analyzed, and funding proposed. They were not funded because of budget limitations. Among these were the TOW missile, M109 Howitzer, and the F-16 aircraft. More recently in 1979, a DOD Mobilization and Deployment Steering Group was formed to "...assure a credible, responsiveness DOD capability for all levels of mobilization and force deployment."

Early this year, a subgroup was organized -- the Industrial Mobilization Advisory Group. The impact of these groups wasn't discernible to the DSB Task Force.

Other activity has been carried out by the students and faculty of the Industrial College of the Armed Forces. Several studies -- called Defense Management Issue Analyses -- have been done. An example, "Peacetime Industrial Production Expansion - Problems and Approaches," dated May 25, 1979, contains a series of recommendations on establishing a Peacetime Industrial Production Expansion System. Among the Services, the Army is the only one with identifiable organizations that are concerned with the mobilization base.

Most of the concern expressed about the state of industrial readiness or responsiveness comes from sources outside the DOD. The American Defense Preparedness Association (ADPA) has held a number of seminars and working groups to try to develop solutions. The Association of the U.S. Army issued a special report on "Army Industrial Prepardness" in May 1979. One of the best summaries of the industry's inability to surge was published in the Feb. 4, 1980, issue of Business Week, "Why the U.S. Can't Re-arm Fast." Several articles have been written by Fred Ikle, former Director, Arms Control and Disarmament Agency.

The National Security Council recently completed a study on Mobilization Planning which led to Presidential Decision 57. This looked at mobilization in the broadest sense. Additional work is continuing. The Federal Emergency Management Agency has substantial responsibilities in scenario development and mobilization planning. A great deal remains to be done.

When the current Administration came into office, they commissioned a number of studies of the Defense Department. One of these was a very detailed examination of sustainability of combat forces. The emphasis was on ammunition with some analysis of land combat vehicles and tactical missiles. The general conclusion reached was that for most scenarios, it is preferable to use procurement funds to fill War Reserve Materiel inventories rather than to invest in industrial base capability. Considering the current serious shortfalls in War Reserve Materiel and the pervasive view among defense planners that a long war is unlikely, the conclusion is hardly surprising. The study really reflected the reality of past (and current) Congressional, OMB and OSD practices, policies, and resource allocation priorities.

The constraints on the Defense procurement budget have resulted in reduced quantities of new systems, limited buys of WRM and spares, and almost no investment in industrial base responsiveness. In this regard, the OSD guidance on production facilities and equipment for new systems is that they be sized for "efficient, peacetime production." This has generally led to use of multi-shift operations for high-value equipment operations, i.e., test equipment and major tooling. The result is a very limited ability to increase production.

II. DEFENSE INDUSTRY BACKGROUND

A. Character of Defense Industry

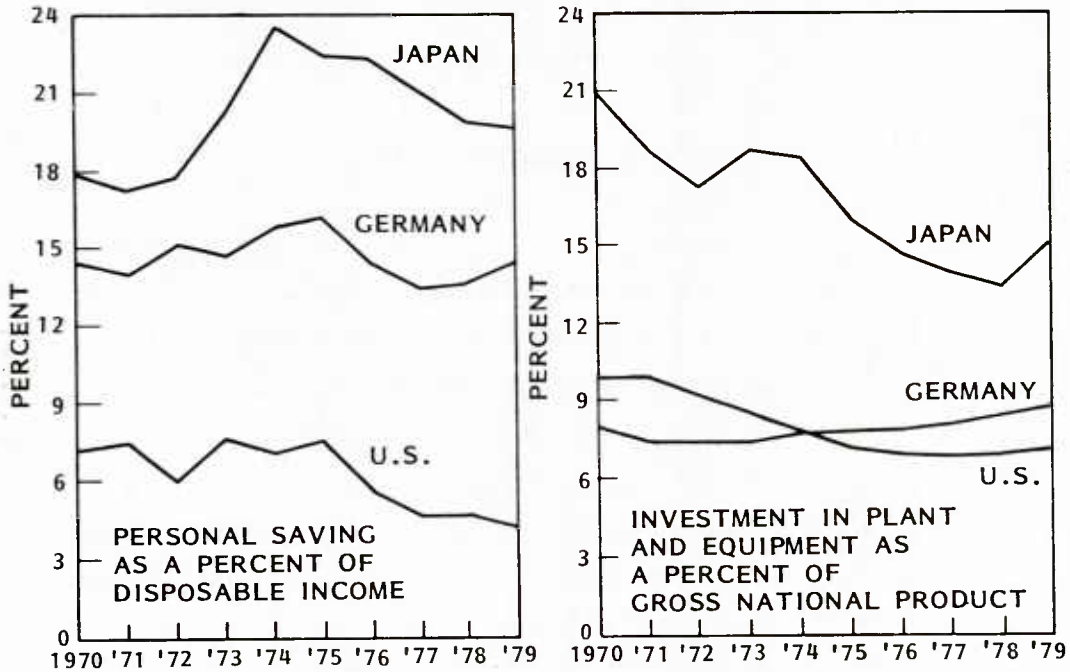
1. Multi-Product Organizations

In the past 10-15 years, the character of the defense industry has changed significantly. The large prime contractors and major subcontractors are no longer stand-alone organizations devoted primarily to defense business. The companies have become elements of large multi-product, multi-market organizations, and must compete internally for the limited capital that is available. The management of these corporations has a responsibility to the shareholders to invest the capital where the return is best. There are strong indications that the return on investment in the defense sector has deteriorated for reasons that will be discussed later, and that investment is going to the non-defense sector because of higher yields and lower risk. The situation is exacerbated by the instability in the defense market, as evidenced by changing program requirements. As a result, the defense industry is under-capitalized.

2. Productivity and Capital Investment

The general decline of U.S. industry is very well documented in several recent articles in Business Week, Time, and Newsweek. The information that follows comes primarily from the special issue of Business Week (June 30, 1980) on "The Reindustrialization of America." A key point made is that there is a serious shortfall in U.S. investment in plants and equipment compared to Japan and Germany. This is shown in Figure II-1 which indicates the substantial rate of investment by Japan as a percent of the GNP and a steadily increasing rate by Germany. One of the impacts of the U.S. shortfall is that productivity rate increases have slowed significantly. Figure II-2 shows the rates for four major industrial countries. Currently, the productivity rate increases for all but the U.S. are about 5%. In the U.S. from 1973 to 1979, the gains were only about 1.6% per year.

THE SHORTFALL IN U.S. SAVING AND INVESTMENT



DATA: DATA RESOURCES, INC.

Figure II-1

HOW U.S. PRODUCTIVITY LAGS IN MANUFACTURING

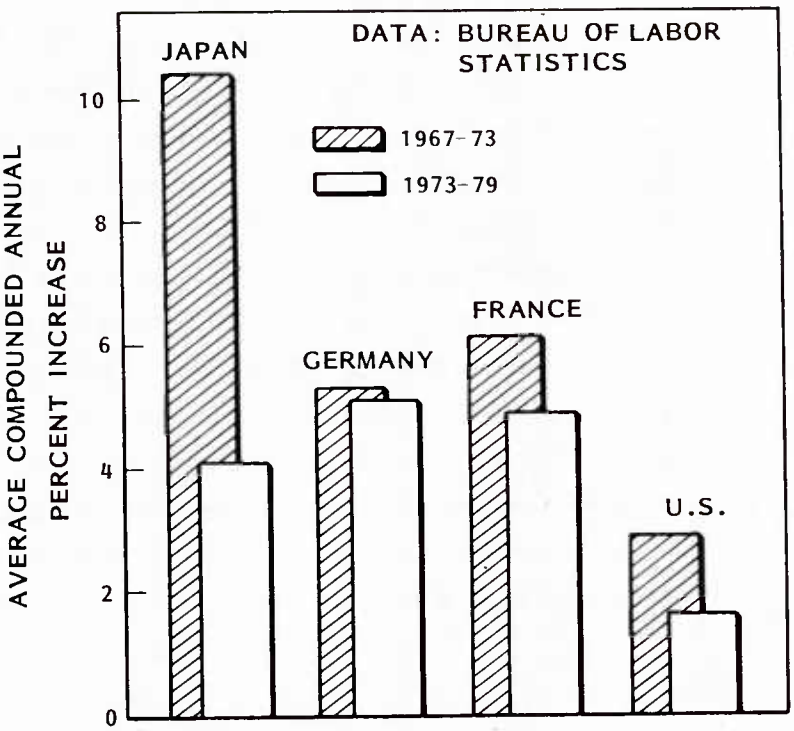


Figure II-2

The general situation in U.S. industry is further aggravated in the defense business. Figure II-3 shows capital investment as a percent of sales. Aerospace has been investing at only about half the rate of U.S. manufacturing in general and at only a fraction of all industries. When one considers that U.S. investment in general is lagging, the aerospace sector is seriously under-capitalized.

The upturn in the recent years appears to be primarily related to commercial aircraft capital investment. It is difficult to get detailed data on the defense portion of aerospace but these trends send a clear message.

3. Personnel

There are serious shortages of skilled or trainable people in the defense business resulting in intense competition. The decline in engineering and scientific graduates is well documented, but perhaps less visible is the current increasing shortage of skilled production workers, electronics technicians, tool and die makers, etc. The National Tooling and Machinery Association recently conducted a survey and concluded that their industry would have a shortage of 240,000 persons by 1985. Approximately 10,000 will be needed in the defense industry to replace attrition and accommodate some very modest growth. Current training and apprenticeship programs are not adequate to meet the demand. For example, the Department of Labor estimates that the average annual openings for machinists during the period 1978-1990 will be 22,000. Contrast this with the apprentice program output of approximately 2,800 a year in 1976-78. The orientation of the CETA (Comprehensive Employment and Training Act) program has not been toward developing a base of skilled workers and from the viewpoint of the defense industry has been of little assistance.

The Task Force did not have data available on other skilled worker categories but vendor and subcontractor surveys indicated shortages in the categories mentioned above plus test technicians, optical personnel, and skilled assemblers. In short, personnel shortages are a pervasive problem.

CAPITAL INVESTMENT

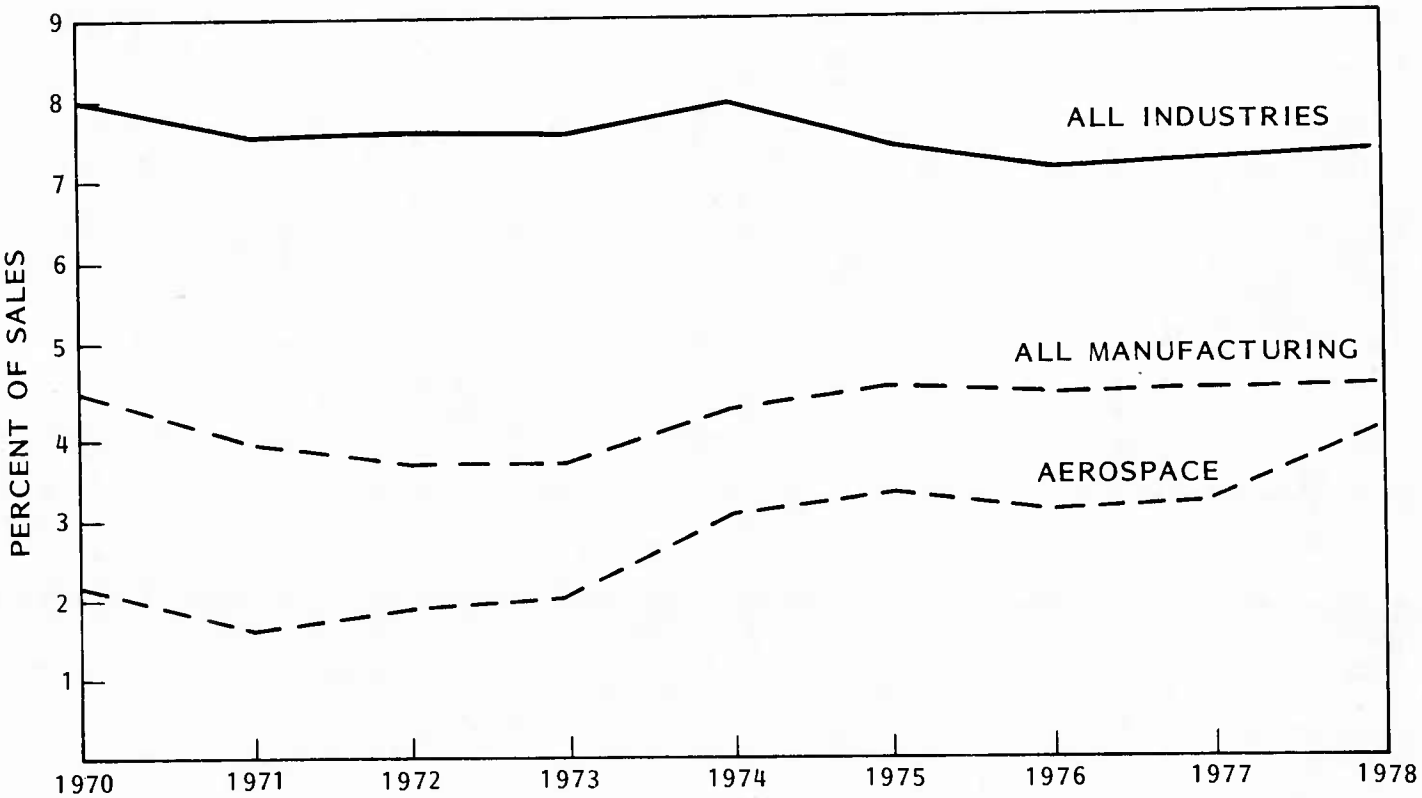


FIGURE II-3

4. Different Problems in Different Sectors

The findings of the Task Force generally apply to the whole defense industry, but there are some unique problems in the different sectors. Clearly, the Task Force was limited by both time and the number of industries represented. Some differences by sector are:

a. Electronics

The military market represents only 7 to 10% of the total electronics market which leads to very difficult investment "choices" by these companies. As indicated earlier, there is low investment for military products and some product lines are being dropped because of low production rates and ROI.

The military buys are characterized by low volume, specialized designs (often very complex), extensive and costly testing, and excessive paperwork for bids and contracting. All of these factors are discouraging the electronic companies from continuing the unique military products. However, where screened commercial devices can be utilized in assemblies, the industry is interested.

Another factor that is unique to the electronics industry is the increasing dependence on overseas sources. Economic considerations and higher productivity of off-shore production facilities have led to this dependence. It is estimated that from 80 to 90% of military semiconductors are assembled and tested outside the United States. These facilities are primarily in the Far East -- Taiwan, Korea, Singapore, Malaysia and Hong Kong. In addition, most ceramic packages and a significant amount of lead frames are supplied from Japan, as are certain high technology electronic components. The implications of this dependence are obvious in the event of a national crisis.

Appendix B contains additional information.

b. Munitions

Of the various sectors of the defense business, munitions is the one where a "surge" is most likely to be required. This industry is unique in that it is strongly dependent on government-furnished machine tools. It is also one of the few defense industry sectors where government- owned, government-operated and government-owned, contractor operated (GOGO's and GOCO's) plants are a signficant portion of the industrial capacity. This latter condition has led to a continuing problem of government-industry competition(1).

Even the contractor-owned and operated plants depend on government-owned machine tools. It is estimated that the Army investment is approximately $800 million (original cost, not replacement). The preponderance of the machine tools were acquired over 20 years ago. Tools in use are obsolete and inefficient, leading to high production costs and extended lead times. DOD has not modernized these assets because of budget constraints and the industry has not made investment because of lack of adequate incentives -- lack of stability, tax policies, etc.

Several DOD contracting practices have adversely affected the munitions industry. The first is general, i.e., growing use of fixed price contracts for development and early production programs. The second seems to be applied more in the munitions area than in major systems acquisition, and that is the practice of competing production shortly after development is completed with no provision for assuring the developer of any benefit from his investment. In fact, the developer can, and often does, lose out early in the production run. The practice cannot help but inhibit capital investment by the development contractor.

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(1) See "Meeting Report - Executive Seminar on Ammunition Programs, April 10-11, 1980," American Defense Preparedness Association, for comprehensive discussion of the problem.

Although the munitions industry is the most likely to have to "surge," the Task Force found that it would take from 7 to 18 months to obtain delivery of items from the inactivated mobilization base. Some increase in production is possible from currently operating lines, but it would be limited by long lead time on many components.

More detail on the munitions base is contained in Appendix C.

c. Aircraft

The military aircraft segment of the industry has been particularly impacted by increasing lead time problems. A later section deals with this subject in more detail, but a couple of examples make the point. One aircraft engine has gone from 19 months lead time to 41 months in the last 3 years. Lead time for one air frame has increased from 28 months in 1977 to 42 months currently. The consequences of these lengthening lead times have been increased costs and scheduling difficulties for the industry. In order to protect end item schedules, aircraft companies and their major subsystem suppliers have committed to material and component orders in advance of contract. In some cases this has been 12 to 15 months. The financial exposure is significant and further increases capital formation problems.

A major difficulty of the military aircraft industry is the almost continual changing of production rates and quantities. Even though facilities have been sized for certain rates, almost no aircraft program is being procured at economic rates of production. The "one year at a time" procurement practice has permitted and encouraged such disruptive changes.

In regard to "surge" capability in military aircraft programs, it is virtually non-existent. Some short time increase might be possible by draining the component pipelines, but no sustained production increase should be achieved in less than 3 years.

d. Basic Materials, Forgings, Castings, and Machine Tools

These industries are part of the supplier base to the defense industry, and because of their importance, the Task Force took a fairly detailed look at the current situation. The lead time problems for castings and forgings have been widely publicized in both trade and general interest publications, so this section will summarize the information.

1) Basic Materials

The supply of aluminum virgin metal is quite adequate. There has been movement to off-shore smelting facilities where energy and raw materials are more available. Two recent moves are to Brazil and Australia. A potential problem is that the Pacific Northwest power shortage will impact U.S. smelting capacity.

The steel industry is in trouble from aging plants, foreign competition, and environmental restrictions. In addition, alloying elements (chromium, cobalt, etc.) for speciality steels are in short supply. However, the supply of basic steel was not identified as a pacing item during the Task Force review.

The major basic material shortage is in titanium sponge. Processing facilities have not been able to keep up with the expanding demand. During the period 1977 to 1979, the number of titanium fabricators dropped from 16 to 4, primarily because of the sponge shortage. U.S. producers are expanding capacity for the sponge. U.S. production of sponge was 20,000 tons in 1979 and is expected to reach 30,000 tons by 1985. Japan is also expanding capacity. Current estimates of supply and demand are shown in Figure II-4. This demand curve may be suspect since it probably doesn't consider the impact of the new Synthetic Fuels program which will require substantial titanium products.

ESTIMATED 1980-85 U.S. SUPPLY AND DEMAND FOR TITANIUM SPONGE

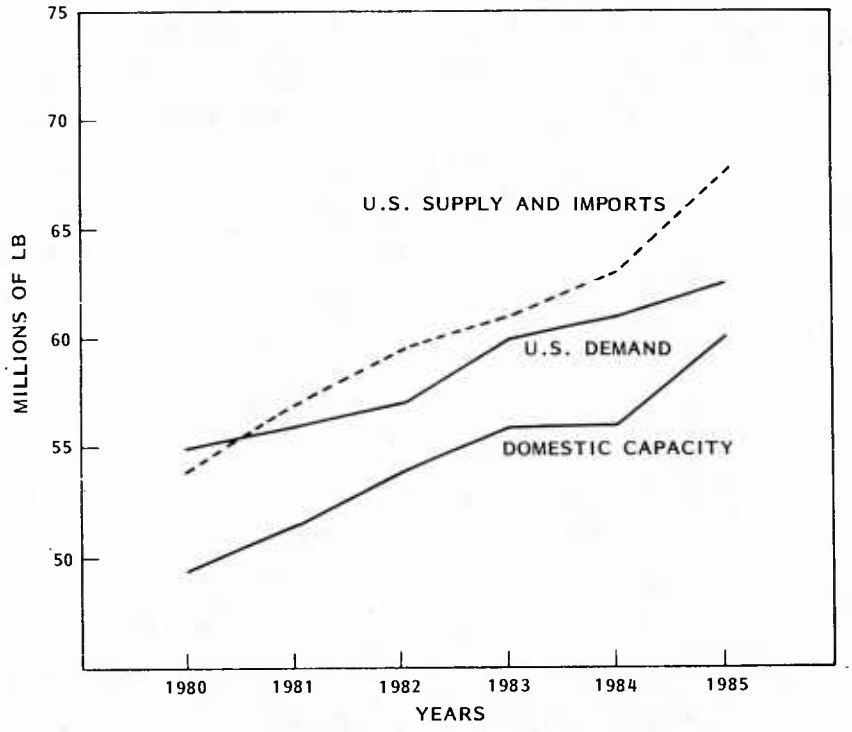

Figure II-4

2) Forgings and Castings

While basic steel and aluminum are in reasonably good supply, the lead times associated with fabricated parts range from inconvenient to critical. The Task Force received conflicting views on forgings, but there was general agreement that castings are and will remain a serious problem. In the past decade, over 400 foundries have gone out of business, primarily because of EPA and OSHA requirements. The demand continues so the queues get longer. There were no indications given to the Task Force of any program for corrective action.

All of the data presented to the Task Force indicated substantial increases in lead times for both aluminum and titanium forgings -- particularly large forgings. Figure II-5 is an example of data obtained. On the other hand, the Task Force was informed that existing large press capacity is not being fully utilized. Such a statement is understandable for titanium forgings where forging stock is in short supply. However, the statements are puzzling when it comes to aluminum forgings. There is medium to large press capacity being added. In addition, some of the commercial aircraft orders have been cut back. These two factors will help reduce lead times but a strong demand still exists.

All the basic material producers are commercially oriented doing business using commercial practices. They sell from published price schedules on a competition basis. The accounting systems they employ cannot accommodate DOD cost breakdown information systems, and at their level of defense business, there is no motivation (or flat-out refusal) to change their ways of doing business.

3) Machine Tools

This industry is characterized by a large number of small companies. Of 1300 firms in the U.S. that make machine tools, there are only 10 firms that employ more than 1,000 people, and there are only two with 2500 or more employees. Most companies are not publicly owned.

It is a very cyclical industry and it is currently in the "boom" cycle. The massive retooling in the automtive industry and orders from commercial aircraft producers have saturated the industry. Most of these companies have no interest in defense business and often will actively avoid it. They feel incapable of handling the red tape and the contracting paperwork.

LEAD TIME ANALYSIS
RAW MATERIAL FORGINGS
(IN MONTHS)

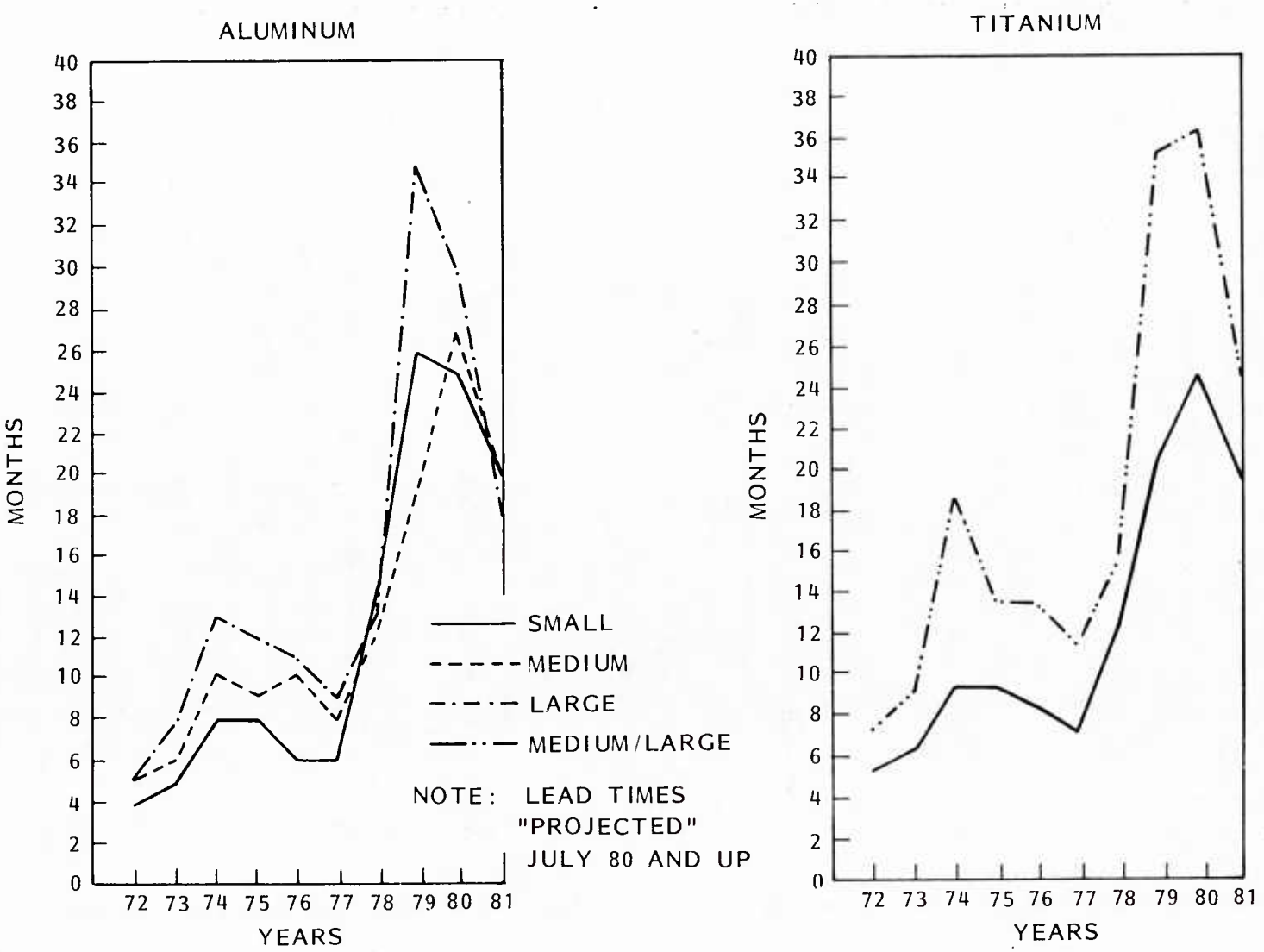

FIGURE II-5

The industry has three major problems -- the growing shortage of skilled craftsmen, the difficulty of obtaining investment capital, and severe and increasing foreign competition. A comprehensive study of the industry was conducted in 1978 and contains much detail for those interested[1].

Appendix D contains a summary of a panel on basic materials, castings, forgings, and machine tools.

The Lower Tier

The problems of the primes and large subcontractors are very often intensified in smaller subcontractors and suppliers. Two special surveys were conducted by Task Force members (Hughes and Texas Instruments). The results of these surveys are contained in Appendices E and F. Other information was obtained from a forum held at Ft. Monmouth by elements of the Army's Acquisition and Readiness Command and from informal discussions with personnel of several small companies.

In summary, the following factors were consistently reported as signficiant deterrents to pursuing defense business either directly or as subcontractors to large primes:

- Stringent cost/pricing data, Cost Accounting Standards and DAR requirements -- small companies do not have sufficient personnel to handle all the administrative burden imposed. This particular item was highlighted by every respondent. The result, in many cases is that smaller companies will accept only fixed price contracts, even when inappropriate for risk involved.

- Paperwork imposed by both the DOD and the prime contractors.

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(1) Machine Tool Industry Study, U.S. Army Industrial Base Engineering Activity, Rock Island, Illinois, 1 November 1978.

- o Slow payment leading to cash flow problems. A contributing factor is the bureaucratic decoupling of the inspection and acceptance function from the acquisition function.

- o Limitations of profits under DOD contracting compared to commercial endeavors.

- o Social program requirements in defense contracts.

- o Many changes in quantities and schedules.

- o Lack of insight into DOD planning.

- o Small orders.

- o Excessive testing, both qualification and acceptance.

- o Multiple quality assurance inspections.

With all these inhibitors, one must ask the question as to what motivates suppliers to stay in the defense business. Some of the reasons given by companies still in business are:

- o The ROI, although less favorable than a few years ago, is still reasonably attractive, particularly for small companies which have difficulty raising investment capital.

- o If a company is associated with a successful program, it can expect a long production run.

- o The challenge of high technology, innovative systems is stimulating. Such efforts give the company a "window" into advanced technology which may assist in commercial developments.

- Companies who have dedicated their facilities, management systems, and organization structure to the defense market would require radical changes in attitudes, systems, and investment policy to enter the commercial marketplace.

- The potential for foreign sales is still an attraction.

- Defense business is better than no business.

The Task Force noted several trends in the subcontractor/supplier base. The first is a growing tendency for suppliers to take positions of "do business on my terms or I won't do business at all." This is particularly true in resisting the cost and pricing data requirements. The second trend is increasing reliance on single sources -- because of lack of response to competitive bids. There may well be a correlation of sharp cost increases with this latter trend.

III. GOVERNMENT POLICIES AND PRACTICES WHICH IMPACT INDUSTRIAL RESPONSIVENESS

A. The Short War Philosophy

The Task Force identified a number of government policies and practices which impact industrial responsiveness, industrial preparedness planning, and productivity. A very important influence on the ability of the industrial base to respond is the "short war" philosophy, which has been the basis for a number of Defense Department actions -- or inactions. Writing in The Wall Street Journal (Dec. 26, 1979), Fred Ikle, former Director of the Arms Control and Disarmament Agency, said:

> "Our capability to expand defense production in a compelling crisis has been neglected in recent years. The need to improve it is lost today between two extreme assumptions. Either it is assumed that the greater strength of our economy could unquestionably be marshaled should the need arise. Or, it is assumed that any major war would start so suddenly and end so quickly -- resulting either in our total destruction or a new era of peace and stability -- that the mobilization of our industrial strength would come too late.
>
> 'Short War' Thinking
> The assumption that industrial mobilization is irrelevant because it would come too late stems from a peculiar habit of thought common among our defense planners -- "short war" thinking. Because of budget stringencies over many years, our military stockpiles today could support a major conventional war for only a couple of months or so. This puts our planners in a quandary: either they have to assume a short war, or envisage fighting a war without suppliers. Understandably, they choose to "plan for a short war."
>
> In a short war, lo and behold, the mobilization of American industry would come too late; the war would have ended before Detroit could produce the new tanks."

While this may overstate the case, the approach has led to several policies which affect industrial response. One is the guideline that War Reserve Materiel stockpiles be based on the short war scenarios, i.e., 30, 60, or 90 days. In conflict with this guidance is that industrial preparedness planning is to be based on 180 days lead time to reach wartime consumption rates.

As mentioned earlier, the recent "Sustaintability Study" concluded that it is preferable to fill WRM inventories rather than to invest in industrial base capability. In view of the minimal investment in the industrial base, it appears OSD heeded that conclusion.

Another result of the "short war" philosophy was a change in 1977 on the policy regarding production base. Until 1977, the production base was sized on a 1 shift, 8 hour, 5 day basis. Facilities are now sized for cost effective peacetime production. In general, this means that pacing operations are on a multi-shift basis. The ability to surge is limited by this approach.

B. Annual Buys

Policies and regulations make it difficult to utilize stable, longer term contracts. Annual buys are the practice even for programs that stretch over many years. Multi-year contracts are allowed but the following limitations make it difficult to implement:

- The full funding policy as stated in DODD 7200.4. A further constraint of this policy is the limitation of long lead funding to components that are usable even if the program is cancelled.

- The $5 million cancellation ceiling imposed by the Defense Authorization Act of 1976.

- The provisions of DAR 1-322 which limits reimbursements under cancellation ceilings to non-recurring costs.

In practice, very few multi-year contracts are used, and only when a contractor is willing to assume the risk of financing recurring costs.

C. Investment Considerations

1. Cash Flow

Cash flow is the name of the game in the defense business. The following have a strong influence on cash flow:

- Non-allowability of the cost interest.

- Delays in the government paying cycle.

- Fixed progress payments regardless of changes in the economic environment.

- So many constraints that milestone billings and advanced funding are little used.

2. Financial Stability

Some factors that impact financial stability and industry investment decisions are:

- o Inconsistent application of Economic Price Adjustment clauses.
- o Implementation or lack thereof of recent profit policy changes.
- o The lack of clear policy on the role of the development contractor during subsequent production.
- o Inappropriate use of fixed price contracts both at prime and sub levels.

3. Tax Policy

The matter of tax policy is, of course, of concern to the whole industrial base, not just the defense sector. Some steps must be taken to stimulate capital formation in the United States. Two major inhibitors to capital investment are the current lengthy depreciation schedules for facilities and equipment and the use of original cost as a basis for depreciation.

IV. ISSUES AND FINDINGS

A. Cost and Schedule Trends

1. Findings

- Costs of parts, materials and subsystems have increased substantially in the last year.
- Lead times of both DO and DX rated items up significantly from 1976 to 1980.

2. Costs

The Task Force developed fairly extensive data on cost and schedule trends. The cost information, while extensive, is still a small sample of the total defense items and therefore may not be statistically valid. The Task Force recommended that additional study was needed and the Office of Secretary of Defense has initiated such studies. A preliminary report was submitted on October 17, 1980(1).

Selections from the data developed by the Task Force are shown in Figures IV-1, IV-2 and IV-3 and indicate the cost growth problem. The material came from four primes on a variety of programs. In the majority of cases, only the 1979-1980 data was available. To the extent possible, the numbers reflect comparable buy quantities, but information was not available on the influence of learning curves. It is to be noted that at the higher level assemblies and for systems, the cost increases are moderated by smaller increases in the cost of labor (see Figure IV-3 for an example).

The data on labor costs was less extensive and the details are proprietary. However, the indications are that "people" costs increased roughly 16%. The companies are operating under wage

(1) Preliminary Report on Review of DOD Weapon Systems Prices. Coopers & Lybrand October 17, 1980 - Not for Public Release.

COST TRENDS (ANNUAL PERCENT INCREASES

SELECTED PARTS	1977-78	1978-79	1979-80
A/C ELECTRICAL CONNECTORS			170%
A/C SEMICONDUCTORS			18
EMI FILTERS			35
TORQUE MOTORS			106
HYDRAULIC ACTUATOR	14	11	68
A/C ELEVATOR INDICATOR	24	10	57
A/C LANDING GEAR		18	48
MICROWAVE TUBES			30
MISSILE WIRE			35
CAPACITORS			87
COUPLINGS			111
SLEEVINGS			203
CUSTOM HYBRID I.C.'s			53
RELAYS			38
HEAT EXCHANGERS			102
FILTERS			27
RESISTORS			182
AMPLIFIERS			25
POWER SUPPLY			58
PIN PLATES			115
HOOK-UP WIRE	3	17	126
HIGH RELIABILITY PARTS	6	12	25
CONTAINER TANKS	9	9	21
GENERATORS	8	11	39

FIGURE IV-1

COST TRENDS (ANNUAL PERCENT INCREASES)

	1977-78	1978-79	1979-80
SELECTED MATERIALS			
NON-FERROUS METALS		10	86%
PETRO-CHEMICAL PRODUCTS		13	43
TITANIUM PRODUCTS	2	20	38
COPPER			92
MOLYBDENUM			267
KOVAR			650
GOLD			275
AGGREGATED PARTS AND MATERIALS			
MISSILE		13	21
A/C RADAR	6	10	23
ELECTRONIC SYSTEM	8	16	16
AIRCRAFT MATERIAL	3	19	37
SATELLITE MATERIAL			34
MAJOR SUBSYSTEMS			
A/C ENGINE		10	28
A/C SUBCONTRACTS (A)			35
A/C SUBCONTRACTS (B)			19
SATELLITE SUBCONTRACTS			33
MEMORIES	6	8	19
STRUCTURES	11	16	34
THERMAL CONTROL SYS.	9	12	14
SYSTEMS			
SATELLITES		20	25
A/C		12	22

FIGURE IV-2

EXAMPLE CASE - SAME TWO SATELLITES QUOTED 3/79 AND 2/80

COST CATEGORY	% COST INCREASE 1979 - 80	% OF 1980 TOTAL QUOTE	CAUSES
PARTS AND MATERIAL	34%	7%	- SHORTAGE OF SUPPLIERS - COMMERCIAL DEMAND - MACHINIST'S LABOR UP 33%
SUBCONTRACTS	33%	12%	- LABOR COSTS - PARTS AND MATERIAL
DIRECT LABOR	16%	20%	- INFLATION (PRIOR YEAR LABOR INCREASE WAS 6%) - BREAK IN PRODUCTION (DUE TO STRETCHOUT) REDUCED BENEFITS FROM LEARNING
OVERHEAD	27%	32%	- SOCIAL SECURITY UP - RENT (UP 38% IN '80) - RECRUITING COSTS WAY UP
OTHER COSTS AND FEE	23%	29%	- TRAVEL UP 50%
TOTALS	24.5%	100%	

FIGURE IV-3

guidelines, but there are pressures that increase those costs in excess of guidelines. Among these are labor contracts tied to the Consumer Price Index, the shortage of technical people which increases new hire salaries, and the general increase in entry level salaries for college graduates.

The Task Force reached the general conclusion that the costs for defense systems have increased in the last year at a rate higher than the CPI (14.3%) and may approach the 20% level. The impact of these cost increases is discussed further in a later selection.

3. Schedules

Selections from the data developed by the Task Force are summarized in Figures IV-4 and IV-5. The information was drawn from various sources[1][2][3]. Examples of the material provided are shown in Figures IV-6, IV-7, IV-8 and IV-9. All of the data reviewed strongly supports the finding of increased lead times, and such lead time increases represent money increases. The lead time figures are shown for both DO and DX priority ratings of the Defense Priority System. There is a question whether the priority system is having the desired effect, since lead times for DX priority items are also increasing. See Paragraph IV-I for further discussion.

The reasons for lead time increases are many and complex. Among them:

- Raw material shortages (titanium sponge).
- Inadequate capacity -- large backlogs in specialty metals fabrication.
- Small buys of electronic components and subsystems.

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(1) Talking Paper on Industrial Base Issues, Air Force Systems Command, 11 March 1980
(2) Background material prepared by McDonnell Aircraft Co., 10 July 1980
(3) Briefing, Product Lead Time Growth, Lockheed Missiles & Space Company, March 1980.

SCHEDULE TRENDS (WEEKS)

"DO" RATED PARTS AND MATERIALS	1976	1977	1978	1979	1980
ALUMINUM FORGINGS	20			78	120
TRAVELING WAVE TUBES	35			43	95
ELECTRICAL CONNECTORS			21		42
AEROSPACE FASTENERS		8			50
WASHERS			10	36	50
A/C HORIZONTAL STABILIZER	43	43	52	68	78
MACHINED PARTS (E.G., SPARS)	28	23	25	25	32
MISSILE BATTERY		26			44
ACCELEROMETER		20			44
VIDICON		26			40
TITANIUM	40	46	60	70	104
KOVAR				4	21
ARC CAST MOLY.				17	43
VACUUM MELT. IRON				26	52
CONDUIT COVERS	23	40	50	80	80
ROLLED RING FORGING	25	32	45	48	60
CRUCIFORM BILLET	30	43	52	60	104
ALUMINUM EXTUSION	16	36	45	50	60
COMPLEX FORGINGS	40	43	46	60	87

FIGURE IV-4

SCHEDULE TRENDS (WEEKS)

"DO" RATED MAJOR ITEMS	1977	1978	1979	1980
A/C LANDING GEAR	52			120
SPEED BRAKE ACTUATOR	43			112
ENVIRONMENTAL CONTROLS	60			103
AMMO. HANDLING SYS.	52			99
ANTI-SKID SYS.	39			77
A/C AIRFRAME (A)	95			199
A/C ENGINE (A)	86			168
AIRPLANE (B)	129			194
A/C ENGINE (C)	82			155
A/C GUN	82			120
"DX" RATED PARTS				
ALUMINUM SMALL FORGINGS		55	83	125
ALUMINUM EXTRUSIONS		50	62	90
TITANIUM LARGE FORGINGS		70	150	180
TITANIUM EXTRUSIONS		65	95	108
STANDARD FASTENERS		25	45	58
MICROCIRCUITS		25	40	51
INTEGRATED CIRCUITS		25	40	62
DIODES		25	31	50

FIGURE IV-5

INCREASES IN LEAD TIMES

SYSTEM	1977 (MONTHS)	PRESENT (MONTHS)	DRIVERS
F-15	36	41	LANDING GEAR
F-16	28	42	SERVO ACTUATORS
A-10	29	49	LANDING GEAR
F100 ENGINE	19	37	FORGINGS
TF34 ENGINE	20	39	FORGINGS

FIGURE IV-6

LEAD TIME ANALYSIS
RAW MATERIAL MILL LEAD TIMES
ALUMINUM
(MONTHS)

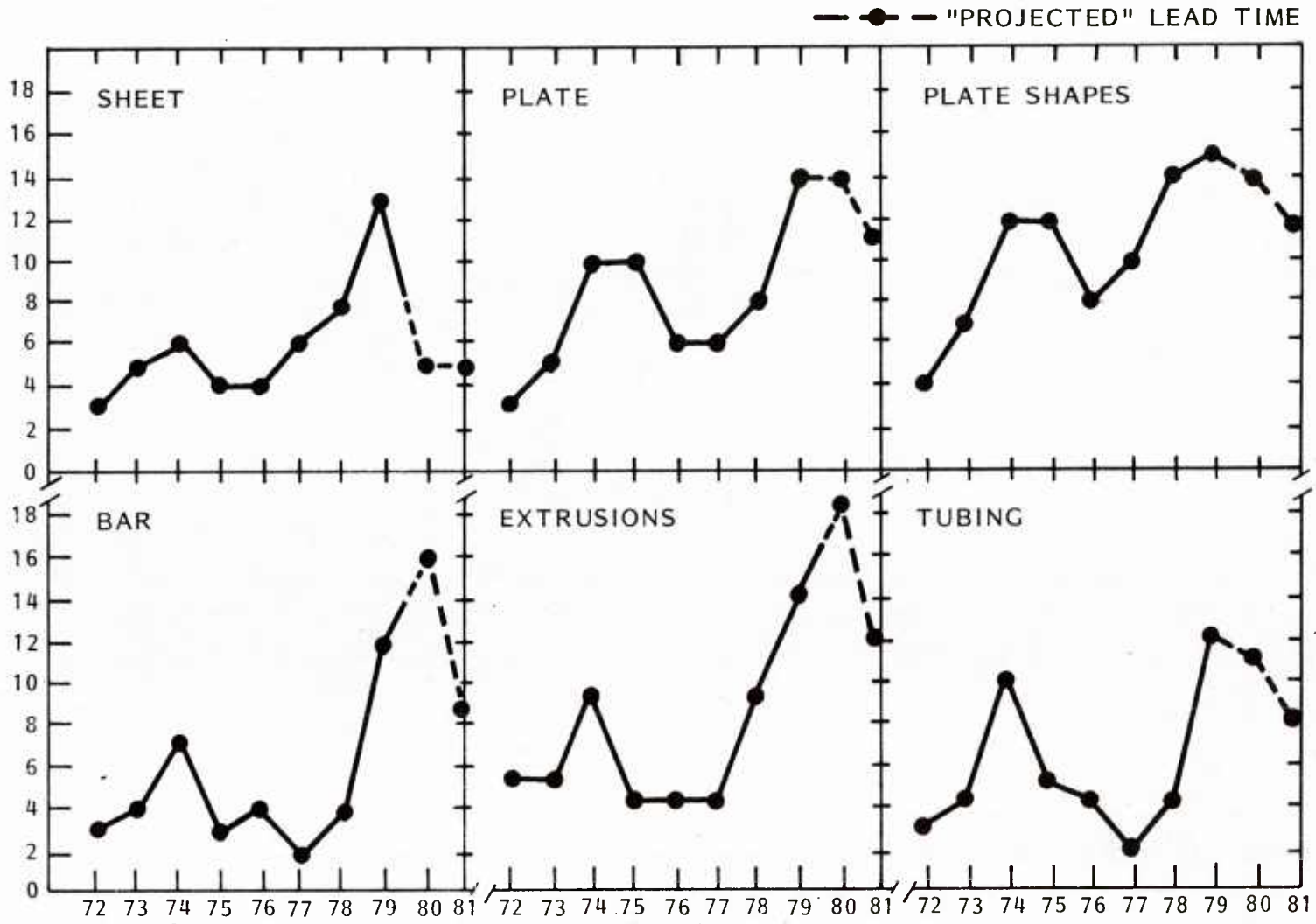

FIGURE IV-7

LEAD TIME ANALYSIS
CFE EQUIPMENT
F-15 PROGRAM

ITEM	1978 MONTHS	1979 MONTHS	1980 MONTHS	FY 81 MONTHS	FY 82 MONTHS	1978 TO FY 82 (MONTHS)	% OF CHANGE
FLIGHT CONTROL ACTUATORS (6)	14-19	23-31	31-35	31-35	31-35	+16	84
HYDRAULIC COMPONENTS (16)	8-15	9-15	11-27	12-27	12-27	+12	80
LANDING GEAR WHEELS & BRAKES	12	12	20	25	24	+12	100
SKID CONTROL SYSTEM	8	9	10	12	12	+4	50
BLEED AIR DUCT SYSTEM	7	7	12	17	17	+10	142
FIRE CONTROL SYSTEM	24	26	26	26	28	+4	17
COMPUTER	16	17	17	17	18	+2	13
INERTIAL NAVIGATION SYSTEM	15	16	15	18	18	+3	20
AIR INLET CONTROLLER	14	16	16	16	17	+3	21
CONTROL STICK BOOST PITCH COMPENSATOR	18	18	18	18	30	+12	67
AFT. FUSELAGE	11	11	13	17	17	+6	55
SECONDARY POWER (3)	7-16	7-16	10-22	10-27	10-27	+11	69
ENGINE FUEL SYSTEM (3)	9-12	11-14	11-15	11-18	11-18	+6	50
LATERAL AND LONGITUDINAL SURFACE CONTROL SYSTEM	9	9	12	12	12	+3	34
HYDRAULICS SYSTEM (2)	12-13	15-21	18-22	18-22	18-22	+9	69
ARMAMENT	14	13	17	22	22	+8	57
ENVIRONMENTAL CONTROL SYSTEM (2)	11-13	11-14	16-17	17-22	17-22	+9	69

FIGURE IV-8

BOLT TITANIUM

PART NUMBER	NOMENCLATURE	SUPPLIER
3063262	BOLT TITANIUM	S.P.S. TECHNOLOGIES, INC.
3064456	BOLT TITANIUM	S.P.S. TECHNOLOGIES, INC.
		V.S.I. CORPORATION

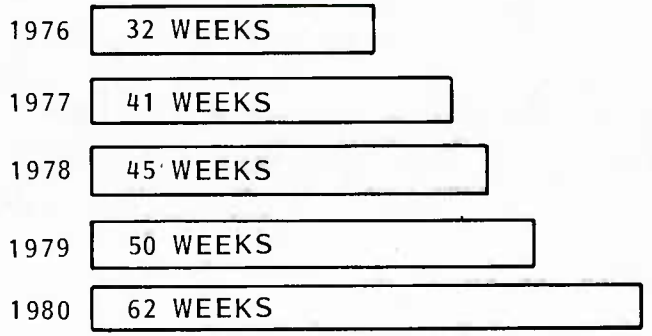

FIGURE IV-9

- o Very limited sources for specialty items such as optical components, bearings, electrical connectors.

- o Increasing complexity and sophistication of parts.

- o Testing and qualification requirements.

B. Realism of Cost Estimating and Budgeting

1. Findings

- o Inflation factors used in DOD planning are unrealistic and are well below actual system cost increases.

- o Since procurement funds available are fixed -- for all practical purposes -- the consequences are reduction of quantities, program stretch-outs and thus, further increases in unit costs.

- o Very few defense programs even approach economic rates of production.

2. Discussion

As noted in the previous section, cost increases for defense systems are running at a level above the Consumer Price Index, and yet the DOD budgetary guidance derived from OMB guidelines is based on inflation factors substantially below actual experiences. For example, the June 1978 estimate to be used for the 1980 budget was 6.2%. The current guidance is approximatey 9%. Clearly this creates enormous problems for Defense Department managers who must later make major adjustment to their procurement plans to stay within the monies appropriated. The usual practice of defense managers is to make schedule changes and quantity reductions, with invariable increases in unit costs.

To further compound the problem, the continued practice of optimistic early estimates by program advocates, both military and industrial, leads to budget levels which have no room for the unforeseen. This subject has been addressed often in the past, most recently in the 1979 Defense Science Board Study on "Reducing the Unit Cost of Equipment,"(1) dated March 1980.

A factor contributing to unrealistic cost estimating is that the cost impact of technical changes is generally not included in the estimates. These changes invariably occur, thus placing additional stress on program budgets. The combination of these factors results in much instability in production programs. The Task Force concluded that very few defense programs were being conducted at efficient production rates. One particular example is the F-16 program where changes in quantities have effectively negated the productivity investment made by the Air Force and the contractor(2).

C. Lack of Financial Incentives

1. Findings

- The instability of defense programs has discouraged productivity investments.
- Cash flow problems, tax policies, high interest rates and inflation have all tended to discourage needed investment.
- There is no consistent DOD policy or practice on the use of a development contractor for significant production of a successful development.

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(1) Page 16, Appendix A and Appendix C of the subject report.
(2) General Dynamics presentation to Task Force, August 1980

2. Discussion

A number of laws, government regulations and practices have had an inhibiting effect on the defense industry cash flow, financial stability, and investment decisions. The matter of instability of defense programs has been discussed previously. The current practice of annual buys -- the lack of any commitment by the government -- has certainly been a deterrent to capital investment by industry.

Cash flow problems are of particular concern to all levels of industry(1). The factors leading to the problem are, in large part, imbedded in defense policies and acquisition regulations which fortunately can be changed more easily than the basic economic factors that affect all industry. The defense industry is not in any way sheltered from the economic problems faced by U.S. industry. In fact, double digit inflation and interest rates impact more severely on defense contracts than they do in the commercial business sector. Commercial businessmen have the flexibility to change price as economic changes occur. In defense business, procurement regulations and practices determine both the negotiated profit rate and therefore pricing -- and contracting financing terms. These regulations have not changed to reflect the current economic environment.

In recognition of special conditions in the defense industry, progress payments have been used for a number of years. Current regulations (DAR E-503.1) limit progress payments to 80% of total costs for other than small business. This number was established in 1968 when the inflation rate was 4% and the prime interest rate was 6%. Since 1968, a number of adverse changes have increased the cost of working capital by a factor of 3. The prime rate increase from 6% to the current 12-18% has been a principal influence. Counter productive DOD policy changes and practices of significance are:

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(1) The majority of the following material was derived from a presentation, "Defense Industrial Responsiveness and the 'New Economics'", by D. H. White, Hughes Aircraft

- Material and subcontract cost billed after paid.
- Biweekly vs. weekly billing frequency.
- Longer payment lag times.
- Higher initial liquidation rates.
- Longer performance periods.

Payment lag times have become a serious problem. The larger companies with visible programs generally are paid with reasonable promptness. Such is not the case for smaller companies dealing directly with the Defense Department. Often they do not receive payment until 45 to 60 days after billing. It was indicated to the Task Force that the primes are also "slow payers" in some instances. A special problem exists when the procuring agency, the acceptance and inspecting organization, and the disbursing organization are different. For example, items procured through the Defense Logistics Agency are accepted and inspected by a Service using organization, and payment is by another Service organization. Delays of 75-80 days in payment are not unusual under these conditions.

The impact of borrowing and payment lag on realized profit rate is illustrated in Figure IV-10. The figure was developed by use of a computer cash flow model. The dotted line represents the case where the receipt of progress payments lags one month which was about the situation in 1968. The changes since 1968 have resulted in about a 1.5 month lag. The effective borrowing rate in 1968 was about 7.2% and has risen to about 14.4% (July 1980). Thus, based on a negotiated 12% profit rate, the realized potential profit rate in 1968 was 8.1%, but the same performance today would net only about 5.5% -- a degradation of over 30%. Small companies have even a more difficult problem since they generally must pay 2 to 3 points over prime.

REALIZED PROFIT RATES AT VARIOUS BORROWING RATES
12% NEGOTIATED PROFIT RATE
PROGRESS PAYMENTS AT 80%

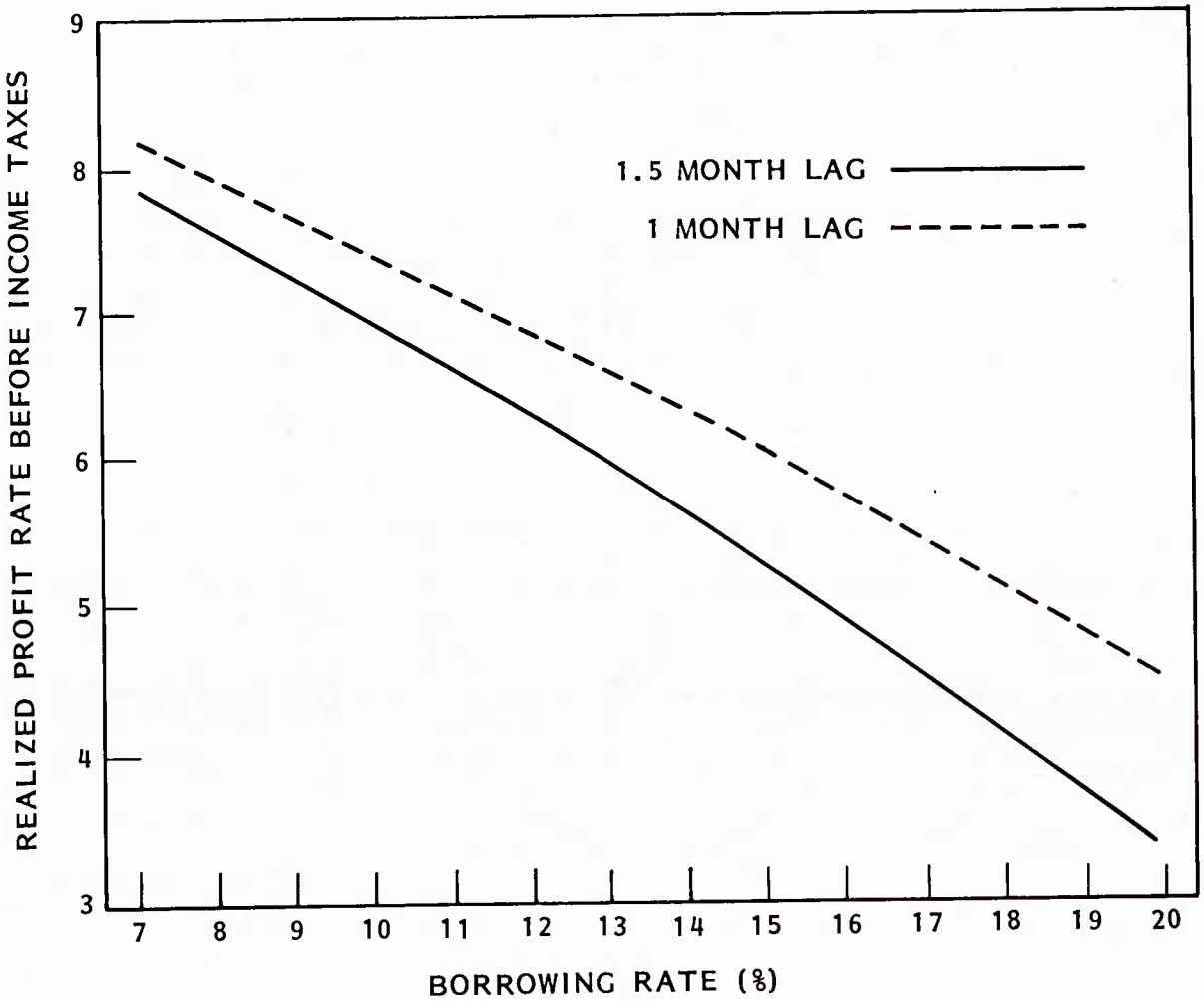

FIGURE IV-10

Figure IV-11 illustrates one method of compensating for the changes in the economic environment, i.e., by changing progress payments as a function of borrowing rates. To maintain equivalence with the 1968 base case, the progress payments rate would have to be approximately 90 to 95% at today's prime rates.

There are other established mechanisms to improve cash flow such as milestone billing, advance payments and unusual progress payments. Without exception the administrative controls that have been established relating to criteria and level of approval are so restrictive that the tools are virtually useless.

Milestone billings are outlined in DAR E-529 and the intent of such arrangements was to provide a method of reimbursing contractors where procurements involved large amounts of money, and there were long lead times between commencement of performance and first deliveries. However, the criteria established implies that the contractor must demonstrate a financial need in order to qualify, which has nothing to do with the basic intent. Further, the approval required is at the Service Comptroller level and can be delegated no lower than the contract financing office of Departmental Headquarters. The Task Force took the position that such authority should be delegated to the head of the procuring agency since he is in the best position to evaluate the merits.

Advance payments and unusual progress payments have the further constraint imposed by legislation (Public Law 85-804) that any unliquidated payments which would exceed $25,000,000 must be submitted to the Armed Services Committees. If not disapproved within 60 days of continuous session, the Service can proceed. As one can imagine, tackling this bureaucratic nighmare is not often done. It appeared to the Task Force that the procedures can be simplified and the criteria revised. Again, the approval authority should be the head of the contracting activity (except for the $25,000,000 limitation).

PROGRESS PAYMENT RATES REQUIRED TO MAINTAIN PROFIT RATES
AT VARIOUS BORROWING RATES
7% INTEREST AND 80% PROGRESS PAYMENTS = BASE CASE

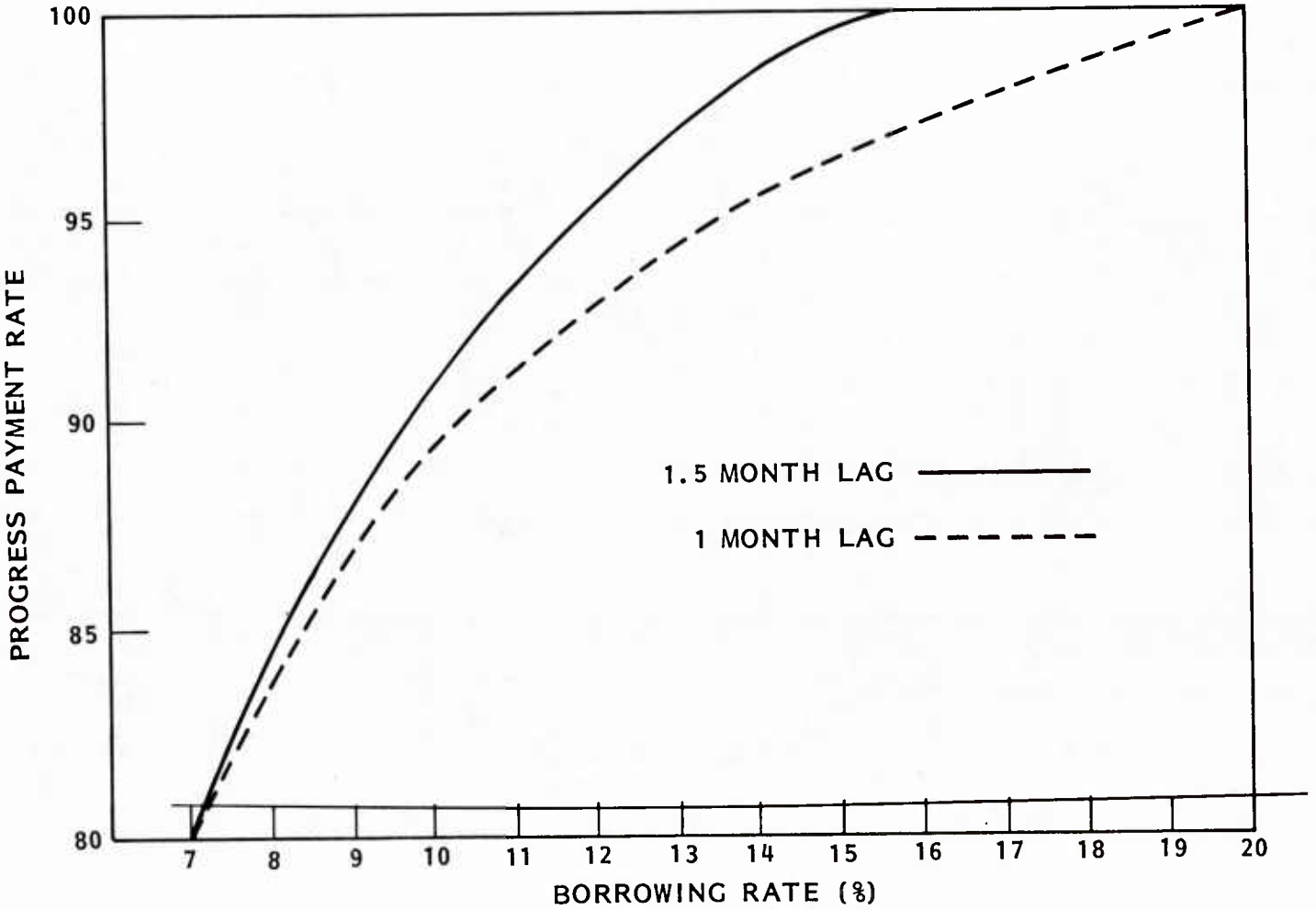

FIGURE IV-11

Figure IV-12 summarizes the benefits to be gained by changes to contract funding.

In addition to steps to improve the cash flow position of industry, there are several other actions which would lead to enhanced financial stability of industry. The first of these is a more consistent application of Economic Price Adjustment Clauses. This particular subject has been clouded by an Office of Federal Procurement Policy Memorandum dated October 31, 1978, "Anti-Inflation Measures in Federal Purchasing." The memorandum reflected the concept that all new contracts would be priced on the basis of the principle of deceleration explicit in President Carter's Anti-inflation Program.

The Memorandum stated, "Contracts should normally be priced on a basis that considers all costs reasonably expected to be incurred during the period of performance. Thus, projections of performance costs which are based on economic trends that can be predicted with a reasonable degree of confidence should be considered in the initial negotiation of a contract price. The use of economic price adjustment clauses under this pricing concept should be limited." (Emphasis added.)

The Air Force implementing instruction was issued 7 December 1978 and established the policy, "...EPA clauses should not routinely be offered to contractors in solicitations or routinely included in contracts." The result was that acquisition activities became very reluctant to include EPA clauses in contracts. The other Services took similar positions. Recently, however, the Air Force helped clear up the confusion by noting that EPA clauses are not prohibited and each situation should be evaluated in light of the criteria in DAR 3-404.3. Industry is still very much concerned since inflation is a critical risk factor over which they have little or no control. Prime contracts should have protection for escalation or inflation beyond that which was used as a basis for pricing. The provisions of these clauses must also be a part of the contracts the primes have with their subs and vendors.

GOVERNMENT BENEFITS FROM CONTRACT FINANCING CHANGES

- STIMULATES DEFENSE INDUSTRIAL BASE BECAUSE:
  - DECREASES CONTRACTOR WORKING CAPITAL INVESTMENT
  - IMPROVES PROFIT MARGINS SINCE INTEREST UNALLOWABLE
  - STIMULATES CAPITAL INVESTMENT BY CONTRACTORS
    - PROVIDES ADDITIONAL CASH
    - REDUCES UNCERTAINTY ABOUT FUTURE
- PROCUREMENT ACTIVITIES WILL HAVE USEABLE FINANCING TOOLS
- MAINTENANCE OF A BROAD, VIABLE DEFENSE INDUSTRIAL BASE
- DECREASED LONG TERM COST TO THE GOVERNMENT IN SYSTEM ACQUISITION

FIGURE IV-12

The recent change[1] to weighted guidelines to improve relative weight given to facilities investment profit factor is a step in the right direction. It is too early to tell whether contracting officers will, in fact, use these factors to improve profit rates. There will be need to monitor the applications of these guidelines to determine their effectiveness. There are, however, some further steps that could be taken to encourage investment. The change was based on the premise that it would increase the defense contractor's ROI rate to about 15%. Dale Church, Deputy Under Secretary of Defense, in a letter dated 29 May 1979 stated, "Industry generally requires, at a minimum, this rate of return to cover their cost of capital." (Emphasis added.) The change was limited in application to manufacturing-type efforts. Major defense contractors typically perform three types of effort -- research and development, manufacturing, and Service support and establish their facilities investment accordingly. In order to maintain a balanced facility, the factor should be applied to all efforts. Further, the Task Force believes that in today's business environment, a 20% profit policy objective is appropriate.

Another area that needs attention is the application of Cost Accounting Standard #414, "Cost of Money as an Element of the Cost of Facilities Capital." Interest is treated as an imputed cost of doing business rather than an explicit cost. The implementation of CAS #414 is through the negotiation process per DAR 3.808 and the weighted guidelines. The contracting officer is to calculate the imputed interest and then to subtract it from the calculated total profit. What CAS giveth, DAR taketh away.

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(1) Defense Acquisition Circular 76-23, dated 26 February 1980

As discussed briefly in Section II, the Task Force found that there is no DOD policy on the use of a development contractor for some significant portion of the production. The time to get investment in production efficiencies is during the development phase. That's when the contractor can do the planning for how to produce and how to save money. Without some assurance of payback, development contractors will be very hesitant to take the risk of facilities investment. The Task Force is not looking for absolute guarantees to the developer but an expression of intent; nor are they arguing against second sourcing -- just do it at the right time.

Finally, the need for revisions to tax policy to stimulate capital investment is beginning to be widely recognized. Changes in methods of handling depreciation received serious consideration during the recent session of Congress (the so-called 10-5-3 approach). There are a number of approaches -- one is to recognize the impact of inflation on replacement costs. Figure IV-13 illustrates the problem. For example, an item depreciated over 10 years with 10% inflation recovers only about one-third the replacement costs. Another approach is to have accelerated depreciation schedules. Many countries use this method. In Japan, machinery and equipment for R&D is depreciated 95% in the first year. In Canada, all M&E is depreciated 100% in two years. There are many other examples.

Other ways to stimulate capital investment are to increase investment tax credits and tax credits for R&D investment. The Task Force felt that this is a matter of national priority, and industry and DOD should strongly support revisions to tax policy.

D. Subcontractor and Supplier Base

1. Findings

- The subcontractor and supplier base has decreased.

DEPRECIATION AS A PERCENT OF REPLACEMENT COSTS AT VARIOUS INFLATION RATES

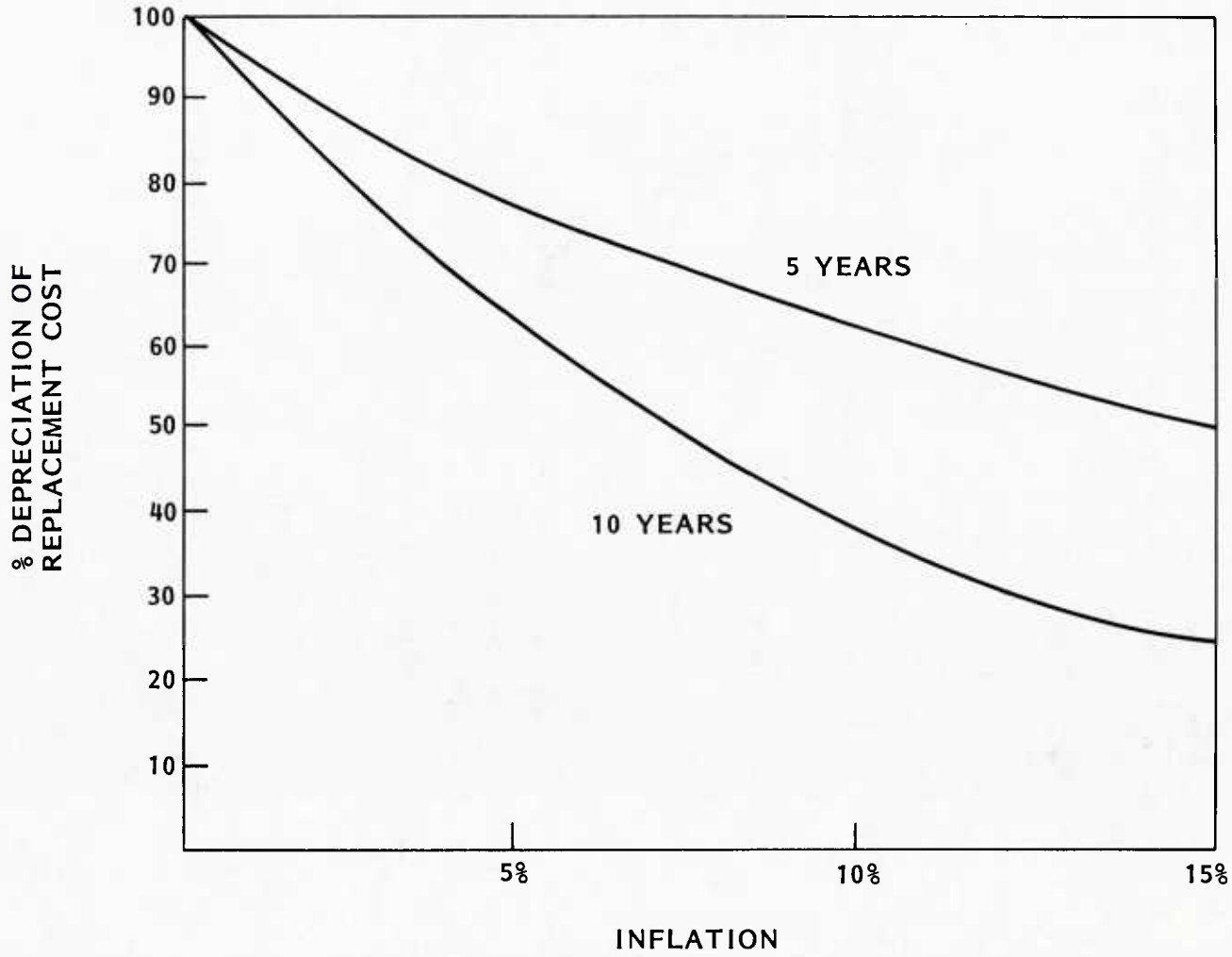

FIGURE IV-13

2. Discussion

There are a number of indications that the subcontractor and supplier base is decreasing, but hard quantitative data was difficult to obtain. The Task Force could not find any source which is collecting data on or analyzing the condition of the base. This section presents what quantitative information was obtained. The qualitative feeling of experienced purchasing personnel is:

- Fewer bidders on competitive solicitations.
- More and more sole source.
- Former defense-only suppliers moving toward commercial markets (particularly in electronics) due to better ROI.
- The base hasn't disappeared -- it has moved away.
- Large commercial firms with small percentage of defense sales are dropping defense lines.

As noted earlier in the report, some 400 foundries have gone out of business in the past decade, and titanium fabricators of bar and billet have decreased from 16 to 4. Perhaps of more significance is the large number of cases where the base is narrow because of only a few suppliers. Some examples are shown in Table IV-1

TABLE IV-1

ITEM	NO. OF SUPPLIERS
Aluminum Plate	2
Aluminum Tubing	2
Titanium Sheet	3
Titanium Wing Skins	2

ITEM	NO. OF SUPPLIERS
Titanium Extrusions	1
Aerospace Fasteners	Less than 24 out of hundreds of fastener companies
Air Frame Bearings - Special Ball	1
Needle Bearings	2
Mil. Spec. Qualified Connectors	3
Aircraft Landing Gear	3
Radomes	2
Image Converter Tube	1
Periscope Lenses	2
Optics Coatings	1

In most cases, all these suppliers are at capacity and have substantial backlogs.

In terms of responses to solicitations, one aircraft company is experiencing approximately 50% "no-bids" compared to 40% a few years ago. Another company reported steadily decreasing number of responses but provided no data. A third company, with several large defense programs, indicated that of some 6,000 suppliers, about 1500 dropped out each year, but the total remained the same. This turnover was caused by many reasons -- left the defense business, failed in bids, went bankrupt, or merged. Such volatility affects production stability, efficiency, and costs.

A very limited sample of specific cases of reasons for leaving are shown in Table IV-2. The theme of unprofitability is the primary reason for withdrawing.

More generalized reasons were obtained from a variety of sources regarding deterrents to remaining in the defense business. The principal ones were:

TABLE IV-2

SUPPLIERS WHO HAVE GONE OUT OF BUSINESS OR NO LONGER WISH TO MANUFACTURE THE PRODUCT

SUPPLIER	PRODUCT	REASON
FUTURE CRAFT	RELIEF VALVE	SUPPLIER WILL NO LONGER BUILD AFTER UPCOMING BUY. UNPROFITABLE PRODUCT LINE.
OWENS CORNING	S904 GLASS	SUPPLIER WILL MAKE ONE FINAL RUN OF FIBERGLASS CLOTH. DROPPING PRODUCT LINE.
KLAMA	KLAMA K-7	MADE ONE LAST RUN WHICH FULFILLED KNOWN REQUIREMENTS. VERY HAZARDOUS - WILL NOT MAKE ANY ADDITIONAL RUNS - LAST ONE LEVELED PLANT.
FERRO CORP.	S1014 MARBLES	SUPPLIER WILL DROP PRODUCT LINE - UNPROFITABLE.
OWENS CORNING	S904 ROVING	FINAL PROCUREMENT. NO FUTURE SOURCE OF CRITICAL CHEMICAL COMPONENT.
AMERICAN MICRO DEVICES	SHIFT REGISTER	DISCONTINUING PRODUCT - UNPROFITABLE.
SIGNETICS	SHIFT REGISTER	DISCONTINUING PRODUCT - UNPROFITABLE.
NATIONAL SEMICONDUCTOR	TRANSISTOR	DISCONTINUING MILITARY PRODUCT LINE.
PLESSY	INTEGRATED CIRCUIT PACKAGE	DISCONTINUING PRODUCT LINE - UNPROFITABLE.
WOOD ANDERSON CO.	SCREW MANUFACTURER	REFUSED TO CONTINUE BUSINESS BECAUSE OF EXCESSIVE REJECTIONS, NOT PROFITABLE FOR THEM.
DOW CORNING	SILICON GLASS MATERIAL FOR ANTENNA WINDOW	DISCONTINUED PRODUCT LINE.
ELECTROPHY, INC.	COPPER CLAD MATERIAL	CANNOT MAKE ACCEPTABLE MATERIAL. WILL NO LONGER MAKE PRODUCT.
HI-G	RELAY	MARGINAL ON PRODUCT. STORM DESTROYED SOME OF FACILITIES. DECIDED NOT TO CONTINUE MAKING PRODUCT.
HAMILTON TECHNOLOGY	INERTIAL INITIATOR	DISCONTINUED PRODUCT LINE.
SONORA	AEROSPIKE PROTECTIVE CAPS	CANNOT MAKE ACCEPTABLE PRODUCT.
HEWLETT PACKARD	9500, 9510, 8592, 8580	DISCONTINUED MODELS.
COOK ELECTRIC	TAPE READER	DISCONTINUED MODEL.

- o Volume of paperwork (overhead) required to do business under defense contracts.

- o Cost Accounting Standards, stringent cost/pricing data, detailed contract requirements.

- o Continual delays in Congressional/DOD decision making coupled with funding policies which creates serious financial problems.

- o Limitations on profits.

- o Social Program requirements imposed on defense contracts.

- o Slow pay by both the government and prime contractors.

- o Small orders.

- o Excessive specifications.

In summary, there is a lack of capacity in the subcontractor and supplier base brought about by fewer suppliers, increased commercial demand and a perception that defense business isn't worth the trouble.

E. Other Productivity Considerations

1. Findings

- o The DOD Manufacturing Technology program appears to be an effective instrument for increasing productivity. Investment in the program varies widely among the Services.

- o The government-owned machine tool base is obsolete.

2. Discussion

a. Manufacturing Technology

The Manufacturing Technology Program was given its primary stimulus in 1975 by the Deputy Secretary of Defense when he asked the Services to centralize management of their MT programs, increase program funding, and to create new initiatives resulting in reduced manufacturing costs. Succeeding defense managers have continued to support the program and it has grown. In FY 1976, roughly $90 million was spent and the proposed budget for 1981 is $151 million. The funds come from procurement accounts and are difficult to pry loose. The objective of the program is very straightforward, " to significantly improve the productivity and responsiveness of the industrial base..." The program is designed such that DOD provides "seed money" to assist a transition from R&D innovation to full-scale production application. Industry is expected to fund the application in production.

Records maintained by the Defense Department provide good evidence that the payback for investment in manufacturing technology is about 5 to 1. The most widely publicized case is the F-16 program. The Air Force invested $25 million and General Dynamics $100 million in automated machinery and fabrication centers. The Air Force estimates a potential $200 million saving during the life of the program (as noted in Section IV-B, quantity changes may dilute this number).

One management problem does need some attention. The responsibility for the program is divided within the Office of the Under Secretary for Research & Engineering. The Task Force suggests that one office should have necessary authority for the program.

b. Machine Tool Base

The Defense Industrial Act (Public Law 93-155) requires that DOD maintain an essential nucleus of government-owned facilities and equipment to meet current and emergency defense requirements. The act further states that DOD should depend on the private sector to the maximum extent possible to provide required industrial capability. DOD policy is to have contractors replace government-owned machine tools. Although this policy has been in effect for many years, there are still some 26,000 government-owned metal cutting and metal forming machine tools in contractors' plants (included are tools in government-owned, contractor-operated plants -- GOCO's). More than 20,000 of the tools are over 20 years old. Industry has not made needed investment due to the lack of incentives, as discussed earlier. They have "made-do" with obsolete and aging tools.

The government machine tool base contains about 115,000 tools of which only 8,000 are less than 10 years old. In all 83,000 tools are in active use and the remainder are in storage. The condition of those in storage is deteriorating because of lack of maintenance funds, and some are useless. A representative of the National Machine Tool Builder's Association stated that the DIPEC inventory is worthless and should be disposed of.

DOD policy states that the existing equipment should be modernized at the rate of 5% per year. Actual modernization has never exceeded 2 to 3% per year, and today, DOD investment in other than Munitions Base Modernization is miniscule. The Task Force concluded that some portion of the machine tool base must be maintained by the Defense Department and that steps to upgrade that portion should be taken. As a source of funding for this modernization, it is suggested that a revolving fund should be used where the receipts from rental or sale of government-owned facilities and equipment be reinvested in modern tools.

As noted elsewhere in the report, the current backlog of new orders in the machine tool industry might limit the DOD ability to move quickly.

F. Industrial Preparedness Planning Program (IPP)

1. Findings

- o The IPP is not adequately defined nor sufficiently limited.
- o There is little realism and no contractual commitment in the "DD1519" process.
- o The defense industry has little or no capability to surge production in the short term.

2. Discussion

The Task Force treated this subject as a secondary but important issue. There is a great deal of background material from previous studies and surveys and the findings are largely drawn from a synthesis of that previous work(1)(2).

a. Industrial Preparedness Planning

The program suffers from a number of inadequancies. The planning base of some 6,000 items is much too large to handle with the limited funds and personnel that are available. Further, the truly critical items have not been identified. The process is keyed to the DD Form 1519, "Industrial Preparedness Program Production Planning Schedule." Indicative of the lack of commitment in the process is a statement on the form as follows:

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(1) Defense Management Issue Analysis #11, Industrial College of the Armed Forces, 11 June 1979.

(2) Special Report, Army Industrial Preparedness, May 1979

"Notwithstanding the foregoing basis for acceptance, the signatures hereon in no way bind the named firm(s) nor the Government in any contractual relationship, nor is acceptance to be construed as an agreement by industry to maintain production capability as indicated herein. The signature of industry does not obligate the named firm to accept a military contract if one is offered nor is the Government obligated to convert production planning scheduled to contracts, to contract with the named firm if procurement of the items specified herein is required, or to convert planned subcontract support to subcontracts if the planned production is converted to prime contracts."

Clearly, there is very little motivation on the part of the contractor to take the forms seriously. One critic has commented that since the Defense Department doesn't pay for the effort, they are getting just what they pay for.

The deficiencies of the process are contained in reports from GAO, the ICAF study, and the 1976 Defense Science Board Study. In summary:

- No commitment by either party.
- Uncoordinated requests to individual companies from different services.
- Little or no look at the supporting subcontractor base which would serve multiple program demands.
- No evidence of any action on the basis of what is contained in the forms.
- "Planned producers" often were not used for surges during the Vietnam war.

OSD has taken some steps to try and improve the process by including Data Item Descriptions for Industrial Preparedness Planning as a contractual requirement. Information presented to the Task Force led to the conclusion that this approach hasn't been very effective because of funding limitations.

One of the outputs of the IPP is a definition of the related Industrial Preparedness Measures (IPM's). Necessary investment is identified and specific steps outlined to respond to increased production demands. However, because of the OSD position not to invest in the industrial base, nothing comes of the IPM's -- they just are not funded.

One encouraging note is that the National Security Council and the Federal Emergency Management Agency (FEMA) are working to revitalize mobilization planning. Part of their activity is to develop agreed upon scenarios in order that government agencies will have a common basis on which to base planning, and, it is hoped, actions. The Task Force felt that actions for improved Industrial Preparedness Planning can be started without waiting for the detailed scenarios. The basics need to be developed regardless of the scenarios. Some action is in process. A draft of a DOD Master Mobilization Plan was issued in mid-July 1980 which proposed a set of organizational responsibilities for mobilization actions. The Industrial Preparedness Program is one of the elements of the plan. The necessary actions are clearly identified, but it is doubtful that either personnel or budget resources are there to implement the plan.

b. Surge Capability

As discussed in Section II, the industries studies by the Task Force have little or no surge capability in today's environment, that is -- operating in essentially a peacetime mode.

The Task Force did not directly examine the ability of industry to increase production in the event of a declared national emergency, but it can be inferred that even under mobilization circumstances, the time to respond would be lengthy. Even in the munitions industry where Plant Equipment Packages are in standby, it was found that it would take from 7 to 18 months to obtain first deliveries.

The electronics companies have some surge capability if screened commercial devices were needed, but special designs would be difficult to accelerate. The Texas Instruments survey (Appendix F) found that people limitations might be pacing.

Although the Task Force did not develop specific recommendations to improve the surge capability of industry, other recommendations such as multi-year contracting would assist in providing a surge in the second or third year. Some other suggestions made were:

- o Advanced material buys.
- o Stockpiling critical components and subassemblies.
- o Use of commercial components.
- o Government investment in facilities and equipment.

The Task Force view is that these other suggestions appear to have merit, but the lack of time prevented a rigorous examination of the suggestions.

G. War Reserve Materiel and Critical Spares

1. Findings

- o Each year, the WRM shortfall is essentially extended another year due to lack of funding.

- o Lack of critical spares is very damaging to the readiness posture.

- o Annual planning provides for WRM, spares and subsystems, but each year the budget crunch favors end item deliveries at the expense of WRM and spares.

- o Spares buys are not combined with major systems acquisitions, resulting in spares costs of 300-800% of equivalent cost of an item in production hardware.

2. Discussion

Data presented to the Task Force supports the first finding, but the numbers are classified and are not included in this report. The 1976 Defense Science Board Study, "Industrial Readiness Plans & Programs (U)" (SECRET), contains material that is still applicable. The only change of note since 1976 is that there is some improvement in inventory levels of ammunition stocks.

The lack of critical spares has been highlighted in posture statements, Congressional testimony, and numerous articles. Aircraft spares seem to be a particular problem. In part, this is caused by continual arbitrary cuts by OMB and appropriations committees (although the trend is reversed in the 1981 budget). The House Armed Services Committee commented in reporting the 1981 Authorization Bill:

> "The action is an indication of the committee's growing concern that underfunding and the vulnerability of operation and maintenance accounts to reductions in the later phase of the budget cycle is having a serious adverse impact on military readiness. In recent years, there has been an

alarming tendency to finance needed weapons program increases by offsetting reductions to the operations and maintenance accounts. The committee does not believe that weapons systems -- no matter how urgently needed -- can be procured at the expense of near-term readiness without serious consequences.

Recent testimony by operation commanders substantiates this view as they invariably state that their number one priority is to secure increased operation and maintenance funding to enhance the readiness of their forces. An examination of the fiscal year 1981 budget submission demonstrates that this concern is well founded."

The Task Force agrees with their assessment.

Repair parts and spares are procured from at least two different appropriations. Initial provisioning for major systems is provided in the procurement account but follow-on buys are funded from Operations and Maintenance budgets. The result of this piecemeal approach is that follow-on buys are made in small quantities and subjected to all the paperwork burdens of a large procurement. This practice invariably leads to high costs for repair parts. Information provided to the Task Force indicates that equivalent parts can cost as much as 300 to 800% more than when they are a components of a major end item. It appears that this is an area worth pursuing with some vigor.

H. Strategic and Critical Materials

1. Findings

- Continued availability of critical materials is jeopardized by dependence on overseas sources.

- Funding is no longer available to develop domestic sources of critical materials, using Title III of the Defense Production Act.

- o The National Stockpile appears to have some serious imbalances.

- o The DOD materials substitution program is of low priority.

2. Discussion

a. Strategic and Critical Materials

The Task Force took a brief look at strategic and critical materials. Dr. John Morgan of the Bureau of Mines has the definitive briefing on the subject which he has given many times. The data from his briefing was the basis for two excellent articles in Aviation Week published May 5, 1980(1)(2). For the purpose of this report, it is sufficient to note that the Defense Department is heavily dependent on specialty metals and alloys. In turn, the suppliers are dependent on overseas sources for critical materials such as cobalt, chromium and manganese. The sources of supply are largely in Southern Africa from countries who are not noted for stable governemnts. Figure IV-14 has been used often but it emphasizes the point.

There are potential sources of many of the critical minerals in the United States, but they have not been developed because of economic reasons. The Defense Production Act of 1950 provides authority under Title III which enables the government to underwrite expansion of domestic production of critical materials when the U.S has substantial dependence on imports. Under Title III the government can help establish or support mining and metal producing industries by establishing floor prices or guaranteed markets, by guaranteed

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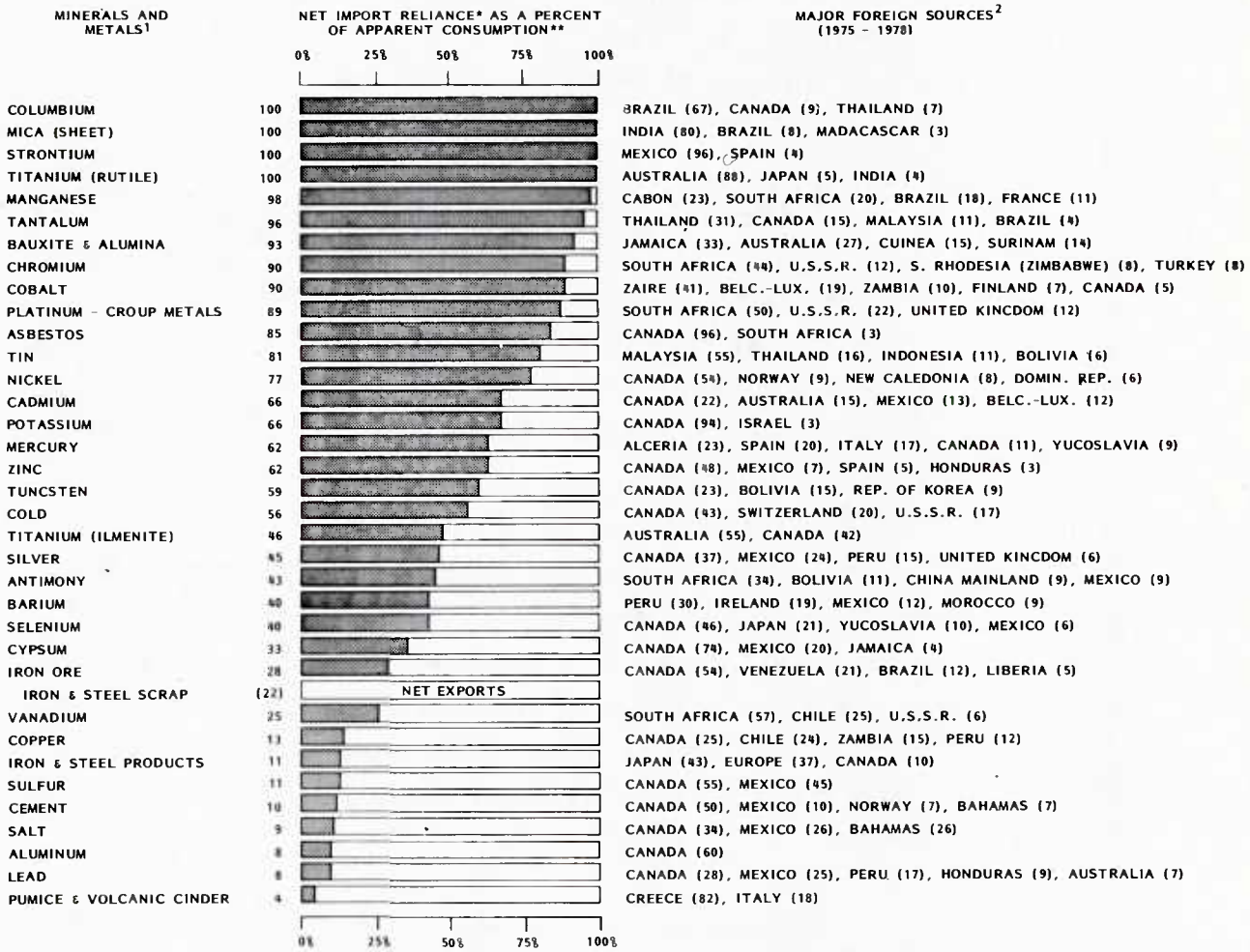
(1) "Availability of Strategic Materials Debated," Aviation Week, May 5, 1980.
(2) "Domestic Production Stimulant Sought," Aviation Week, May 5, 1980.



*NET IMPORT RELIANCE = IMPORTS-EXPORTS
*ADJUSTMENTS FOR COVT AND INDUSTRY STOCK CHANCES.
**APPARENT CONSUMPTION = U.S. PRIMARY
*SECONDARY PRODUCTION + NET IMPORT RELIANCE

APRIL 1980

[1]SUBSTANTIAL QUANTITIES ARE IMPORTED FOR FLUORSPAR, CRAPHITE RHENIUM AND ZIRCON. DATA WITHHELD TO AVOID DISCLOSINC COMPANY PROPRIETARY DATA.

[2]SOURCES SHOWN ARE POINTS OF SHIPMENT TO THE U.S. AND ARE NOT NECESSARILY THE INITIAL SOURCES OF THE MATERIAL

BUREAU OF MINES, U.S. DEPARTMENT OF THE INTERIOR
(IMPORT-EXPORT DATA FROM BUREAU OF THE CENSUS)

FIGURE IV-14 U.S. NET IMPORT RELIANCE OF SELECTED MINERALS AND METALS AS A PERCENT OF CONSUMPTION IN 1979

loans or by allowing accelerated write-offs of capital investments. The Act provides a powerful tool but it has been little used in recent years. In 1974, the revolving fund for Title III was abolished and a requirement established that each program be submitted to the Congress for appropriation. As might be expected, very few, if any, programs survived the perils of OMB and/or the Congress. At the moment, Title III is a hollow shell.

b. Stockpile

The Task Force took a limited look at the National Defense Stockpile. The Federal Emergency Management Agency is responsible for establishing stockpile goals, both quantitative and qualitative. New goals were announced in April 1980 but it isn't at all clear whether necessary actions are in process to align the stockpile with the goals. There are some dozen materials which have a zero goal but substantial inventories are in the stockpile. The most striking example is silver. The goal is zero -- and has been since 1976 -- and yet the inventory contains almost 140 million troy ounces. At today's prices, that would buy a lot of the materials that are in short supply in the inventory. It was reported to the Task Force that attempts had been made to dispose of some stockpile items but Congress had disapproved most of the transactions.

It was reported to the Task Force that the quality of some of the items in the stockpile was deteriorating and should be rotated. There was disagreement on the subject, but one case cited was that the cobalt stockpiled was not of the quality necessary for today's high strength steels. While the Task Force did not pursue this particular subject, the general concept of rotating and upgrading the stockpile seems eminently reasonable. In fact, the 1979 Strategic and

Critical Materials Stock Piling Act calls for such actions, but whether it is being implemented is questionable. As always, the drawback to carrying out the responsibilities of the Act is the lack of funds appropriated for such purposes.

c. Material Substitution

The Defense Research and Engineering organization has established a small program to develop substitutes for materials which depend on critical minerals such as chromium, cobalt and beryllium. The program is lightly funded and has been in existence for a relatively short time. The Task Force felt that the program has merit and should be supported.

I. Defense Priority System

1. Findings

- The Defense Priority System is not extended throughout the production and delivery cycle (i.e., to the lower tiers).
- Industry is reluctant to extend priority ratings because it creates problems with suppliers.

2. Discussion

The Defense Priority System was established by the Defense Production Act of 1950 to help ensure that authorized defense programs are maintained on schedule by providing priority treatment for defense orders. There are two types of rating. The DO rating is normally applied to all defense orders and gives preferential treatment over unrated orders. The DX rating takes priority over DO and its use is limited to urgent national programs, and must be approved by the President.

The system is not working very well. A 1979 survey conducted by students of the Industrial College of the Armed Forces found that only about half of DO rated orders were given priority. When questioned about the effectiveness of the system, only about 25% said it was effective. The vendor survey conducted by Texas Instruments determined that compliance was good at the first tier, only 50% at the second, and 25% at the third tier. In other words, it was not being extended through the system. THe Hughes survey found that 56% of the respondents considered the system unnecessary, or too burdensome to be worthwhile.

The reasons for the difficulties are varied, but one of the principal conclusions is that the system isn't well understood by either government or contractor personnel. Even though it is supposed to flow down through the subcontractors and vendors, it does not. Another deterrent to the use of the system is that industry is reluctant to apply pressure on their suppliers because of problems it might create in the future. The short-term solution is not worth damaging long-term relations. If applied to a heavily scheduled supplier, it creates serious internal turbulence. Finally, in some situations when Special Priorities Assistance is requested to assist in maintaining required production and delivery schedules of rated programs, too much time is taken at various approval stages of the process cycle. This causes excessive paperwork and undermines the purpose of the system, and causes those that the systems are intended to assist to question the usefulness of the process.

On the positive side, several Service representatives noted that when the requests do get to the Department of Commerce, the response is very timely and effective. The general view of persons familiar with the system was that it is mandatory to keep it in place in the event of a declared national emergency. It can be more useful in today's situation, but it must be carefully applied. It is not a panacea, but it can be more effective.

J. Management

1. Findings

- o There is a lack of focus within the DOD on industrial responsiveness and industrial preparedness.

- o OSD does not take strong positions or make its views known during the development or the application of non-defense government regulations.

2. Discussion

Two problems in the management area came to the attention of the Task Force. The first was the difficulty in determining the responsibilities throughout the DOD for matters of industrial base, industrial responsiveness, or industrial preparedness. The Army does have several offices which have "mobilization" responsibilities and who act on Industrial Preparedness Planning (IPP) matters. The offices exist in the Secretariat, the Army Staff and in DARCOM. The Navy has a mobilization office in CNO but no other identifiable activitiies. In the Air Force, the Air Force Systems Command has conducted studies on the Industrial Base and there are several offices in the Pentagon with appropriate titles. For example, there is an assistant for industrial resources in the Secretariat.

In the Office of Secretary of Defense, the responsibilities are scattered. Policy decisions and guidance which strongly influence the industrial base are developed outside the provice of the Acquisition Executive. What implementation is carried out is done under the auspices of the Deputy Under Secretary (Acquisition Policy). In short, there is little focus on and no strong advocate for the health and care of the industrial base.

The second problem is that the OSD does not appear to take activist positions on legislative and regulatory matters which impact national defense needs. An example of lack of regard for national defense needs was in the development of the National Non-Fuels Mineral Policy. As noted by Representative James Santini, "The Administration's non-fuel policy August 1979 report fails to look at the National Security aspects of such dependence, the related problems of disruptions, and our increasing loss of flexibility to cope in an emergency(1)."

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(1) Speech before the 18th World Affairs Forum, June 17, 1980.

V. RECOMMENDATIONS

This section is for the most part a restatement of the recommendations contained in the Executive Summary. Many of the recommendations were derived directly from the findings and further discussion would not add much. In some cases, the Task Force did not develop any details on "how to." Additional detail is contained in this section for several of the recommendations.

A. Industry Actions

1. Recommendations

- o Emphasize a vigorous cost reduction program carried out at all levels and at all cost elements.
- o Establish practices that encourage a strong supplier base.
  - Equitable terms and conditions.
  - Reduction of documentation requirements.
  - Assistance in acquiring and training people.
  - Multi-year contracts with EPA clauses.
  - Flowing down beneficial contract provisions.
- o Work intensely with non-defense industrial segments to create a more favorable capital formation climate.

2. Discussion

The prime contractors must take steps to maintain a strong supplier base. They must work with defense acquisition personnel to limit flow down of onerous provisions, and to provide the beneficial provisions of their contracts. The primes should vigorously pursue relief by obtaining waivers on Cost Accounting Standards and Cost Breakdown Information (DD 633's).

The industrial base is widely varied and no one approach is going to make these things happen. The Task Force recommends that the message be communicated through the various industrially supported associations (this is in process).

B. Department of Defense Actions

1. Stability

a. Modify current legislation, regulations and practices to permit greater use of multi-year contracts.

b. Discussion - The search for ways to achieve some stability in defense programs has been in process for many years. The 1979 Defense Science Board Study on "Reducing the Unit Cost of Equipment" recommended that the DOD should seek multi-year appropriations for production programs that exceed three years and $1 billion. Such an approach creates some severe budgeting problems since it would exacerbate the current "bow-wave" problem. This Task Force agreed in principle with the previous recommendation, but looked for a different approach, which would provide for the use of multi-year contracts but with annual funding.(1)

The principal benefit of such longer-term contracting arrangements is to achieve economies of scale. With the greater assurance of a solid program, contractors have a much greater incentive to invest in productivity measures and to make economical buys from vendors and subcontractors. The savings potential for multi-year contracting is estimated to be from 10 to 15% (in constant dollars). This is based on recent studies, but it reflects the experience of the late 1960's and early 1970's when multi-year contracting was used fairly extensively. An indirect benefit of the multi-year approach is that it provides a surge potential in the second year and beyond because the materials and suppliers are there if you have to surge.

(1) One successful approach to program stability is the Advanced Funding Program used in the Navy's Trident Program. See Appendix G for details.

The principal inhibiting factor to use of this concept rests within the current framework of laws and implementing regulations relating to the contracting and budgeting process. The specific constraints are:

- The language of the Defense Authorization Act of 1976 (Section 810) which limits the cancellation ceiling on multi-year procurement to $5 million.

- DAR 1-322 which limits funding to non-recurring costs in the event of terminations.

- DOD Directive 7200.4, "Full Funding of DOD Procurement Programs," which requires that each annual appropriation request must contain the funds to cover the total costs to be incurred in completing the delivery of a given quantity of usable end items. There is a provision for the use of advanced procurement funding for the purchase of long lead time components. However, such components must be stable in design and usable even if the program is cancelled. Thus, many long lead items such as raw material, special electronic designs, and forgings cannot be procured.

These limitations must be modified if multi-year contracting is to be of use. Currently, the risks are not acceptable to the defense industry, and only a few multi-year contracts are in being.

There are several alternative approaches to achieve an annual funding of multi-year contracts. The Air Force Systems Command has proposed one approach(1). Industry representatives have made a

(1) AFSC letter to HQ, USAF, dated 28 March 1980, "Legislative and Policy Changes for Multi-Year Contracting"

number of recommendations to the Department of Defense and to the Industrial Readiness Panel of the House Armed Services Committee, which is currently (November 1980) holding hearings[1]. The approaches differ, but the theme is constant -- there are ways to make more economical buys, but the contractors must have greater protection for the risks of program termination.

In summary, the Task Force recommends:

- o Revise DAR 1-322 to include recurring costs in termination liability provision.
- o Repeal the $5 million cancellation ceiling.
- o Revise DOD Directive 7200.4 to permit multi-year contracting without requiring full funding.

2. Encourage Investment

- o Index progress payments to prime interest rate.
- o Expedite government paying cycle.
- o Increase use of milestone billings and advanced payments. Delegate approval authority to head of the contracting agency.
- o Enforce consistent application of tailored Economic Price Adjustment (EPA) clauses.
- o Ensure that primes flow down EPA clauses to subs.
- o Ensure that recent profit policy changes are implemented at all levels.

(1) See Appendix K. Letter from Hughes Aircraft Company to Representative Richard Ichord, dated October 29, 1980.

- o Establish incentives for the full-scale development contractor to make productivity investments by assuring him a significant portion of the production of a successful development.

- o Support Executive Branch and Congressional actions to stimulate capital investment.

3. Improving Productivity

a. Manufacturing Technology

- o Increase emphasis on Manufacturing Technology program.

- o Fund at 1% of procurement.

The funding level of 1% was arbitrarily chosen, but it reflected the view of the Task Force that this is a reasonable appropriate level. It was not intended as an upper limit.

b. Machine Tool Base

- o Phase out the obsolete machine tool base.

- o Upgrade the government-owned machine tool base, particularly for munitions by a one-time 25% investment and selective modernization at 5% per year.

The DOD policy of encouraging contractor ownership of machine tools and replacement of government-owned tools is correct. Contractors should continue to phase out the many obsolete tools in their plants.

In the special case of the munitions industry, the government will have to continue ownership of much of the machine tool base. The Task Force recommends that in order to

upgrade the base in some reasonable time, a significant, one-time replacement of 25% of the acquisition value (plus inflation) of the base be done. Following that step, selective modernization at the rate of 5% per year should be continued. Many of the tools should be disposed of now and any funds generated from their disposal put in a revolving fund to buy new tools.

4. Industrial Preparedness Planning (IPP)

- o Restructure the current Industrial Preparedness Planning Program.

A number of steps need to be taken to revitalize the IPP. OSD and the JCS should select and prioritize a limited number of pacing items and/or systems. There are about 6,000 items currently in the system. The Task Force felt that 200 critical consumables is about the level that could be effectively handled. A few well planned items are better than thousands of poorly planned ones.

OSD should establish a consistent production base plan and investment concept, and them implement an integrated IPP and acquisition process. This would include such steps as:

- Include IPP and Industrial Preparedness Measures (IPM's) as line items in the selected production (or separate) contracts.

- Establish a quick reaction BOA or letter contract approach.

- Define pre-agreed waivers for EPA, OSHA, etc., regulations.

- Integrate a realistic procedure for surge in the IPP manual.

The output would provide an annual vertical data base (subs and suppliers) of the selected items including industrial capability, consistent schedule and cost requirements, and critical path identification. The Task Force estimated that to develop necessary plans and implement industrial preparedness measures for 200 consumables would cost between $1 to $1.5 billion a year. The DOD may not be able to afford this level, but it can afford some decent planning on a selected number of items.

5. War Reserve Materiel and Critical Spares

- o Increase priority for WRM stocks and spares.
- o Combine spares and end item quantities and procure them under a single contract.

6. Strategic and Critical Materials

- o Support actions by FEMA to utilize Title III of the Defense Production Act to develop strategic and critical material sources.
- o Include materials availability considerations in DOD Materials R&D program.
- o Support actions by GSA and FEMA to rotate and upgrade the National Stockpile.

FEMA and GSA have the principal responsibilities for actions in this area, but DOD must continue to take an active role in advising these agencies and supporting them in the budget process.

7. Defense Priority System

- o Place emphasis on proper application of the Defense Priority System.

The Task Force recommends several actions that could enhance the usefulness of the Defense Priority System:

- o Conduct an educational program in industry and DOD.
- o Integrate DPS/DMS considerations in the DSARC.
- o Require inclusion of DPS/DMS in RFP's for rated programs.
- o Expedite handling of requests for special priorities assistance.

8. Defense Management

- o Ensure that National Defense needs are properly considered in the development and application of non-defense government regulations.

The Defense Department must articulate its position on matters that affect the national defense. Continuous monitoring of legislative, regulatory, and executive actions is necessary to avoid getting blindsided. In short, the OSD must speak up and defend their positions.

TERMS OF REFERENCE

(Memorandum, USDRE to Chairman, Defense Science Board
dated 20 May 1980)

THE UNDER SECRETARY OF DEFENSE
WASHINGTON, D.C. 20301

ESEARCH AND
NGINEERING

20 MAY 1980

MEMORANDUM FOR THE CHAIRMAN, DEFENSE SCIENCE BOARD

SUBJECT: Defense Science Board Task Force on Industrial Responsiveness

You are requested to form a Defense Science Board Task Force on Industrial Responsiveness. The objective of this DSB Task Force is to develop a near-term strategy and specific actions for improving the present state of industrial responsiveness to support current acquisitions or emergency surge requirements. The emphasis is to be on steps that will decrease the lead-time. The Task Force should focus on those actions which can be accomplished within the Defense community such as:

1. Multi-year funding concepts.
2. Profit policy adjustments.
3. Loan guarantees.
4. Offload of manufacturing bottlenecks to allies.
5. Advance buy/stockpiling of long leadtime components.

The Task Force shall review actions taken, or in process, since the 1976 DSB Study of Industrial Readiness Plans and Programs, including:

1. Changes in DoD Industrial Preparedness Planning policies and procedures.
2. NSC Interagency Mobilization Planning Study.
3. DoD efforts to reduce acquisition leadtimes, improve productivity and increase capacity.

The Task Force should interact with the recently-established Industrial Mobilization Advisory Group which is presently developing policies for investment in stand-by industrial surge capacity. This effort is being accomplished under the aegis of the DoD Mobilization and Deployment Steering Group chaired by the Under Secretary of Defense (Policy). A study contractor is presently being selected for analytic support to this effort.

The product of the study shall be a report which will provide specific recommendations for execution of various business strategies. The report shall include actions, costs, milestones, an assessment of feasibility of implementation, and estimated payoff in terms of readiness, increased productivity or capacity improvements.

The Task Force will be sponsored by Mr. Dale W. Church, my Deputy for Acquisition Policy. Mr. Robert A. Fuhrman, President, Lockheed Missiles & Space Co., has agreed to serve as the Chairman, and Mr. Richard E. Donnelly, Deputy Director for Production Resources, will serve as Executive Secretary.

Gerald P. Dinneen

Gerald P. Dinneen
Principal Deputy

SEMICONDUCTOR SUPPORT OF MILITARY PROGRAMS

PRESENTED

TO

THE DEFENSE SCIENCE BOARD TASK FORCE

BY

INDUSTRIAL RESPONSIVENESS

BY

JERRY JUNKINS
TEXAS INSTRUMENTS

SEMICONDUCTOR SUPPORT OF MILITARY PROGRAMS

The major suppliers of military semiconductors are Texas Instruments, Signetics, Motorola, Fairshild, and National. There are others with Mostek recently adding a military division. At the present time, the military semiconductor market is about 7% of the total semiconductor market. This will reduce to 4-5% by the late 1980's. Major investments have been and are being made in the market to increase capacity. Lead times have reduced from averages of 40-52 weeks a year ago to 16-25 weeks now, with some exceptions. Shipments are up an estimated 20-30% from 1979 showing some of the capacity increase. In general, capacity limitations are in the assembly operations and test, screening, burn-in, etc. Front end or bar capacity is available or could be diverted to handle surge needs in the industry. However, some 80-90% of military semiconductors are assembled outside the United States, primarily in the Far East — Singapore, Korea, Hong Kong, Taiwan, Malaysia. Type A devices — JAN, JAN TX, etc. — must be assembled in this country. The majority of semiconductors used in military products are supplied from commercial lines assembled in MIL Qual ceramic packages and they then receive special testing. Most ceramic packages and a significant number of lead frames are supplied from Japan. Profits in the industry are adequate to good on most of the business, that is the screened commercial devices, but in general it is inadequate to very poor on custom, special, qual, and JAN devices.

SEMICONDUCTOR SUPPORT OF MILITARY PROGRAMS

- Major suppliers of Military Semiconductors

  Texas Instruments
  Signetics
  Motorola
  Fairchild
  National

- Military Semiconductor market is about 7% of total semiconductor market.

- This will reduce to 4-5% by mid to late 80's.

- Major investments have been and are being made in this market to increase capacity.

- Lead times have reduced from 40-52 weeks in 1979 to 16-25 weeks now.

- Shipments are up an estimated 20-30% from 1979.

SEMICONDUCTOR SUPPORT OF MILITARY PROGRAMS (Cont'd.)

- In general, capacity limitations are in assembly operations and test, screening and burn-in, etc.

- Front End (bar capacity) is available or could be diverted to handle surge needs.

- 80-90% of military semiconductors are assembled outside the U.S. (primarily Far East).

- Most ceramic packages and a significant amount of lead frames are supplied from Japan.

- Profits are adequate to good on most of business (screened commercial devices) but are inadequate to very poor on custom, special, Qual/Jan, etc.

SLIDE

Looking at capacity, if the semiconductor industry was asked to double its military capacity, it is estimated that it would take 12 to 15 months as it is now placed. That means, continuing to do majority of business in the Far East. A rough order estimate of the investments to double the capacity is in the $100-150 million range. It is felt to train people would be a limitation particularly if that increase was mandated to be in the U.S. as opposed to continuing in the Far East.

MILITARY SEMICONDUCTOR
CAPACITY INCREASE

- To double military capacity in Semiconductor would take 12-18 months as now placed (i.e., continuing in Far East).

- Investment to double capacity is estimated to be $100-150M.

- Trained people would be a limitation particularly if the increase was mandated to be in U.S.

SLIDE

Critical issues - as far as the declining interest in the military business, it is really a mixed bag, because as I indicated, there are major investments being made by many of the corporations to increase their capacity in military. However, some of the factors that do contribute to this declining interest are the difficulty in dealing with government programs versus commercial business, the non-standard specifications, slow placement of orders, certainly the military consumes more resources per billing dollar (people, production capacity, equipment, etc.). The smaller production runs are inefficient, larger amounts of paperwork, contracting procedures and in general, what is felt to be a bureaucratic approach to problem solving. In an industry that leads in the productivity improvements, it is frustrating to see military products being manufactured with equipment at 30-60 parts per hour sitting next to commercial lines producing 10-20 times that rate because of past qualifications and the inability to make changes to move up to the higher productivity machines. There is a long payout for major programs investments, especially those requiring custom designs. Now, this is not any different than the environment that all of us face from the military, but still it is an area that makes the marketplace less attractive as compared to a large commercial market. Some cost sharing on design programs could help and the elimination of contract auctions would improve the situation.

SEMICONDUCTOR SUPPORT OF MILITARY PROGRAMS

CRITICAL ISSUES

- Declining interest in military business.
  - Difficulty of dealing with government programs versus commercial business.
    - Non-standard specifications.
    - Slow placement of orders.
    - Consumes more resources per billings dollar (people, production capacity, equipment).
    - Smaller production runs are inefficient.
    - Paperwork!
    - Contracting procedures.
    - Bureaucratic approach to problem solving.
  - Long pay-out for major program investments (especially those requiring custom designs).
    - "Cost Sharing" on design programs
    - Contract auctions.

SLIDE

Considerations and Recommendations - First, we can simplify component specification and contract procedures. Equipment, I'm talking about prime equipment design, must be tailored for the real environment. Design in as many standard parts as possible. Specify as close to commercial components as possible, and eliminate the unneeded and excessive inspection and test specifications. Simplify qualification and requalification requirements to encourage component and equipment upgrades, cost reduction redesigns, productivity improvements and production automation. Improve the profitability by some cost plus instead of cost sharing for the design programs. Some progress payments or milestone payments should be used. Continuous production contracts possibly for stockpiling could add stability and encourage investment.

Last, I offer a special consideration and I have mixed emotions about whether it should be adopted. But if we are concerned about the high dependency on foreign sources for semiconductors and want to force some of this production back in-country in the U.S., we could mandate the 50-100% of domestic production of semiconductors for all new programs say starting a year from now and for all procurement starting say three years from now. This would allow an orderly build-up of U.S. capacity.

Critical piece part production should also be established in the U.S. if this were adopted.

It must be recognized that most of these activities are in the Far East is for productivity and economic reasons. The cost to subsidize mandated U.S. production might be considerable and more than the military can afford.

The question of "What could be done to insure that you remain a viable supplier?" There were several responses but all were summarized and said the business must allow a fair return on investment.

SEMICONDUCTOR SUPPORT OF MILITARY PROGRAMS

CONSIDERATIONS/RECOMMENDATIONS

- Simplify component specification and contract procedures.
    - Equipment designs must be tailored for real commitment (mission profile).
    - Design in as many standard parts as possible.
    - Specify as close to commercial components as possible.
    - Eliminate unneeded and excessive inspection and test specs.
- Simplify qualification and requal requirements to encourage:
    - Component and equipment upgrades.
    - Cost reduction redesigns.
    - Productivity improvements.
    - Production automation.
- Improve profitability of military business.
    - "Cost Plus" instead of "Cost Sharing" for design programs.
    - Progress Payments/Military Payments.
    - Continuous production contracts for stockpiling.

SEMICONDUCTOR SUPPORT OF MILITARY PROGRAMS

SPECIAL CONSIDERATION

- Establish significant U.S. based Military Semiconductor production capability.
  - Mandate 50-100% domestic production of Semiconductors for all new programs starting January 1981 - for all procurement effective 1 January 1984.
    - Timing would allow orderly build-up of U.S. capacity.
    - Government must recognize cost increase.
  - Establish domestic production of critical piece parts (ceramic packages and lead frames).
    - May require government funding/subsidy or guaranteed quantity buys to establish U.S. production.

APPENDIX C

THE MUNITIONS BASE

PRESENTED

TO

THE DEFENSE SCIENCE BOARD TASK FORCE

ON

INDUSTRIAL RESPONSIVENESS

BY

DR. MATTHEW A. SUTTON
HONEYWELL, INC.

DEFINITION OF MUNITIONS MARKETPLACE

THIS SECTION OF THE PRESENTATION IS MEANT TO BRIEFLY DEFINE THE MUNITIONS (AMMUNITION) AREA IN TERMS OF:

- MAJOR AMMUNITION CATEGORIES
- TYPICAL AMMUNITION CONTRACTORS
- THE CUSTOMER MARKETPLACE
- UNIQUE CHARACTERISTICS OF THE AMMUNITION AREA

MAJOR AMMUNITION CATEGORIES

THE LATEST FIVE YEAR CONVENTIONAL AMMUNITION HARDWARE PROGRAM FOR THE ARMY, NAVY, AIR FORCE, AND MARINE CORPS (FY80 - 84) TOTALS $8.3 BILLION. IT IS BROKEN DOWN INTO CATEGORIES, AS FOLLOWS:

- SMALL CALIBER AMMUNITION

  INCLUDES "SMALL ARMS" CATEGORY OF AMMUNITION SUCH AS 5.56MM, 7.62MM, 38 CALIBER, 45 CALIBER AND 50 CALIBER. A TOTAL OF ABOUT 1.8 MILLION ROUNDS OF THESE SIZES ARE PLANNED FOR PROCUREMENT IN FY80 - 84.

  THE BALANCE OF THE SMALL CALIBER AMMUNITION CATEGORY IS 20 - 40MM ROUNDS USED IN AIRCRAFT, HELICOPTERS, VEHICLES, SURFACE TO AIR GUNS, GRENADE LAUNCHERS, ETC.

- MORTARS

  INCLUDES 60MM, 81MM, AND 4.2" MORTAR SYSTEMS.

- TANK AMMUNITION

  INCLUDES AMMUNITION PRIMARILY FOR THE 105MM TANK GUN SYSTEM. SPECIFICALLY INCLUDED ARE HEAT, TP, AND ARMOR PIERCING ROUNDS, PROJECTED PROCUREMENTS OF THE 120MM AMMUNITION FOR THE XM-1 TANK ARE ALSO IN THIS CATEGORY.

MAJOR AMMUNITION CATEGORIES (CONT'D)

- ARTILLERY PROJECTILES

  INCLUDED IN THIS CATEGORY ARE 155MM, 5 INCH, AND 8 INCH ARTILLERY SYSTEMS. CARGO ROUNDS AND HIGH EXPLOSIVE ROUNDS ARE INCLUDED IN THIS CATEGORY. CARGO INCLUDES MINES AND M42/46 GRENADES. COPPERHEAD - - A LASER GUIDED ARTILLERY SOUND - - IS ALSO INCLUDED.

- ARTILLERY FUZES

  THESE ARE MECHANICAL, ELECTRO-MECHANICAL, OR ELECTRONIC FUZES FOR ARTILLERY ROUNDS. THE FUZES VARY IN OPERATION - - - POINT DETONATING, PROXIMITY, AND TIME SETTING.

- ROCKETS

  CONSISTS PRIMARILY OF 2.75 INCH ROCKETS. THE 70MM VIPER IS ALSO INCLUDED.

- IRON BOMBS/FUZES

  BOMBS INCLUDED IN THIS AREA RANGE FROM 25 POUNDS TO 2000 POUNDS. FUZES ARE MECHANICAL, ELECTRO-MECHANICAL, ELECTRONIC, AND PROXIMITY.

MAJOR AMMUNITION CATEGORIES (CONT'D)

- DISPENSERS/BOMBLETS

  INCLUDES THE ROCKEYE SYSTEM, TMD DISPENSER, BLU-63 BOMBLET, FUEL AIR EXPLOSIVE WEAPON, ACM, ETC.

- MINES

  INCLUDES M15 (ANTI-TANK) AND M18 (ANTI-PERSONNEL) HAND EMPLACED MINES. ALSO INCLUDED ARE ARTILLERY DELIVERED MINES - ADAM & RAAM, THE GATOR AIRCRAFT DELIVERED MINE SYSTEM, A VEHICLE DISPENSING MINE SYSTEM (GEMSS) AND A MODULAR PACK MINE SYSTEM (MOPMS).

TYPICAL AMMUNITION CONTRACTORS

- ☐ BULOVA (FUZES)
- ☐ EASTMAN KODAK (FUZES)
- ☐ HAMILTON (FUZES)
- ☐ LOCKHEED (FUZES)
- ☐ MOTOROLA (FUZES)
- ☐ AEROJET (SMALL CALIBER AMMO. MINES)
- ☐ CHAMBERLAIN (TANK AND ARTILLERY AMMO)
- ☐ FORD (SMALL CALIBER AMMO)
- ☐ NORRIS (ARTILLERY AND TANK AMMO)
- ☐ OLIN (PROPELLANT AND LAP)
- ☐ AVCO (BOMBLETS)
- ☐ MARTIN (BOMBLETS)
- ☐ HUGHES (MINES)

CUSTOMER MARKETPLACE

- ☐ ARMY
  - – DCSRDA
  - – ARRADCOM
  - – MICOM
  - – ARRCOM
  - – PROJECT MANAGERS (FVS, XM-1, AAH)
  - – DARCOM HQ
  - – ASST. SECY. OF ARMY, RDA
- ☐ NAVY
  - – NWC/CHINA LAKE
  - – NSWC/DAHLGREN
  - – NSWC/WHITE OAK
- ☐ OSD
  - – OUSDRE
- ☐ PRIME CONTRACTORS
  - – MARTIN (COPPERHEAD FUZE)
  - – GENERAL DYNAMICS (DIVADS)
  - – HUGHES HELICOPTERS (AAH)
  - – CHAMBERLAIN (AMIS)
  - – GENERAL ELECTRIC (GAU-8, GAU-12, & 505A3E2)
- ☐ AIR FORCE
  - – EGLIN
  - – OGDEN
  - – AFSC HQ
  - – TAC
  - – AF HQ
- ☐ CONGRESS
  - – HASC
  - – SASC
  - – HAC
  - – SAC

UNIQUE CHARACTERISTICS OF THE AMMUNITION AREA

- ☐ DOD SINGLE MANAGER FOR CONVENTIONAL AMMUNITION
- ☐ DOMESTIC WEAPON SYSTEMS INTERFACES AND NATO RSI
- ☐ IN THE AMMUNITION INDUSTRY THERE IS SIGNIFICANT MILITARY INVOLVEMENT IN THE FORM OF ARMY AMMUNITION PLANTS. FY'80 AMMO PROCUREMENT FUNDING FOR THE COCO AND GOCO FACILITIES IS AS FOLLOWS:
  - COCO'S: $575M
  - GOCO'S: $500M
- ☐ IN GENERAL, PRIVATE INDUSTRY AND ARMY AMMUNITION PLANTS SPLIT THE BUSINESS AS FOLLOWS:

PRIVATE (COCO)	GOCO	GOGO
– FUZES	– PROPELLANTS & EXPLOSIVES	– CHEMICAL LOADING
– METAL PARTS	– SMALL ARMS AMMO	– LAP (20%)
– CARTRIDGE CASES	– LAP (80%)	
– BOMBLETS	– LARGE CALIBER SHELLS	
– SOME LAP		

TASK FORCE ON INDUSTRIAL RESPONSIVENESS

UNIQUE CHARACTERISTICS OF THE AMMUNITION AREA

THE DOD SINGLE MANAGER FOR CONVENTIONAL AMMUNITION (SMCA) IS LOCATED AT THE ARMY'S ARMAMENT MATERIEL READINESS COMMAND IN ROCK ISLAND, ILLINOIS.

MAJOR GENERAL BILL EICHER IS THE COMMANDING OFFICER OF ARRCOM, AS WELL AS BEING THE SINGLE MANAGER FOR CONVENTIONAL AMMUNITION. AS SUCH, HE WAS INSTRUCTED ON 26 NOVEMBER 1975, BY THE DEPUTY SECRETARY OF DEFENSE, TO "BEGIN IMMEDIATE ACTION TO INTEGRATE PLANNING FOR AND JOINT USE AND MODERNIZATION OF DOD AMMUNITION PLANTS AND FACILITIES". (DOD DIRECTIVE 5160.65).

AMMUNITION MUST INTERFACE WITH VARIOUS WEAPON SYSTEMS - REQUIRING CLOSE COORDINATION OF WEAPON SYSTEM CHARACTERISTICS AND THE AMMUNITION THEY UTILIZE.

FOR INSTANCE, MINES MUST BE ABLE TO WITHSTAND THE ENVIRONMENTS OF BEING LAUNCHED FROM ARTILLERY PROJECTILES, DROPPED FROM AIRCRAFT DISPENSERS, AND DISPENSED FROM GROUND VEHICLES. FUZES MUST BE CAPABLE OF MATING WITH BOMBS, DISPENSERS, ARTILLERY ROUNDS, SMALL CALIBER PROJECTILES, ETC. AND STILL FUNCTION RELIABLY EITHER PRIOR TO, OR AT, TARGET IMPACT.

INTERFACES ARE BEING REQUIRED OF AMMUNITION IN THE U.S. BEING CAPABLE OF USE IN NATO GUN SYSTEMS. AN EXAMPLE WOULD BE THE 30MM AMMUNITION DEVELOPED IN THE U.S. FOR THE 30MM GUN UTILIZED ON THE ADVANCED ATTACK HELICOPTER. THIS AMMUNITION IS ALSO CAPABLE OF BEING FIRED FROM THE FRENCH DEFA GUN SYSTEM UTILIZED ON THE MIRAGE, AND OTHER AIRCRAFT. THE 30MM AAH AMMUNITION MUST ALSO BE CAPABLE OF BEING FIRED FROM THE ENGLISH ADEN GUN SYSTEM - NOW UTILIZED ON VARIOUS AIRCRAFT, INCLUDING THE MARINE CORPS AV 8-A HARRIER.

UNIQUE CHARACTERISTICS OF THE AMMUNITION AREA (CONT'D)

THE LAP (LOAD, ASSEMBLE, AND PACK) OF AMMUNITION HAS HISTORICALLY BEEN DONE IN GOCO'S (SUCH AS LAKE CITY) OR TO A LIMITED DEGREE IN GOGO FACILITIES. MORE RECENTLY PRIVATE INDUSTRY IS HANDLING LAP OF SELECTED AMMUNITION (OLIN-30MM GAU-8; FORD-25mm BUSHMASTER; HONEYWELL-30MM AAH AMMO). WHEN WE USE THE TERM "LOAD," WE ARE REFERRING TO THE LOADING OF THE MUNITION WITH A HIGH EXPLOSIVE.

NUMBER OF FACILITIES		DEFINITIONS	ARMY INVESTMENT
115	COCO	- COMMERCIALLY OWNED LAND, BUILDINGS AND EQUIPMENT. COCO OPERATION MAY HAVE LARGE QUANTITIES OF GOVERNMENT OWNED EQUIPMENT.	$800M
5	GOGO	- GOVERNMENT OWNED LAND, BUILDINGS AND EQUIPMENT OPERATED BY THE GOVERNMENT.	$ 3B
25	GOCO	- LAND, BUILDINGS AND EQUIPMENT GOVERNMENT OWNED. A PRIVATE CONTRACTOR OPERATES, MAINTAINS.	$15B

12 - ACTIVE PROD.
12 - INACTIVE (STANDBY)
1 - UNDER CONSTRUCTION

INDUSTRIAL READINESS ENVIRONMENT IN THE MUNITIONS AREA

THIS SECTION OF THE PRESENTATION ADDRESSES THE STATUS, AND UNIQUE ASPECTS, OF INDUSTRIAL READINESS IN THE MUNITIONS (AMMUNITION) MARKETPLACE. SPECIFIC TOPICS COVERED INCLUDE:

- COMBAT SCENARIO
- AMMUNITION STOCKPILES
- AMMUNITION ACQUISITION POLICIES

COMBAT SCENARIO

THERE IS NO CLEAR NATIONAL POLICY IN THE U.S. AS TO WHAT KIND OF WAR (WARS) WE SHOULD PREPARE FOR, WHERE THE WAR WILL BE, LONG VS. SHORT WAR, ETC.

THE MORE RECENT "SHORT WAR" PHILOSOPHY POSTULATES THAT ANY WAR SITUATION THAT WE ENCOUNTER, OR SUPPORT, WILL BE OVER IN 30, 60, OR 90 DAYS. SUCH THINKING LEADS TO PROCURING AMMUNITION ONLY FOR THIS PERIOD OF TIME - - - SINCE THAT WILL BE THE PERIOD OF CONSUMPTION. THERE ALSO IS NO NEED FOR ESTABLISHMENT OF LARGE MOBILIZATION BASES FOR NEW ITEMS, SINCE THEY WOULD NOT BE REQUIRED.

AMMUNITION STOCKPILES

- ☐ NO AGREED UPON UNIVERSAL POLICY
- ☐ DOD GUIDELINES ARE NOT PRACTICAL
  - STOCKPILE TO REACH LEVEL SUFFICIENT FOR 90 DAYS CONSUMPTION (SHORT WAR) (AAH AMMO)
  - INDUSTRIAL PREPAREDNESS PLANNING ASSUMES 180 DAY LEADTIME TO REACH WARTIME CONSUMPTION RATES.
  - U.S. AMMO STOCKPILES OVERSEAS CAN NEVER EXCEED TOTAL STOCKPILES OF OUR ALLIES.
- ☐ CURRENT FUNDING LEVEL IN FIVE YEAR DEFENSE PLAN (FYDP) FOR FY81-85 DOES NOT ACHIEVE 90 DAY STOCKPILE LEVELS.
- ☐ CONDITION OF THE INVENTORY IS QUESTIONABLE

AMMUNITION ACQUISITION

- IN 1977, OSD CHANGED DEFENSE POLICY REGARDING PRODUCTION BASE:

  1945 - 1977: SIZE PRODUCTION BASE AT 1/8/5 TO MEET MOBILIZATION REQUIREMENTS

  1977 - 1980: SIZE PRODUCTION BASE TO MEET FYDP REQUIREMENTS

AMMUNITION ACQUISITION

THE "SHORT WAR" PHILOSOPHY HAS BROUGHT WITH IT THE DEFENSE POLICY, SINCE 1977, OF SIZING THE PRODUCTION BASE (FACILITIZATION) TO MEET THE FIVE YEAR DEFENSE PLAN (FYDP) REQUIREMENTS.

THIS POLICY HAS SEVERAL RESULTS:

1. THE SERVICES CAN ESTABLISH ONLY ONE PRODUCTION SOURCE IF THAT FACILITY CAN MEET THE FYDP REQUIREMENTS BY RUNNING AT MULTIPLE SHIFT CAPACITY.

2. SURGE CAPABILITY IS CONSEQUENTLY REDUCED. AN INDIVIDUAL SUPPLIER RUNNING ALREADY ON A 2 OR 3 SHIFT CAPABILITY CANNOT SURGE HIS LINE AS MUCH AS IF HE WAS ONLY OPERATING ON A 1/8/5 BASIS (1 SHIFT, 8 HOURS, 5 DAYS A WEEK).

3. THE SERVICES ARE NOT ALLOWED TO ESTABLISH MULTIPLE PRODUCTION SOURCES TO RUN AT 1/8/5 (OR MSR - MINIMUM SUSTAINING RATE) TO MEET FYDP REQUIREMENTS.

ISSUE THERE IS NO CLEAR NATIONAL POLICY REGARDING READINESS.

DISCUSSION

WHEN THERE IS NOT A CLEAR NATIONAL POLICY ON READINESS, THERE EXISTS LATITUDE FOR VARIOUS DOD DEPARTMENTS TO PUSH FOR FUNDING OF THEIR FAVORITE PROGRAMS TO MEET THE "THREAT". THE SAME IS TRUE OF THE VARIOUS CONGRESSIONAL UNITS:

- o HOUSE APPROPRIATIONS COMMITTEE
- o SENATE APPROPRIATIONS COMMITTEE
- o HOUSE ARMED SERVICES COMMITTEE
- o SENATE ARMED SERVICES COMMITTEE

WITH OVER 17,000 CONGRESSIONAL STAFF MEMBERS, THERE EXISTS THE CAPABILITY TO INCREASINGLY GET INTO "MICRO-MANAGEMENT" OF LINE ITEMS IN THE VARIOUS BUDGET REVIEWS. IN THE MUNITIONS AREA, ESPECIALLY IN THE PAST TWO YEARS, WE HAVE SEEN INCREASING INVOLVEMENT BY CONGRESSIONAL UNITS IN RECOMMENDING CUTS OR CANCELLATIONS OF SPECIFIC MUNITION PROGRAMS. WITH NO CLEAR POLICY OR PROGRAM PLANS TIED IN TO READINESS, THERE EXISTS AN ENVIRONMENT FOR CONGRESSIONAL MICRO-MANAGEMENT DURING BOTH THE "AUTHORIZATION" AND "APPROPRIATIONS" BUDGET REVIEW CYCLES.

THE CONSEQUENCES OF THIS ACTIVITY INCLUDE DISRUPTION OF PLANNING BY THE SERVICES AND DOD, LACK OF PRODUCTION PROGRAM STABILITY, AND RESULTING DIS-INCENTIVES FOR CONTRACTORS TO CONTINUE IN DEFENSE WORK.

RECOMMENDATIONS

THE SKETCH AT THE BOTTOM OF THIS VIEWGRAPH SHOWS A MAN REACHING A FORK IN THE ROAD -- UNCERTAIN OF THE ROAD TO TAKE. WE BELIEVE THAT READINESS PLANNING IS AT THAT CROSS-ROAD. WE MUST CHOOSE WHAT PATH TO FOLLOW - WHICH MEANS FORMING A CLEAR, REALISTIC NATIONAL POLICY ON READINESS, AND THEN FOLLOWING IT VIGOROUSLY.

WE BELIEVE THAT THE TIME IS AT HAND TO DEVELOP A REALISTIC NATIONAL POLICY AND THEN TAKE APPROPRIATE ACTION TO HAVE THIS POLICY ENDORSED AND SPONSORED BY THE EXECUTIVE AND LEGISLATIVE BRANCHES OF GOVERNMENT, THE DEPARTMENT OF DEFENSE, DEPARTMENT OF STATE, ETC. WITHOUT SUCH POLICY ACTION, PLANNING---BASED ON CONTINUALLY CHANGING POLICY DIRECTIVES--- WILL NOT SOLVE THE PROBLEM OF ESTABLISHING AN ADEQUATE FORMULATION OF INDUSTRIAL RESPONSIVENESS.

ISSUE VALUE OF MOBASE AGREEMENT FOR READINESS

PROBLEMS

MOBILIZATION BASE AGREEMENTS ARE GOOD AS A PLANNING MECHANISM TO PROVIDE SOME INDICATION OF THE STATUS OF MOBILIZATION EQUIPMENT THAT IS EITHER IN LAY-AWAY OR PRESENTLY BEING USED FOR PRODUCTION OF A MUNITION. WE HAVE NEVER SEEN ANY GOVERNMENT ACTION RESULT FROM OUR ANNUAL SUBMITTAL OF THE MOBILIZATION 1519 FORM.

THE MOBILIZATION AGREEMENTS ARE NOT BINDING ON EITHER THE CONTRACTOR OR THE GOVERNMENT. AS A RESULT, THE WHOLE PROCESS LACKS ANY REAL EFFECTIVENESS IN ACHIEVING READINESS OF INDUSTRIAL FACILITIES.

RECOMMENDATIONS

THE ARMY IS PRESENTLY CONSIDERING A "READINESS KIT" CONCEPT WHICH WOULD INCLUDE THE FOUR AREAS INDICATED IN THIS VIEWGRAPH. BY PUTTING TOGETHER A "KIT" FOR READINESS, WHICH CARRIES CONTRACTUAL OBLIGATIONS, WE BELIEVE THE WHOLE PROCESS OF MOBILIZATION AGREEMENTS CAN BE SUBSTANTIALLY STRENGTHENED.

THE "KIT" WOULD CONSIST OF THE ITEMS INDICATED IN THE VIEWGRAPH AND WOULD BE CONTRACTUALLY COVERED IN EITHER A BASIC ORDERING AGREEMENT (BOA), A FACILITIES CONTRACT, OR A LETTER CONTRACT.

INACTIVE MOBILIZATION BASES

REQUIRED INITIAL DELIVERY	INITIAL DELIVERY - CURRENT STATUS
M + 4	M + 7 TO 12

ACTION NECESSARY TO MEET MOBILIZATION REQUIREMENTS

- ☐ STOCKPILE RAW MATERIAL
- ☐ STOCKPILE KEY PARTS & ASSEMBLIES
- ☐ UPDATE EQUIPMENT, TOOLING, PROCESSES TO CURRENT TECH DATA
- ☐ REHAB EQUIPMENT WHERE REQUIRED
- ☐ FILL EQUIPMENT AND TOOLING VOIDS
- ☐ ESTABLISH PRODUCTION LINE
- ☐ UPGRADE TO MEET SAFETY AND ENVIRONMENT REQUIREMENTS
- ☐ SAME DEGREE OF PLANNING, KEY SUBCONTRACTORS

INACTIVE MOBILIZATION BASES

THIS VIEWGRAPH DEPICTS THE ACTIONS NECESSARY AT HONEYWELL TO MEET THE MOBILIZATION REQUIREMENTS FOR INITIAL PRODUCTION (M+4) ON 8 MUNITIONS WHERE THE PRODUCTION EQUIPMENT IS NOW IN LAY-AWAY. THE INITIAL DELIVERY TIME INDICATED ON THE RIGHT SIDE OF THE VIEWGRAPH IS A COMPOSITE OF THE MONTHS INDICATED ON THE 8 INDIVIDUAL 1519 FORMS THAT ARE REQUIRED BEFORE BEGINNING PRODUCT DELIVERY AFTER "M" DAY (WHEN MOBILIZATION IS DECLARED) - ASSUMING NO INDUSTRIAL PREPAREDNESS ACTIONS ARE TAKEN.

BY TAKING THE INDUSTRIAL PREPAREDNESS ACTIONS INDICATED AT THE BOTTOM OF THE VIEWGRAPH, AND WITH PRE-IDENTIFIED FUNDING AVAILABLE AT A SPECIFIC TIME PRIOR TO M-DAY, THEN THE MOBILIZATION REQUIRED DELIVERY DATE OF M+4 CAN BE ACHIEVED.

ISSUE FULL CAPABILITY CONTRACTORS TEND TO BE NON COST COMPETITIVE

DISCUSSION

BECAUSE OF HIGH OVERHEAD RATES GENERATED FROM HAVING AN R&D BASE AND ASSOCIATED TECHNICAL, PRODUCTION ENGINEERING, SUPPORT TO PRODUCTION, TESTING, AND RELATED CAPABILITIES, THE FULL CAPABILITY CONTRACTOR IS NOT CAPABLE OF "EQUAL" PRICE COMPETITION WITH "SPECIALTY" PRODUCTION FACILITIES. SUCH SPECIALIZED ELECTRONIC OR MECHANICAL PRODUCTION FACILITIES GENERALLY HAVE LITTLE, IF ANY, TECHNICAL STAFFS, AND ALL OF THE OTHER FUNCTIONS OF A FULL CAPABILITY CONTRACTOR.

1980
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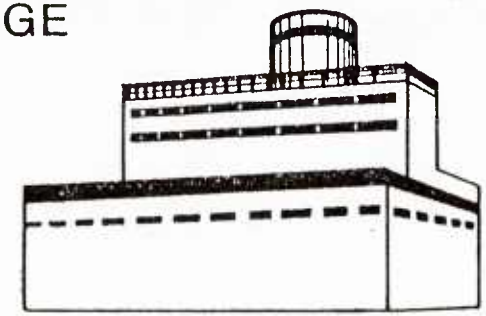
RECOMMENDATIONS:

- ☐ UTILIZE EVALUATION FACTOR IN COMPETITIVE PRODUCTION PROCUREMENT FOR PAST PERFORMANCE ON SIMILAR MUNITION PROGRAMS
- ☐ UTILIZE EVALUATION FACTOR FOR DEVELOPMENT CAPABILITY ON ITEM BEING COMPETITIVELY SOLICITED FOR PRODUCTION
- ☐ AWARD 1ST PRODUCTION OF AN ITEM TO THE INDUSTRIAL AMMUNITION DEVELOPER
- ☐ IN APPROPRIATE COMPETITIVE PRODUCTION SITUATIONS, PROCUREMENT SHOULD BE BASED ON A PERFORMANCE SPECIFICATION RATHER THAN A TECHNICAL DATA PACKAGE



RECOMMENDATIONS

RELATIVE TO RECOMMENDATIONS FOR IMPROVING THE PRODUCTION COMPETITIVENESS OF A FULL-CAPABILITY CONTRACTOR, THIS VIEWGRAPH COULD BE RE-STATED AS FOLLOWS:

- INCREASE THE INCENTIVE FOR A CONTRACTOR TO REMAIN IN THE MUNITIONS R&D BUSINESS. THIS COULD BE ACCOMPLISHED AT LEAST IN PART BY ESTABLISHING STRONGER POLICY REQUIRING THE 1ST PRODUCTION BE DIRECTED TO THE DEVELOPING CONTRACTOR.

- ESTABLISH AN EVALUATION FACTOR FOR THE R&D CONTRACTORS THAT WOULD ACT AS A PRICE EQUALIZER WHEN THE R&D CONTRACTOR IS PLACED IN PRICE COMPETITION WITH THE NON R&D HOUSES. SUCH A FACTOR WOULD REDUCE THE R&D CONTRACTOR EVALUATED PRICE BY AN AMOUNT THAT EQUATES TO HIS COST FOR CONDUCTING R&D.

ISSUE: INCENTIVES FOR PRIME CONTRACTORS

PROBLEM/DISCUSSION:

- ☐ UNCERTAINTY OF MAJOR PROGRAM CONTINUITY
- ☐ UNCERTAIN LONG TERM MOBASE REQUIREMENTS AND PRIORITIES
- ☐ NO ADVANCED FUNDS FOR MAJOR LONG LEAD EQUIPMENT AND RECURRING MATERIAL
- ☐ HIGH CAPITAL INVESTMENT REQUIREMENTS WITH UNCERTAIN RETURN

ISSUE INCENTIVES FOR PRIME CONTRACTORS

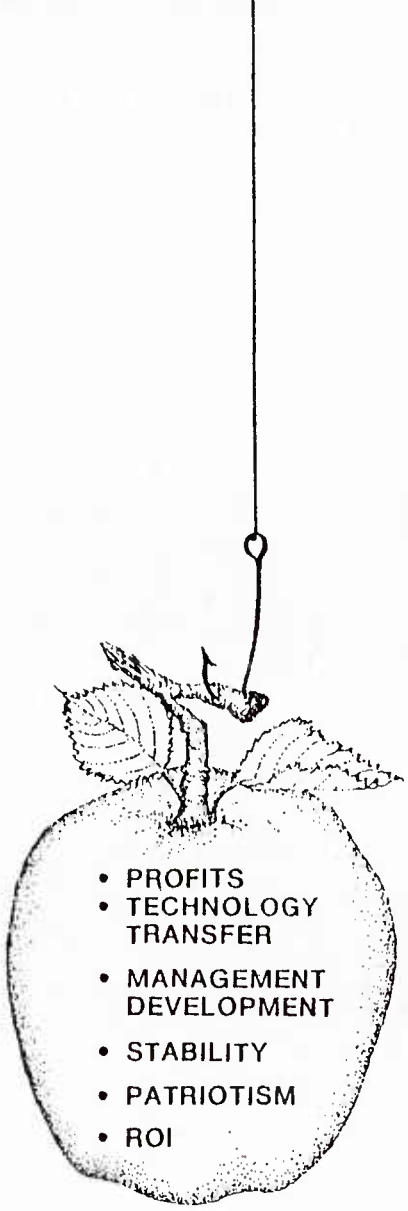
PROBLEM/DISCUSSION

IN THE MUNITIONS MARKETPLACE, THE INCENTIVES FOR PRIME CONTRACTORS TO STAY IN DEFENSE WORK ARE CONTINUALLY FLUCTUATING. THE RECENT TREND TOWARD FIXED PRICE CONTRACTING ON DEVELOPMENT CONTRACTS IS CERTAINLY AN EXAMPLE OF A VERY NEGATIVE INCENTIVE FOR PRIME CONTRACTORS.

PROBABLY THE GREATEST PROBLEM IN THIS AREA IS NEVER KNOWING HOW SOLID A PROGRAM WILL BE IN TERMS OF GOING THE FULL CYCLE FROM ENGINEERING INTO VOLUME PRODUCTION. THIS HAS EFFECTS ON CAPITAL INVESTMENT, ADVANCE FUNDING OF VARIOUS PROGRAM PHASES, PROFIT INVESTMENTS, AND WHAT RETURNS THE CONTRACTOR WILL RECEIVE IN TERMS OF PROFIT, ROI, ETC.

RECOMMENDATIONS:

- ☐ SELECT, PRIORITIZE, QUANTIFY AND COMMIT TO MOBASE ITEMS
- ☐ PROVIDE ADVANCED FUNDING FOR LONG LEAD EQUIPMENT AND RECURRING MATERIAL
- ☐ STABILIZE PRODUCTION PLANS TO ENCOURAGE INDUSTRIAL CAPITAL PLANNING
- ☐ USE OF MULTI-YEAR CONTRACTS
- ☐ OFFER CAPITAL PROTECTION CLAUSES FOR FACILITIES AND EQUIPMENT



RECOMMENDATIONS

ANY RECOMMENDATIONS FOR IMPROVING INCENTIVES TO BE IN DEFENSE WORK MUST CONSIDER THOSE KEY FACTORS THAT INFLUENCE INDUSTRIAL COMMITMENT TO DEFENSE ACTIVITY:

- GOOD PROFITS
- ABILITY TO WORK IN NEW TECHNOLOGY AREAS, WHERE SPECIFIC TECHNOLOGY BREAKTHROUGHS CAN BE TRANSFERRED TO THE COMMERCIAL MARKETPLACE.
- MANAGEMENT DEVELOPMENT - THE DISCIPLINES NECESSARY TO MEET DEFENSE PROGRAM SCHEDULES AND COST REQUIREMENTS CAUSE GOOD MANAGEMENT PERSONNEL TO EMERGE - WHO CAN THEN BE PROMOTED INTO OTHER CHALLENGING POSITIONS IN A LARGE COMPANY.
- STABILITY - A VERY IMPORTANT FACTOR FOR MEANINGFUL FORECASTS OF SPACE, MANPOWER NEEDS, EQUIPMENT, ETC.
- PATRIOTISM
- ROI - RETURN ON INVESTMENT

ISSUE: INCENTIVES FOR 2ND AND 3RD TIER SUBCONTRACTORS

PROBLEMS/DISCUSSION:

- ☐ SAME CONCERNS AS PRIMES, BUT ALSO:
- ☐ LACK OF EXPERTISE AND EXPERIENCE IN GOVERNMENT CONTRACTING
- ☐ SMALL SUBCONTRACTORS CANNOT AFFORD LARGE STAFFS TO HANDLE GOVERNMENT PAPERWORK AND COMPULSORY GOVERNMENT PROGRAMS
- ☐ CONCERN OF LOSING BUSINESS TO CUSTOMER OR OTHER VENDORS
- ☐ UNREALISTIC FLOWDOWN REQUIREMENTS

ISSUE INCENTIVES FOR 2ND AND 3RD TIER SUBCONTRACTORS

DISCUSSION

ONE OF THE DISCUSSION POINTS, NOT COVERED IN THIS VIEWGRAPH, IS THE USE OF GOCO FACILITIES AS SUBCONTRACTORS TO A SYSTEMS PRIME. UNDER A RECENT POLICY CHANGE, THE SINGLE MANAGER FOR CONVENTIONAL AMMUNITION HAS AUTHORIZED INDUSTRY OPERATORS OF GOVERNMENT PLANTS TO COMPETE FOR SUPPORT CONTRACTS TO A PRIME, USING THE GOVERNMENT PLANTS THAT THEY OPERATE. ON THE 120MM PROGRAM, WHERE HONEYWELL IS THE PRIME CONTRACTOR FOR ARRADCOM, WE HAVE RECENTLY CONCLUDED NEGOTIATIONS WITH HERCULES - THE INDUSTRIAL CONTRACTOR THAT RUNS RADFORD AAP. WE SEE WORKING WITH ARRCOM AND OTHER GOCO FACILITIES FOR LAP ON DIVADS, BUSHMASTER, ETC. AS A SPECIFIC NEW TREND IN THE AMMUNITION MARKETPLACE.

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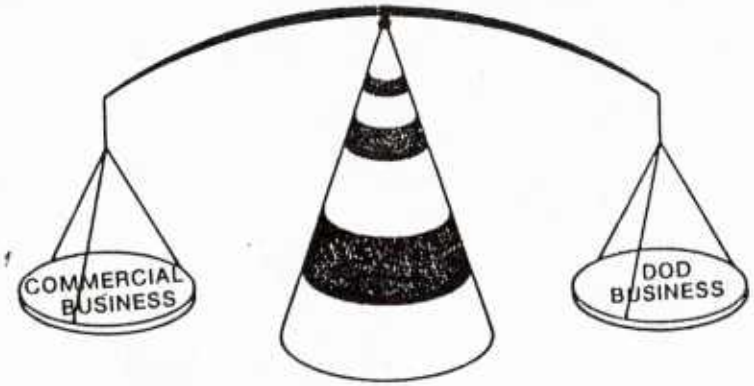


RECOMMENDATIONS:

- ☐ SAME AS PRIME CONTRACTOR FLOWED TO SUBCONTRACTORS, BUT ALSO:
- ☐ RELAX FLOW DOWN OF ALL BUT MOST NECESSARY REGULATIONS TO SMALL SUBCONTRACTORS
- ☐ ENCOURAGE PRIME AND FIRST TIER SUBCONTRACTOR FLOW THROUGH OF MULTI-YEAR CONTRACT, ADVANCED FUNDING, CANCELLATION PROTECTION, AND EPA CLAUSE BENEFITS TO LOWER TIER SUBCONTRACTORS
- ☐ ON SPECIALITY PRODUCTS, ALLOW SUBCONTRACTOR GREATER PROFITS THAN THE PRIME

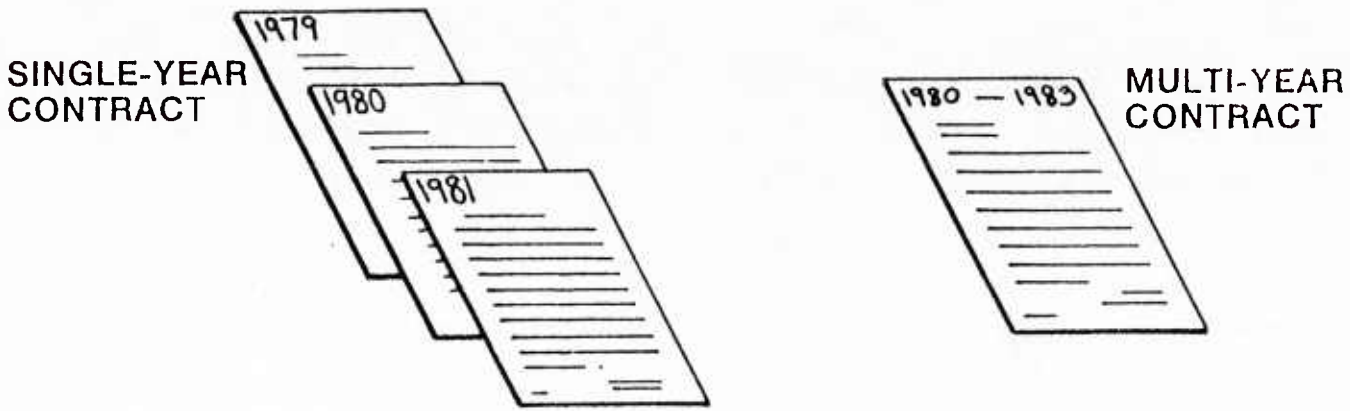
ISSUE: MULTI-YEAR CONTRACTING - MINOR CHANGES CAN RESULT IN READINESS AND COST SAVING IMPROVEMENTS

PROBLEMS/DISCUSSION:

- ☐ SINGLE YEAR PROCUREMENTS INCREASE PRODUCTION LEAD TIME AND COST
- ☐ STANDARD MULTI-YEAR CONTRACTING POLICY IMPROVES LEAD TIME AND REDUCES COST, BUT HAS UNDESIRABLE RECURRING COST RESTRICTIONS
- ☐ COST ESCALATION PROTECTION IS NECESSARY
- ☐ ONE YEAR FUNDING CYCLE NOT COMPATIBLE WITH LEAD TIME AND COST REDUCTIONS

RECOMMENDATIONS:

- ☐ USE MULTI-YEAR CONTRACTING FOR COST AND LEAD TIME REDUCTIONS
- ☐ OBTAIN NECESSARY DAR 1-322 POLICY CHANGES TO EXPANDED MULTI-YEAR CONCEPT WHERE APPROPRIATE
- ☐ PROVIDE ECONOMIC PRICE ADJUSTMENT CLAUSES IN MULTI-YEAR CONTRACTS
- ☐ CHANGE CONGRESSIONAL FUNDING CYCLE FROM ONE YEAR TO MULTI-YEAR TO ENHANCE CONTINUOUS COST AND LEAD TIME SAVINGS



RECOMMENDATIONS

THE KEY RECOMMENDATION THAT WE WOULD MAKE WITH REGARD TO MULTI-YEAR CONTRACTING IS THAT MULTI-YEAR BUDGETING BE DONE SO THAT FUNDING IS APPROVED OVER A 2 or 3 YEAR TIME PERIOD FOR A PARTICULAR MUNITION. IN THIS WAY, THE FULL ADVANTAGES OF MULTI-YEAR CONTRACTING COULD BE RECOGNIZED.

EXPANDED MULTI-YEAR PROCUREMENTS WOULD LIFT THE DAR 1-322 RESTRICTIONS, AND ENCOURAGE ECONOMIC MATERIAL BUYS, AS WELL AS ENCOURAGE THE USE OF MOST ECONOMIC MANUFACTURING RATES. MATERIAL, MANUFACTURING, AND ASSEMBLY FLOW WOULD BE CONTINUOUS AT THE MOST ECONOMIC RATE. THUS, MAXIMUM COST AND TIME SAVING WOULD BE REALIZED.

ISSUE FIRM FIXED PRICE DEVELOPMENT CONTRACTING TO PERFORMANCE SPECIFICATIONS

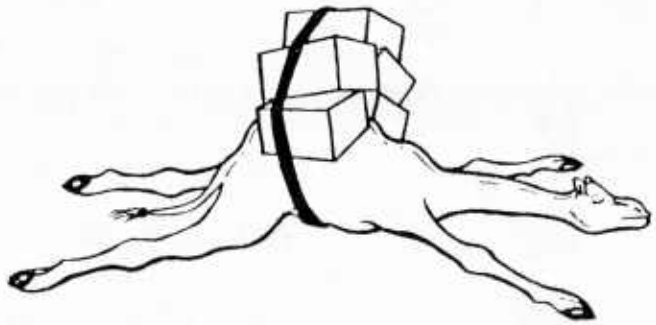
THIS TREND IN CONTRACTING FOR ENGINEERING DEVELOPMENT PROGRAMS CERTAINLY IS A DIS-INCENTIVE FOR CONTRACTORS TO STAY IN THE MUNITIONS BASE.

WE HAVE BID TO RFP'S WHERE PERFORMANCE REQUIREMENTS, RELIABILITY REQUIREMENTS, AND WARRANTIES MADE THE WHOLE PROPOSAL PROCESS VERY DIFFICULT. IN ADDITION, WHERE THE CONTRACTOR IS NOT SURE OF HIS POTENTIAL RISK, HE WILL BID A HIGHER PRICE TO THE GOVERNMENT TO PERFORM THE CONTRACT, IN ORDER TO HAVE SOME PROTECTION IN MEETING THE REQUIRED PERFORMANCE LEVELS.

ALL INCENTIVES FOR THE CONTRACTOR TO "PUSH" THE TECHNOLOGY AREA ARE TAKEN AWAY UNDER A FIXED PRICE DEVELOPMENT ENVIRONMENT.

RECOMMENDATIONS:

- ☐ GOVERNMENT/INDUSTRY REVIEW OF DEVELOPMENT STATUS AND POTENTIAL RISKS
- ☐ INDUSTRY COMMENTS ON DRAFT RFP
- ☐ UTILIZE COST-TYPE CONTRACTING FOR HIGH RISK ENGINEERING DEVELOPMENT PROGRAMS
- ☐ FIXED-PRICE DEVELOPMENT CONTRACTS SHOULD HAVE BOUNDED FINANCIAL RISK



RECOMMENDATION

WE WOULD RECOMMEND THAT THERE BE MORE GOVERNMENT/INDUSTRY DISCUSSION OF A PROPOSED RFP FOR THE FIXED PRICE ENGINEERING DEVELOPMENT OF A MUNITION. WE BELIEVE THAT THIS PROCESS COULD TAKE THE FORM OF EITHER A GOVERNMENT/INDUSTRY MEETING OR RELEASING OF A DRAFT RFP WITH THE ASSOCIATED PERFORMANCE REQUIREMENTS INDICATED, FOR COMMENTS BY INDUSTRY.

WE STILL BELIEVE THAT COST TYPE CONTRACTING IS NECESSARY FOR THOSE ENGINEERING DEVELOPMENT PROGRAMS WHICH HAVE A SUBSTANTIAL DEGREE OF TECHNICAL AND SCHEDULE RISK INVOLVED.

FINALLY, WHEN A FIXED PRICE DEVELOPMENT CONTRACT IS NEGOTIATED WITH INDUSTRY, THERE SHOULD BE A CLEAR INDICATION OF THE AREAS OF RISK, AND CLEAR UNDERSTANDING OF THE PERFORMANCE REQUIREMENTS, RELIABILITY REQUIREMENTS, AND ANY WARRANTIES THAT ARE INVOLVED. ESSENTIALLY, THIS PROVIDES A "BOUNDARY" AROUND THE FINANCIAL RISK THAT THE CONTRACTOR IS UNDERTAKING.

APPENDIX D

BASIC MATERIALS PANEL

PRESENTED

TO

THE DEFENSE SCIENCE BOARD TASK FORCE

ON

INDUSTRIAL RESPONSIVENESS

BY

GREGORY B. BARTHOLD
ALCOA

BASIC MATERIALS PANEL

Mr. Greg Barthold, Manager of Technical Programs for ALCOS and a member of the Task Force, organized and chaired a panel on basic materials, forgings and castings, and machine tools. Members of the Panel, in addition to Mr. Barthold, were:

Robert W. Atkinson	Executive Vice President Forging Industry Association
Ralph Cross	Chairman of Cross & Treacker, representing the National Machine Tool Builders Association
E. F. Andrews	Vice President, Allegheny- Ludlum Industries

A summary of the discussion is attached.

FORGING INDUSTRY ASSOCIATION

MR. ROBERT W. ATKINSON, EX. VP FIA, PRESENTED THE SITUATION IN THE FORGING BUSINESS TODAY, RECALLED PAST STUDIES ON DOD/FORGING INDUSTRY LEAD TIME PROBLEMS DONE IN 1969, AND MADE RECOMMENDATIONS FOR BOTH SHORT TERM AND LONG TERM SOLUTIONS.

HE CALLED FOR A "PARTNERSHIP" BETWEEN GOVERNMENT AND INDUSTRY AS CURRENTLY EXISTS IN OTHER COUNTRIES (JAPAN).

FORGING CAPACITY IS IN PLACE OR IS BEING ADDED TO MEET EMERGENCY NEEDS, HOWEVER THERE IS A SHORTAGE TODAY OF TITANIUM SPONGE WHICH HAS CAUSED THE APPARENT PROBLEM OF DELIVERIES.

RESTRICTIVE GOVERNMENT REGULATIONS ARE HURTING THE FORGING BUSINESS, OSHA AND EPA, THE NEED FOR DD633 COST BREAKDOWNS ON DOD BUSINESS, THE VINSON TRAMMEL ACT, ECONOMIC SANCTIONS AGAINST FOREIGN GOVERNMENTS, AND CONTRADICTORY POLICIES FROM DIFFERENT U.S. GOVERNMENT DEPARTMENTS. HE ADVISED THAT A STUDY FIA DID IN 1969 PREDICTED THE CURRENT PROBLEM. FIA IS AGAIN, THROUGH A QUESTIONNAIRE, SEEKING TO DETERMINE THE U.S. FORGING CAPACITY AND ITS ABILITY TO MEET WAR TIME REQUIREMENTS.

HE RECOMMENDED THAT FOR THE SHORT TERM:

- PROCUREMENT PLANS BE SHARED WITH INDUSTRY
- REDUCE PAPERWORK AND RED TAPE ASSOCIATED WITH DD633, VINSON TRAMMEL, EEOC
- PROVIDE SELECTED ADVANCE FUNDING

LONG TERM:

- MULTI-YEAR PROCUREMENT
- A SET ASIDE FOR TITANIUM
- DISCOURAGE OVERSEAS PROCUREMENT AND REINFORCE BUY AMERICA ACT
- ENCOURAGE MORE FORGING COMPANIES TO GET INTO THE AEROSPACE BUSINESS
- SUBSTITUTION R&D
- PROVIDE TAX INCENTIVES FOR BUSINESS

NATIONAL MACHINE TOOL BUILDERS ASSOCIATION

MR. RALPH CROSS, CHAIRMAN OF CROSS AND TREACKER, REPRESENTS THE NMTBA. HE CHARACTERIZED THE INDUSTRY AS FOLLOWS:

- $22,600,000,000 WORLD WIDE BUSINESS
- $3,900,000,000 1979 U.S. SHARE
- $5,500,000,000 VALUE OF 1979 ORDERS
- GERMANY (FRG) THE LARGEST AT $4,100,000,000; USSR AT $2,900,000,000

U.S. BACKLOG GOING UP MAINLY FROM DETROIT'S DOWN SIZING EFFORTS AND BOEING'S NEW PLANE ORDERS.

HE CRITIZED THE DOD EXISTING TRIGGER ORDER PROGRAM AND SUGGESTED THAT THE DIPEC INVENTORY OF MACHINE TOOLS WAS WORTHLESS AND SHOULD BE DISPOSED OF.

HE SAID THAT THE GOVERNMENT DOESN'T GET THE BEST SUPPLIERS FOR ITS MACHINE TOOL REQUIREMENTS DUE TO THE FACT THAT MANY MACHINE TOOL BUILDERS DON'T WANT TO BOTHER WITH GOVERNMENT BUSINESS. THEY KNOW THEY CANNOT COMPETE WITH A LARGER COMPANY THAT HAS SEGMENTED ITS VARIOUS BUSINESSES FOR ACCOUNTING PURPOSES -- SETTING ONE SEGMENT UP FOR CONTRACTING ONLY.

MR. CROSS STATED THAT THE MAJOR PROBLEM IN THE MACHINE TOOL BUSINESS WAS THE GROWING SHORTAGE OF SKILLED CRAFTSMEN BOTH TO BUILD THE MACHINE TOOLS AND OPERATE THEM.

THE STEEL AND TITANIUM INDUSTRY AND CRITICAL METALS

MR. E. F. ANDREWS, VP, ALLEGHENY LUDLUM INDUSTRIES, SPOKE ABOUT THE STEEL INDUSTRY'S DIFICULTIES IN OBTAINING THE ALLOYING ELEMENTS NEEDED FOR MAKING STAINLESS, SPECIAL PURPOSE, AND HIGH TEMPERATURE CORROSION RESISTANT STEELS. HE CHARACTERIZED THE SITUATION REGARDING THE AVAILABILITY OF THE ELEMENTS TO THE CURRENT OIL CRISIS. HE DESCRIBED SOUTH AFRICA AS THE "PERSIAN GULF OF METALS," AND WARNED OF THE SOVIET ENCIRCLEMENT OF THESE RESOURCES. HE CALLED FOR A NATIONAL MATERIALS POLICY FOR NON-FUEL MINERALS.

HE SAID BOTH ALLEGHENY LUDLUM AND U.S. STEEL ARE TRYING TO DIVERSIFY OUT OF THE STEEL BUSINESS. USS WOULD LIKE TO REDUCE ITS DEPENDENCE ON THE STEEL MARKET TO 40%. ALLEGHENY IS ALREADY DIVERSIFYING, E.G., THE RECENT PURCHASE OF WILKINSON LTD.

THE METAL INDUSTRY STARTS WITH A "HOLE IN THE GROUND," STEEL, TITANIUM AND ALUMINUM. BUT THESES ORES ARE NOT DISTRIBUTED TOO WELL. TITANIUM ORE -- RUTILE IS THE SEVENTH MOST PLENTIFUL ELEMENT. THERE SHOULD NOT BE A TITANIUM SHORTAGE. THESE SHORTAGES ARE CAUSED BY OUR GOVERNMENT AFFECTING SUPPLY AND DEMAND THROUGH CHANGES IN IMPORT/EXPORT POLICY AND TAX CREDITS. HE SAID THE PAST SHORTAGE IN MOLYBDENUM WAS CAUSED BY THE REMOVAL OF TAX CREDITS. HE CRITICIZED THE DOC AND THE STATE DEPARTMENT FOR REMOVING EXPORT CONTROLS ON STAINLESS STEEL SCRAP, THUS CAUSING THIS LOSS OF THE CHROME CONTENT IN THE SCRAP.

THE "DECOLONIZATION OF AFRICA" CAUSING AN INSTABILITY IN GOVERNMENTS IS PART OF THE PROBLEM. OUR REACTION TO THESE GOVERNMENTS IS THE OTHER PART. SANCTIONS ON SOUTH AFRICA AND RHODESIA ARE "STUPID" CONSIDERING THEIR AFFECT ON OUR ECONOMY AND NATIONAL SECURITY.

HE COMMENTED ON THE STATUS OF METALS IN THE STOCK-PILE. COBALT NOT BEING UP TO THE QUALITY NEEDED FOR MAKING THE STEELS AND HIGH TEMPERATURE METALS OF TODAY.

FURTHER WAGE AND PRICE CONTROLS CAUSE SHORTAGES. HE CITED THE DEMISE OF THE ZINC INDUSTRY AS AN EXAMPLE.

HE SAID THE STEEL INDUSTRY WHICH IS ESSENTIAL IS NOT WELL.

THE ALUMINUM INDUSTRY

THE BASIC METALS INDUSTRIES CAN BE CHARACTERIZED INTO THREE SEGMENTS:

1. MINING
2. REFINING, SMELTING, AND SCRAP RECLAIMATION
3. FABRICATION

BAUXITE MINING IS 95% OFF SHORE, HOWEVER THERE ARE OTHER ALUMINUM BEARING ORES SUCH AS ANORTHOSITE, ALUNITE, AND KAOLIN WHICH ARE LESS EFFECIENT TO REFINE BUT ARE LOCATED WITHIN THE UNITED STATES. CHEMICAL PROCESSES TO REFINE THESE ORES HAVE BEEN DEVELOPED TO THE EXTENT THAT THEY ARE READY FOR SCALE-UP TO FULL SIZE PLANTS. SMELTING OPERATIONS WHICH REQUIRE ELECTRICAL ENERGY ARE MOVING TO AREAS WHERE ENERGY IS MORE AVAILABLE, I.E., HYDRO IN BRAZIN AND BROWN COAL IN AUSTRAILIA.

THE UTILIZATION OF SCRAP AS A SOURCE FOR METAL IS BECOMING MORE AND MORE IMPORTANT SINCE IT CONSUMES BUT 5% OF THE ENERGY THAT IS REQUIRED TO ELECTRO CHEMICALLY PRODUCE VIRGIN METAL.

THE ALUMINUM INDUSTRY IS EXPANDING DOMESTICALLY TO MEET THE GORWING DEMAND IN THE AEROSPACE AND DEFENSE MARKETS. HEAD TREATED SHEET AND PLATE, FORGING AND EXTRUSION CAPACITY EXPANSIONS HAVE BEEN ANNOUNCED.

THE ALUMINUM INDUSTRY, AS WITH OTHER METALS, IS EXTREMELY CAPITAL INTENSE. CAPITAL FORMATION TO MODERNIZE AND EXPAND HAS BEEN A PROBLEM. THE ALUMINUM INDUSRY ALSO

USES THE ELEMENT OF SCALE TO COMPETE, LARGE PLANTS ARE NECESSARY TO OBTAIN LOWER COSTS.

THE BASIC METAL COMPANIES (ALUMINUM, STEEL, TITANIUM, COPPER, ETC.) ARE COMMERCIALLY ORIENTED DOING BUSINESS USING THE COMMERCIAL CODE. THEY SELL FROM PUBLISHED PRICE SCHEDULES ON A COMPETITION BASIS, BUT WHERE A SOLE SOURCE SITUATION OCCURS, THEY ARE NOT PREPARED TO HANDLE COST BREAKDOWNS (DD633). FURTHERMORE, THEY ARE NOT COVERED BY THE CASB (COST ACCOUNTING STANDARDS BOARD).

WHEN GOVERNMENT PLOS ATTEMPT TO USE DOD PROCUREMENT PRACTICES INCLUDING SUBCONTRACTOR COST AND PRICE ANALYSIS, A PROBLEM OCCURS WHICH COULD EASILY BE SOLVED BY UTILIZATION OF THE WAIVER PROVISIONS.

OTHER PROBLEMS OF THE BASIC METALS BUSINESS ARE UNIVERSAL TO AMERICAN INDUSTRY, E.G., LAGGING PRODUCTIVITY, AGING FACILITIES, FOREIGN COMPETITION, RESTRICTIVE ANTI-TRUST LAWS, AND THE NEED FOR A TAX POLICY THAT WOULD STIMULATE CAPITAL FORMATION.

THE ALUMINUM INDUSTRY HAS FORMED MANY CONSORTIA OVERSEAS TO DEVELOP ORE RESERVES, BUT HAS NOT BEEN ABLE TO EVEN CONSIDER SUCH JOINT VENTURES IN THIS COUNTRY DUE TO ANTI-TRUST POLICY.

SHORT TERM RECOMMENDATIONS FOR OSD CONSIDERATION:

- DOD SHOULD PAY ON TIME. CURRENT PAYMENT PERFORMANCE IS BETWEEN 70-85 DAYS WHILE STANDARD TERMS ARE NET 30 DAYS.

- DOD AND THE OTHER SERVICES SHOULD SHARE REQUIREMENTS WITH LOWER TIER SUPPLIERS.

- Modify DPS/DMS and educate on its use
- Stabilize market - multi-year funding
- Shorten procurement process

Long term recommendations:

- Establish ROI as profit yardstick
- Provide for attractive profit levels
- Balance socio-economic goals with national defense goals

SUBTIER SUPPLIER RESPONSIVENESS
AND
THEIR ABILITY TO RESPOND TO SURGE

PRESENTED

TO

THE DEFENSE SCIENCE BOARD TASK FORCE

ON

INDUSTRIAL RESPONSIVENESS

BY

JAMES F. DRAKE
HUGHES AIRCRAFT COMPANY

Subtier Supplier Responsiveness to Defense Procurement and Their Ability to Respond to Surge

In preparation for the 1980 DSB Summer Study on Industrial Responsiveness, the concerns of OSD on the substantial increases in lead time during the last several years and the perception of a critical contraction in the subtier defense industrial base were discussed with the Deputy Under Secretary of Defense for Research and Engineering (Acquisition Policy), Dale Church, and his staff. In order to provide focus on the most critical areas, the investigation was limited to electronics, castings and forgings, optics and microwave subsystems.

A specific in-depth analyses of subtier contractors for the fighter aircraft industry versus the competitive influences of the commercial industry for the subtier contractors, particularly in large forging and casting, was made by McDonnell Douglas. An in-depth analyses vertically in the semiconductor industry was made by Texas Instruments. Spot interviews in semiconductors were made by Lockheed in silicon valley. Hughes made a broad survey involving 27 subtier contractors in electronics (resistors, capacitors, semiconductors and connectors), small to modest size casting and forgings, optics and microwave subsystems.

This appendix specifically deals with the latter survey. The technique utilized was to provide the subtier contractors with the Task Force terms of reference and a questionnaire covering major issues impacting acquisition including availability of manufacturing and test equipment (life characteristics and replacement lead times), people, financial (ROI, depreciation), impact of government regulations and specifications, DoD vs. commercial marketplace, readiness for surge, etc. Twenty-seven responses were received: 15 from the electronics industry, 2 from casting contractors, 3 from forging contractors, 4 from optical sources and 3 from microwave sources. The electronics

lowered cost and increased capacity through automatic assembly. The problems are capital formation and unrealistic depreciation rates.

B. Conclusions: Of the industries addressed above, only the light casting and forging suppliers have remaining capacity for modest growth. The electronics industry is generally saturated but lacking in capital or the desire to risk capital in defense related product lines due to short runs and poor ROI. Projections for growth in the commercial marketplace in the next decade are enormous, demanding huge capital investment with high ROI. Defense will have difficulty competing for capital investment. The intensive use of assembly and test in the Far East and complete dependence on Japan for ceramic packages and carriers is a matter of considerable concern in the event of general war or a major conflict in the Pacific. The specialty optical industry is barely keeping up with military orders and has no margin for surge.

Question 2: What is Normal Life of Manufacturing and Test Equipment?

A. Responses:

(1) Light and Medium Forging Presses last 20-25 years with constant maintenance, periodic rehabilitation and updating.

(2) Casting equipment life is 3-5 years but is used longer due to inadequate depreciation schedules and inflation increasing cost of replacement.

(3) Optical manufacturing and test equipment life is normally about 10 years.

(4) Microwave manufacturing and test equipment lives are approximately 7 and 5 years respectively.

(5) Semiconductor manufacturing useful life varies from 5-8 years for processing and from 2-5 years for assembly and

test equipment. The useful life is determined more by technical obsolescence than wear-out.

(6) Resistors and Capacitors manufacturing and test equipment lives vary from 3-8 years and 4-8 years respectively. As equipment passes mid-life, it is relegated to less critical applications; as is semiconductors productivity and technology shortens useful life.

(7) Connectors manufacturing equipment life varies from a few years for second operations to 5-25 years for major machinery. Test equipment is generally good for 5-10 years. All of the above require significant maintenance in order to maintain the required close tolerances.

B. Conclusions: Technical obsolescence (producibility and design evolution) of electronic manufacturing and test equipment is incompatible with current depreciation schedules. Producibility improvements are suffering from the same dilemna.

Question 3: What is Average Lead Time to Acquire Manufacturing and Test Equipment? What Can be Done to Accelerate Availability?

A. Responses:

(1) Light and Medium Forge Presses can be procured in 18 months with little acceleration possible due to custom design. Brick and mortar for a new facility is 2 years. Test equipment is commercially available.

(2) Investment Casting manufacturing equipment is available in 4-8 months using "DX" priority.

(3) Optical manufacturing and test equipment can be obtained 6-12 months and 4-8 months respectively. Greater visibility of customer needs and advanced funding would improve deliveries.

(4) Microwave manufacturing equipment takes 2 months for bonders, 6 months for stereo microscopes and 2-2½ years for mills and lathes. The latter are largely made by family owned businesses, and the president of the Machine Tool Association of America has flatly stated they are not interested in doing business with the government due to red tape. Test equipment is available in a few months using "DX" priority.

(5) Semiconductor manufacturing equipment is available in 6-12 months depending on type and complexity with test equipment taking 8-12 months. "DX" priorities established at the time of the order from the prime can reduce lead times by 25-50%. Because of the increasing complexity of equipment requirements associated with the rapidly advancing technology, lead times can be expected to increase.

(6) Resistor and Capacitor manufacturing and test equipment lead times are from 4-12 months and 3-10 months respectively, depending on types and rate capacity.

(7) Connector manufacturing equipment lead times vary substantially between the suppliers from as little as 6-9 months to as much as 12-18 months. Similarly, test equipment varies from 6-18 months. There is no explanation for the wide variance.

B. Conclusions: Lead times vary from a few months to a year plus so long as machine tools are not involved (2-2½ years). "DX" priorities have cut lead times by as much as 50%. Advanced funding and improved planning can probably be as effective as "DX" priorities.

industry is principally characterized as big business (≈7% devoted to defense) while the small to medium casting and forging subcontractors and optical sources are in small specialty business category largely defense oriented. The microwave industry was primarily defense oriented, small specialty houses until recently, when it has blossomed out into the commercial marketplace (medical, automotive and food processing).

The following summarizes the responses to the questions by the subtier contractors, conclusions and recommendations where appropriate.

Question 1: Are You Presently Producing at or Near Capacity? What Are the Limiting Factors?

A. Responses:

(1) Light and Medium Forging/Presses (up to 35,000# drop hammer). The suppliers are running at 50-75% of capacity. Limiting factors were lack of orders, raw materials, die manufacturing capacity and personnel.

(2) Casting Industry is operating at 70-90% of capacity. Lead times have increased by about 50% in some cases because of anticipated commercial orders that have not, however, materialized. One plant is adding 35% in capacity.

(3) Optics Industry is operating at 90-100% capacity, including a two-shift, six-day week in one case. These are specialty houses dealing with precision laser and infrared defense peculiar requirements. Limiting factors in increasing capacity are skilled personnel, brick and mortar and capital equipment. Optical coatings are a black art and only one house was available at the time of this study.

(4) Microwave Industry is capacity limited because of product demand, production facility limitations and lack of engineering

personnel. Lead times have stretched by 25-30% and ROI is likely to favor the rapidly growing commercial market, previously noted, in the future due to high technology, short run defense orders.

(5) Semiconductor Industry is now highly commercial oriented (≈93%). JAN parts are built and tested in the U.S. and the facilities are saturated. Lower quality mil spec semiconductor chips are made in the U.S. with 90% of all assembly and test of end items accomplished in the Far East. Virtually all the ceramic caps and carriers are made in Japan. Assembly and test equipment are limiting for all types whether hi rel or mil spec. Personnel (engineering and technicians) and yield are critical issues for JAN parts. If wartime conditions forced assembly and test in the U.S. for all mil spec components, brick and mortar, assembly and test equipment and personnel would limit capability for 2-3 years. Finally, most of the semiconductor companies are dropping unprofitable low rate lines, many pertinent to older military systems and a number will no longer provide custom devices.

(6) Resistor/Capacitor suppliers are operating near or at capacity. Limiting factors are capital equipment, raw materials and trained personnel. Some tantalum and monolithic ceramic capacitor capacity is being added by one supplier.

(7) Connector Industry is at or near capacity with one exception. Limiting are capital equipment, machinists, toolmakers, short military runs of complex military connectors and subcontracting base. There appears to be a potential for

Question 4: Do You Have Critical Personnel Problems?

A. Responses:

(1) Only one company of the 27 reporting indicated it had no personnel problems

(2) Key shortages were in:

(a) all categories of engineers

(b) medium and high level electronic technicians

(c) tool and die makers, precision machinists

(d) hammer operators in the forging industry

(e) skilled assemblers

(f) trained opticians

(3) Problems included competition for scarce personnel between the primes and subs, instability of the defense marketplace (feast/famine) and spiraling wages/housing costs particularly in the sunbelt.

B. Conclusions:

(1) In spite of the recession, there are major shortages of skilled personnel in all areas.

(2) The Department of Labor program is not solving the problem.

(3) Only through a combination of increased automation (capital investment) and sharply focused training activity supported by DoD and/or the Department of Labor can this problem be resolved during the 80's.

Question 5: How Do You Suggest that Administrative Burdens Placed Upon You by Customers be Reduced, Particularly Those That Are Generated as a Result of Government Regulations and Requirement?

A. Responses:

(1) Everyone responding had strong comments.

(2) Typical were:

Eliminate DD 633 or DD 633-7 or raise dollar threshold. Cancel the Vinson-Trammell Act, the Service Contract Act, the CAS application to small business, the contract by contract survey teams, the value added taxation, the lot by lot government/customer in-process source inspection, the excessive data gathering on semiconductors for MIL "special parts," and eliminate redundant specifications, etc.

(3) It is clear everyone (prime and subs) are inundated with paper, social program requirements, OSHA, monitoring, justification, etc.

B. Conclusions/Recommendations:

(1) The government should certify subtier contractors annually for social program conformance.

(2) More realistic thresholds for DD 633 (from $100K to $500K) should be established and its use should be eliminated entirely in competitive bidding.

(3) Eliminate government source inspection at subtier level by annual evaluation of quality process control.

(4) Eliminate Vinson-Trammell Act.

(5) Streamline OSHA appeals procedures and review policies to induce more practical application.

(6) The primes should exercise greater discretion in passing through government specs, requirements, as well as special clauses.

Question 6: What Changes Would You Like to See in the Customer's Material Specification Techniques?

A. Responses:

(1) Comments by the responders were minimal - perhaps from exhaustion and lack of belief that anything will be done.

(2) Reduction of special marking, testing, screening, packaging, customer specs, closer tolerances, etc., i. e., use standard parts to standard mil specs.

(3) Use commercial parts when feasible.

(4) If unique part is required, use producers' current standard processes and procedures.

(5) Don't include non-relevant specs.

(6) Reduce the volume of specs.

(7) If unique part is required, buyout for entire program needs at one time.

B. Conclusions:

(1) Far greater emphasis needs to be placed on part standardization in new developments, but this standardization must be related to the time of production, not to what is being produced now.

(2) Buyout of unique parts for the entire program.

Question 7: Are You Required to Perform Tests That You Feel Are Unnecessary and Should be Eliminated?

A. Responses:

(1) Resistors and capacitors - one contractor questioned the value of temperature coefficient, inductance, x-ray and pre-cap inspections; others were resigned.

(2) Semiconductors - several questioned the need for both pull tests plus centrifugal tests, duplication of visuals, redundant testing and burn-in; one supplier felt specs and testing weren't keeping up with process improvements. Commercial quality assurance is almost entirely done by process control and sample testing, yet reliability is apparently comparable or better than that realized by mil spec testing.

B. Conclusions:

(1) Careful review of mil std testing should be made to determine if process control in today's technology would permit reduction in special testing.

(2) Duplicative-multiple source inspection is of questionable value.

Question 8: Would Elimination of Mil Std Testing Significantly Alter Availability?

A. Responses:

(1) Two respondents said yes - in essence, use commercial parts; delivery reduced from 6 months to 2-4 months.

(2) All other answers were essentially negative except for suggestions of critical review of alternative approaches, such as lot sampling, process control, etc.

B. Conclusions:

(1) Complete dropping of mil std testing for new systems is questionable.

(2) Spare parts without mil spec testing probably is viable.

(3) A critical review of mil spec testing is probably worthwhile.

(4) Use of plastic commercial semiconductors is probably not feasible, except in applications where there is a controlled ambient environment.

Question 9: What Changes Would You Like to See in the Government Approach to Depreciation and Tax Incentives?

A. Responses:

(1) Response was uniform in support of H. R. 4646 and S 1435 - principally 10-5-3 depreciation schedules.

(2) Emphasis was also placed on continuation and/or expansion of investment credit including all business capital assets.

(3) An appeal was made to make interest an allowable cost under government contracts.

(4) Electronics industry is particularly capital intensive and has an unusually high obsolescence rate due to 3-4 years technological change rate.

B. Conclusions:

(1) DoD should push for the improved depreciations' schedules.

(2) Productivity would be greatly enhanced by the above financial recommendations (interest, investment credit, depreciation).

Question 10: What Changes Would You Like to See in the Methods for Funding Military Business:

A. Responses:

(1) Let DoD contractors receive profits equal to commercial business.

(2) Stabilize procurement - multiyear procurement (helps in establishing backlog/bank loans).

(3) Increase progress payments (80/85% to 95/100%) and provide more and earlier billing milestones.

(4) Buyout of "life quantity" of non-standard parts.

(5) Long lead time funding.

(6) Economic adjustment clauses applicable to the contract.

B. Conclusions: If DoD contracts provide continuity and business profits equal to commercial sector, subtier contractors will make investments and support defense.

Question 11: Is There an Advantage to You If the Customer Contracts on a Multiyear Basis?

A. Responses: Virtually all respondees said:

(1) Yes, but prime and government must permit equitable economic adjustment clauses appropriate to the contract for the impact of labor, material and energy fluctuations outside the control of the supplier.

(2) Should reduce costs, provide stability, etc.

(3) Without clauses covering cost impacts outside the control of the subcontractor, the answer was negative.

B. Conclusions:

(1) The interest and investment in defense product lines by subcontractors would be enhanced by multiyear contracts.

(2) Multiyear contracts would help the subcontractors in obtaining bank loans.

Question 12: Do the Defense Materials and Defense Priorities Systems Assist You in Getting Material or Products?

A. Responses: 56% of the respondents found that the priorities system was unnecessary or too burdensome to be worthwhile. 16% found "DX" priorities had been useful in getting capital equipment. DO priorities were ineffective in improving quoted or actual delivery times. One supplier felt that the priority system value might change radically in times of crisis.

B. Conclusions: Defense priority system not particularly useful at subtier level except "DX" for capital equipment. A crisis situation might change picture, but still is questionable at DO level.

Question 13: Have You Given Thought to Coping With a Surge in Military Demand in the Event of International Crisis?

A. Response: Only a few of the suppliers have existing capability to surge. Most of the suppliers in the electronics industry would need additional capital equipment for assembly and for test and burn-in facilities. Current contracting procedures,

OSHA and social programs would have to be sacrificed in lieu of delivery performance. Evaluation of commercial components where applicable, further use of standard components would improve component availability.

B. Conclusions:

(1) Subtier contractors are not currently prepared to support surge.

(2) Multiyear contracts for mature system production programs to permit building backlog of components and subsystems would be a major help.

(3) Studies of parts substitution should be initiated where there is an opportunity to broaden the supplier base or to eliminate unique parts.

(4) Studies of capital facility/implementation are required.

Question 14: Would Captive Lines Financed by the Government Make Sense?

A. Responses: No. It would tend to perpetuate obsolete poorly maintained government equipment. Maybe for JAN parts, but needs much study. The financial considerations for capital investment make more sense.

B. Conclusion: Drop concept until unique situation shows benefit.

Overall Summary of Subtier Contractor Situation

1. Government regulations and paperwork, feast/famine procurement, short production runs and low ROI strongly favors the commercial marketplace when that alternative is available. The subtier contractors are far less inclined to provide custom devices in the semiconductor industry.
2. Problems in capital formation in general and particularly in government procurement is limiting capital investment.
3. Based on this survey, there is little potential for any significant surge in less than 2-$2\frac{1}{2}$ years. Depending on the area of conflict, some vital foreign sources would have to be built from scratch in the U. S.
4. To significantly change the above situation, the government must take action to:
   (a) improve capital formation through improved profitability of government contracts
   (b) provide advance payments, increase progress payments and/or provide more billing milestones to aid cash flow during times of high inflation and high interest rates
   (c) utilize multiyear contracts with appropriate EPA and energy clauses
   (d) improve depreciation schedules and allow for inflation and higher cost of replacement of equipment
   (e) encourage capital investment for productivity improvements
   (f) increase defense stability so that the prime contractors can provide better planning data to the subcontractors
   (g) reduce the regulatory burdens imposed on government contracts
   (h) be more prudent and less aggressive in application of OSHA and social programs

(i) take positive action to increase the training of skilled personnel from blue collar workers, precision machinists, tool and die makers, skilled electrical and optical technicians to all categories of the engineers either by paying contractors or through the Department of Labor.

THE ELECTRONICS BASE - VENDOR SURVEY

PRESENTED

TO

THE DEFENSE SCIENCE BOARD TASK FORCE

ON

INDUSTRIAL RESPONSIVENESS

BY

JERRY JUNKINS
TEXAS INSTRUMENTS

THE ELECTRONICS BASE - VENDOR SURVEY

My presentation on the electronics base will cover two areas. First a general vendor survey that we took in June in preparation for an NSIA panel participation on the subject of diminishing manufacturing resources. This survey was supplemented with a questionnaire in July and I'll cover the results of those details. The second part of the presentation will be a brief summary of the semiconductor industry support of military programs.

During our survey, we contacted our major subcontractors supplying microwave components, connectors, semiconductors, power supply tubes, rotary components and casting houses. The questions we asked were relative to company plans and supply of Mil Spec components in 1982-1990 timeframe, the major barriers in being a supplier of Mil Spec components, what action could be taken by the government or major customers to increase their participation in Mil Spec, and what could TI do to encourage your or other companies to insure you remain as a viable supplier of Mil Spec components.

ELECTRONICS BASE

- General Vendor Survey

- Semiconductor Industry support of Military Programs

SLIDE

In the follow-up questionnaire we asked several questions. First, "Indicate impact on improving attractiveness for the defense marketplace to your company in the following areas?"

Ranking by the highest impact, profitability, relief of strict requirements and specifications, protecting subcontractors from government and prime paperwork systems, allowability of interest and abnormal escalation clauses were the top items.

SURVEY

CONTACTED

- Microwave components
- Connector
- Semiconductor
- Power display tubes
- Rotary component
- Casting houses

QUESTIONS

- Company plans in supply of Mil Spec components, 1982-1990 timeframe. Will resource and capital investments increase or decrease?
- Major barriers in being supplier of Mil Spec equipment/components.
- What action could be taken by government or major customers to increase your participation in Mil Spec?
- What could TI do to encourage your, or other companies, to insure you remain as a viable supplier of Mil Spec components?

SLIDE

All respondents planned to stay in the military supply business. Resource and capital investment will be conservative but will be made to support market and profit opportunities and, in general, investments will increase during the next two to five years due to their perception of increased spending by DoD and other agencies. From the responses, I believe a good summary is that most intend to modestly invest but I did not get the feeling that there would be major investments to significantly increase capacity or improve productivity.

RESPONSES

- Plans for 1982-1990 timeframe
    - All respondents plan to stay in Mil supply business.
    - Resource and capital investment will be conservative but will be made to support market and profit opportunity.
    - Investments will increase during the next 2-5 years due to increased spending by DOD, other agencies.

SLIDE

This slide lists the barriers that vendors felt they face in being a supplier of Mil Spec components or equipment. The increased government regulations, restriction of sources, process documentation, fragmented procurement policies, lack of visibility in the total product requirements, excessive paperwork, small and erratic orders and excessive specifications.

RESPONSE

- BARRIERS
  - Increase in government regulations
  - Qualified team to generate and police standard Mil Specs
  - Restriction of supply sources (vendors)
  - Process documentation
  - Fragmented procurement policy
  - Lack of visibility of total product requirements
  - Paperwork excessive
  - DD 633's, audits, etc.
  - Lack of uniform quality standards....everybody interrupts!
  - Too many starts.....and stops.....better planning
  - Small orders
  - Excessive specifications

RESPONSE

- ACTION BY GOVERNMENT OR MAJOR CUSTOMER TO INCREASE PARTICIPATION
  - Standard specs
  - Provide drawings, for spares, to DOD earlier, thus more reasonable lead times
  - Reduce administrative interference in a company's business practice
  - Government recognition to recognize a loss on one program must be made up in profits on another
  - Complete and accurate information at start of program
  - Adequate time for proposal effort
  - More time for new product development
  - More lead times
  - Filter out of subcontracts, terms and conditions, which are not required to flow down
  - Permit recovery of investment of D&D (tie development and first production together)
  - Provide long range forecasts for products

RESPONSE

- INSURE YOU REMAIN A VIABLE SUPPLIER

- ALLOW A FAIR RETURN ON INVESTMENT

SLIDE

"Which of the following will improve your productivity"? The increased use of multi-year acquisition to smooth out requirements and add stability to their business ranks first on the list, with some protection to allow capital equipment investment in an unsure marketplace.

WHICH OF THE FOLLOWING WOULD IMPROVE YOUR PRODUCTIVITY?

	IMPACT		
	HIGH	MED	LOW
- Increased use of multi-year acquisition	10	7	1
- "Buy-back" provisions to incentivize investment in capital equipment	8	6	4
- Profitability to invest in improved productivity	7	6	3
- Stability in production rates	6	9	3
- Rapid tax writeoffs	4	9	5
- Improve termination/cancellation liability provisions	4	6	7

SLIDE

This slide lists comments relative to actions by government or major customers to increase participation in the military business. Again, improvements in specifications, reduction in administrative interference, adequate profits and in general, time to do their business and more information about their business were the major items that the vendors felt were necessary for them to increase their participation.

INDICATE IMPACT IN IMPROVING ATTRACTIVENESS OF DEFENSE MARKETPLACE TO YOUR COMPANY IN THE FOLLOWING AREAS:

	IMPACT		
	HIGH	MED	LOW
- Profitability	13	4	1
- Relief of strict requirements & specifications	13	3	2
- Protect subs from government & prime paperwork systems	12	3	3
- Allowability of interest	10	4	4
- Abnormal escalation clauses	9	5	4
- Simpler contracting procedures	8	6	4
- Depreciation allowances	8	5	5
- Improved progress payments	8	5	5
- Multi-year contracting	7	7	4
- Timely progress payments	5	8	5

SLIDE

The next question, "Which of the following would help you reduce your lead-times by 50%"? Advanced material buys, stockpiling of critical components and subassemblies, multi-year contracting, and simplified acceptance testing and qualification lead this list. We also asked how much it would take to increase capacity by a 50%. This ranges from six months to two years, paced largely by capital equipment, followed by brick and mortar. People limitations frequently were a limiter. This is particularly true on the West Coast.

WHICH OF THE FOLLOWING WOULD HELP YOU REDUCE YOUR LEAD TIMES BY 50%?

	IMPACT		
	HIGH	MED	LOW
- Advanced material buys	14	2	2
- Stockpiling critical components and subassemblies	13	2	3
- Multi-year contracting	12	4	2
- Simplified acceptance testing and qualification	11	4	3
- Simplified contracting procedures	8	6	4
- Use of commercial components	6	8	4
- Enforcement of Title I priorities system	6	6	6
- Government investment in facilities & equipment	5	6	7

Time to increase by 50% ranges from 6 months to 2 years. Paced largely by capital equipment, followed by brick and mortar. People limitations frequently a limiter particularly on the West Coast.

SLIDE

Next question, "What incentive could the government give for capacity to lead demand"? The leading responses were additional profit, or profit equal to the commercial sections of their business, accelerated depreciation and again, long-term commitments.

WHAT INCENTIVE COULD GOVERNMENT GIVE FOR CAPACITY TO LEAD DEMAND?

	RANK ORDER NUMBER
- Additional profit or profit equal to commercial	6
- Accelerated depreciation	5
- Long-term commitments	5
- Specifications	2
- Facility funding	2
- Advance material acquisition	2
- Skilled labor pool	1

SLIDE

As a follow-up to our discussion in Washington in preparation for the Summer Study, we asked a question of our direct subcontractors regarding their compliance with the DPS/DMS regulations. In general, they claim to comply 100% of the time, however, they felt as you can see from this chart, that their subs or suppliers did not always comply. We've had further discussions on this subject since the survey, and I believe it is a general consensus that there is less compliance as you go further down in the supply base. I think it's also fair to say that there is a general reluctance on the part of the suppliers to enforce or cause to be enforced the DPS/DMS regulations because of disruption, vendor attitude, etc.

DPS/DMS

	1ST TIER	2ND TIER
- COMPLIANCE WITH REGULATIONS		
- Comply 100%	15	6
- No comply	-	2
- Comply sometime	1	7
- Don't know	-	2

- GENERAL
  - Large companies comply
  - First tiers, majority comply
  - Second tiers comply 50% of the time
  - Third tiers comply 25% of the time

SLIDE

During the survey, we also tried to get some indication of the operating capacity of our subcontractors. As you can see, approximately half were operating it from 70 to 100% of capacity. Some five of the eighteen vendors that we surveyed, claimed that they made adequate profits on Mil Spec business with twelve feeling that they did not receive adequate profits and one replied as a maybe, whatever that means.

- CAPACITY OPERATING AT

%	NUMBER
< 40	3
40-50	1
50-60	1
60-70	5
70-80	2
80-90	4
90-100	2

- ADEQUATE PROFITS ON MIL SPEC BUSINESS

YES	NO	MAYBE
5	12	-

SLIDE

I think you can boil down the results of the survey into about three key factors. The vendors are in general telling us that they must receive an adequate return on investment relative to the commercial business for this to be an attractive marketplace. Give them reasonable stability of production, whether through multi-year or stockpiling material to encourage capital investment, etc., and the attractiveness improves. The reduction of red tape, is a key factor. Specifications, excessive qualification, paperwork, etc., are particularly bothersome to some of the lower tier subcontractors.

Now, what can we do or what should we do. First, the survey pointed out that we can do a better job of communication of status and needs to our subcontractors. In many cases I think we are doing an inadequate job of passing on information that we have relative to our programs, status of the Congressional budgeting cycle, etc. More use of simple milestone payments can help improve the attractiveness of the marketplace, however, we must avoid imposition of government accounting necessitated by the progress payment aspect of our business.

Lead times have certainly stretched out throughout the industry and abnormal escalation clauses to protect against long-term and high rates of inflation would help.

Selective stockpiling of some base materials can help lead times and to some extent stabilize prices.

Tax changes to improve cash flow and provide incentives for R&D are key to all of the industry and last, I think we must realize that the military is a small part of the marketplace and it is to our collective benefits to specify as close to the commercial products as possible.

SURVEY SUMMARY

KEY FACTORS

- Adequate return on investment relative to commercial business.
- Reasonable stability of production (Multi-year, stockpiling material, capital investment).
- Reduction of "red tape" (specifications, excessive qual, paperwork).

CAN DO/SHOULD DO

- Better Communication of status, needs, etc.
- More use of simple milestone payments. (Must avoid imposition of government accounting necessitated by progress payment.)
- Abnormal escalation clauses.
- Selective stockpiling of some base materials.
- Tax changes (depreciation - R&D).
- Spec as close to commercial as possible.

TRIDENT ADVANCED FUNDING PROGRAM

PRESENTED

TO

THE DEFENSE SCIENCE BOARD TASK FORCE

ON

INDUSTRIAL RESPONSIVENESS

BY

A. R. SCHROTER
LOCKHEED MISSILES & SPACE COMPANY, INC.

TRIDENT ADVANCED FUNDING PROGRAM

WHAT IS THE ADVANCE FUNDING PROGRAM?

A GOVERNMENT APPROVED AND BUDGETED SYSTEM TO IDENTIFY AND PROCURE SPECIFIC ITEMS OF MISSILE HARDWARE IN ADVANCE OF ACTUAL PROGRAM REQUIREMENTS.

THE PROGRAM WAS ORIGINALLY PRESENTED TO THE CONGRESS BY ADMIRAL LEVERING SMITH, AND WAS DEFINED BY THE NAVY IN SSPINST 7100.3A CH-69.

TRIDENT ADVANCED FUNDING PROGRAM

OBJECTIVES

- MAINTAIN RELIABILITY OF THE END PRODUCT
- ENSURE PIECE PART AVAILABILITY TO MEET REQUIREMENTS
- OVERCOME PROBLEMS ASSOCIATED WITH LONG LEAD, REQUALIFICATION, AND LOSS OF SOURCES

TRIDENT ADVANCED FUNDING PROGRAM

SAMPLE PARTS AND MATERIAL SURVEY

MOTIVATION

CANDIDATES	FOREIGN SOURCE	SMALL QUANTITY REQUIREMENT	EXCESS SUPPLIER CAPABILITY	INTERMITTENT PRODUCTION	INSUFFICIENT SUPPLIER RATE CAPABILITY	VIRTUALLY NO OTHER MARKET	SOURCE PROTECTION
ELECTRONICS PARTS		X	X	(X)			X
IMU SPECIAL COMPONENTS		X	X	(X)			X
PROPULSION							
MDX-64 - (ALUMINUM POWDER)				(X)		X	X
HDI (PROPELLANT INGREDIENT)	(X)		X	X			X
2ND PA (PROPELLANT INGREDIENT)		X	X	X			(X)
M-ANISIDINE - (PROPELLANT STABILIZER INGREDIENT)	(X)	X	X	X			X
OTHER							
QUARTZ - (ANTENNA WINDOW)	(X)		X	X			X
DOUBLE MELT STEEL (THROUGH BULKHEAD INITIATOR)		X		X		(X)	
HNS II - (EXPLOSIVE)		X		(X)			
GRAPHITIZED FIBER (EQUIPMENT SECTION)	(X)		X	X			X

TRIDENT ADVANCED FUNDING PROGRAM

PROCUREMENT CATEGORIES

- LIFE OF TYPE (LOT)
- PRODUCTION CONTINUITY (PC)
- ADVANCE PROCUREMENT

TRIDENT ADVANCED FUNDING PROGRAM

COMMODITY EXAMPLES

ADVANCE PROCUREMENT	LIFE OF TYPE	PRODUCTION CONTINUITY
MOTOR FORGINGS	CHIP AND WIRE TRANSISTOR	TAB CAPACITOR
MISSILE BODY FORGINGS	BENDIX CONNECTOR	PMM CONNECTORS
SERVOACTUATOR COMPONENTS	RATE GYRO SENSORS	BEAM-LEAD RESISTOR
GAS HYDRAULIC UNIT COMPONENTS	CONNECTOR FILTER PIN	MICROBRIDGE SUBSTRATES
FIRST STAGE FLEX SEAL	CONNECTOR SLEEVE	BEAM-LEAD TRANSISTOR
TITANIUM FORGING AND SHEET	QUARTZ YARN	INTEGRATED CIRCUITS
FIRST STAGE ATTACHMENT RINGS	ORDNANCE CHEMICALS	FCDC, DETONATOR CORD
FIRST STAGE BEARING RING AFT	ORDNANCE COMPONENTS	PTS TRANSLATORS
FIRST STAGE NOZZLE EXIT	RAYON YARN	IVA COMPONENTS
FIRST IGNITION CLOSURE	THIRD STAGE EJECT MOTOR	CARBONIZED RAYON
	RAYON FABRIC	PBCS COMPONENTS
	ANTENNA WINDOWS	AEROSPIKE COMPONENTS
	DUAL ISOLATION	RESISTOR
	PLAIN FLANGE	AFT THERMAL INSULATION
	RETAINER RING	
	FLANGE ASSEMBLY	
	TITANIUM TUBING	
	CERAMIC BODIES	

TRIDENT ADVANCED FUNDING PROGRAM

APPLICATION CRITERIA AND OBJECTIVES

SELECTION CRITERIA

- PRODUCT/COMPONENT RELIABILITY
- MAINTENANCE OF COMPONENT SUPPLY (FOREIGN OR DOMESTIC)
- ASSURANCE OF CONTINUOUS PRODUCTION
- ASSURANCE OF "NO CHANGE" OF QUALIFIED COMPONENT

IMPORTANT CONSIDERATIONS

- MINIMIZE THE NUMBER OF ITEMS AND AMOUNT INVESTED TO THE GREATEST EXTENT POSSIBLE
- MINIMIZE STOCKPILING OF MATERIAL
- MINIMIZE OR ELIMINATE ADDITIONAL FACILITY OR EQUIPMENT ACQUISITION
- MAXIMIZE ABILITY TO EXTEND PROGRAM WITHOUT ENCOUNTERING REQUALIFICATION REDESIGN COSTS

TRIDENT ADVANCED FUNDING PROGRAM

WHAT IS ITS SIZE? (LOCKHEED CONTRACTED)

- CURRENTLY 1788 LINE ITEMS
- CURRENTLY $525 MILLION DOLLAR VALUE (ON PRIME CONTRACT)
- ESTIMATED AT PROGRAM COMPLETION -- 3600 LINE ITEMS
- CURRENT INVENTORY RECEIPTS $112.2 MILLION

  LMSC - STORED $49.9 MILLION (44%)
- SUPPLIERS - STORED $62.3 MILLION (56%)

TRIDENT ADVANCED FUNDING PROGRAM

HOW MANAGED

INVENTORY - - GOVERNMENT OWNED

CONTRACTOR MANAGED

ACCOUNTABILITY - -

LOCKHEED – WIP ON CRC

CHARGED TO – AFP CONTRACT

DISBURSED TO – USING CONTRACT AT NO COST

INVENTORY LOSSES - - DEGRADATION

AFP INVENTORIES	CHARGE TO
INVESTIGATION	AFP
REPLACEMENT	AFP
AFTER ISSUANCE TO USING CONTRACT	
INVESTIGATION	USING
REPLACEMENT	AFP

"ONCE AFP, ALWAYS AFP" - - REDUCES ACCOUNTING TASK

TRIDENT ADVANCED FUNDING PROGRAM

LOSS EXPOSURE

IN HOUSE

OBSOLESCENCE	**$40K**
STOCK SWEEPS (DEFECTIVE MATERIAL)	**$1.25** MILLION (**1.1%** OF INVENTORY)

TRIDENT ADVANCED FUNDING PROGRAM

LIFE-OF-TYPE

- A MODE OF PROCUREMENT EMPLOYED FOR ONE OR MORE OF THE FOLLOWING:
  - MINIMUM PRODUCTION LOT MEETS PROGRAM REQUIREMENTS
  - SUPPLIER INTENDS TO DISCONTINUE PRODUCTION
  - SUPPLIER PLANS TO INTERRUPT PRODUCTION, WITH POTENTIAL RELIABILITY DEGRADATION
  - SUPPLIER IS A FOREIGN SOURCE

EXAMPLE OF LIFE – OF – TYPE

QUARTZ YARN

BACKGROUND

QUARTZ IS FOUND AS A RAW MATERIAL IN BRAZIL, SHIPPED TO FRANCE FOR ADDITIONAL PROCESSING AND SUBSEQUENTLY TRANSFERRED TO THE U. S. FOR MANUFACTURE OF ASTROQUARTZ YARN BY THE J. P. STEVENS COMPANY.

QUARTZ YARN IS UTILIZED IN THE MANUFACTURE OF ANTENNA WINDOWS, AND INSULATORS FOR THE INTEGRATED VALVE ASSEMBLY.

JUSTIFICATION

- DUAL FOREIGN SOURCES, BRAZIL AND FRANCE.
  CHANGING WORLD CONDITIONS COULD INTERRUPT THE SUPPLY.

TRIDENT ADVANCED FUNDING PROGRAM

EXAMPLE OF LIFE-OF-TYPE
RAYON YARN

BACKGROUND

- RAYON YARN IS WOVEN INTO RAYON CLOTH WHICH IS THEN CARBONIZED AND UTILIZED IN BOTH RE-ENTRY SYSTEMS HEAT SHIELDS, AND LARGE MOTOR NOZZLES.
- FMC MATERIAL DECISION STATED THAT AS A RESULT OF DECREASING COMMERCIAL DEMAND, (TIRES & CLOTHING), THE PRODUCTION OF RAYON FILAMENT MAY BE DISCONTINUED

JUSTIFICATION

- ENSURE CONTINUED AVAILABILITY OF CURRENTLY QUALIFIED MATERIAL
- ELIMINATE TIME CONSUMING HARDWARE REQUALIFICATION PROGRAM

TRIDENT ADVANCED FUNDING PROGRAM

PRODUCTION CONTINUITY

- ENSURES MINIMUM CONTINUOUS PRODUCTION OF MATERIALS OR COMPONENTS AT THE LEVELS OF QUALITY, RELIABILITY, AND HOMOGENEITY REQUIRED TO MEET SYSTEM PERFORMANCE OBJECTIVES

TRIDENT ADVANCED FUNDING PROGRAM

EXAMPLE OF PRODUCT CONTINUITY

- INTEGRATED CIRCUITS
  - INITIALLY THREE SOURCES
- MISSILE REQUIREMENTS -- LESS THAN ONE SUPPLIER MINIMUM OUTPUT
  - SOLE SOURCE SELECTED TO INSURE CONTINUOUS PRODUCTION AND TO MAINTAIN PRODUCT RELIABILITY
  - SOLE SOURCE EXPERIENCED FAVORABLE YIELDS, WHICH IN TURN LED TO GAPPING
  - NEGOTIATED WAFER START IN BALANCE WITH CONSIDERATIONS OF:
    - A. CONTINUOUS PRODUCT PROCESSING
    - B. CAPACITY OF SUPPLIER
    - C. MAINTAIN OPTIMUM TRAINED WORK SOURCE
    - D. INSURE SOURCE AVAILABILITY IN OUT YEARS

TRIDENT ADVANCED FUNDING PROGRAM

ADVANCE PROCUREMENT (AP)

- COMPONENTS WITH LEADTIMES SIGNIFICANTLY LONGER THAN THE END ITEM

TRIDENT ADVANCED FUNDING PROGRAM

EXAMPLE OF ADVANCE PROCUREMENT (AP)

TITANIUM FORGINGS

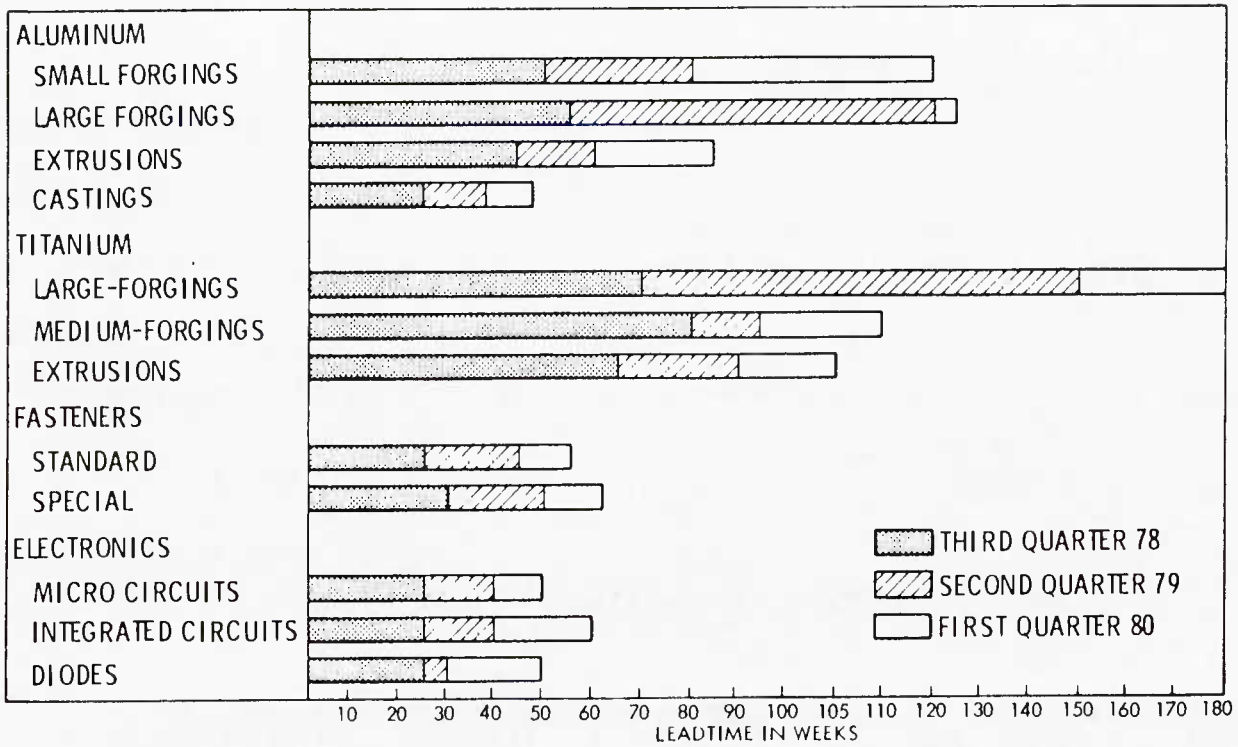
LEADTIMES INCREASED DRAMATICALLY, AS A RESULT OF TWO FACTORS:

- MATERIAL AVAILABILITY
- INDUSTRIAL CAPACITY

ENSURE COMPONENT AVAILABILITY TO SUPPORT PRODUCTION SCHEDULES

TRIDENT ADVANCED FUNDING PROGRAM

LEADTIME COMPARISONS



TRIDENT ADVANCED FUNDING PROGRAM

STORAGE & SURVEILLANCE PLANS KEY ELEMENTS

ELEMENT	PURPOSE
• ACCEPTANCE CRITERIA	• ENSURES PROPER PEDIGREE TO STORAGE
• STORAGE FACILITY	• PROVIDES CONTINUOUS PROTECTION FROM:
• ENVIRONMENTAL CONTROLS	• HOSTILE ENVIRONMENT, DAMAGE, DEGRADATION, AND ADVERSE AMBIENT CONDITIONS
• PACKAGING	
• TESTS	• VERIFIES COMMODITY INTEGRITY
• REQUIREMENTS	• DEMONSTRATES PERFORMANCE STABILITY WITH CONTROLLED TEST DISCIPLINES
• FREQUENCY	• ESTABLISHES TEST INTERVALS FOR TIMELY PREDICTION OF COMMODITY TRENDS
• DATA ANALYSIS	• IDENTIFIES CURRENT INVENTORY CONDITIONS AND PREDICTS LONG-TERM TRENDS

TRIDENT ADVANCED FUNDING PROGRAM

ADVANTAGES

- CONTRIBUTES TOWARD MAINTAINING PIECE PART RELIABILITY
- OFFERS SOURCE PROTECTION
- PROVIDES CAPABILITY TO REACT TO LEAD TIME CHANGES
- KEEPS SUPPLIERS INTERESTED

TRIDENT ADVANCED FUNDING PROGRAM

AREAS OF CONCERN

QUANTITY DETERMINATION

- ATTRITION
- CHANGES (DESIGN, PROGRAMMATIC, LOGISTICS, TEST SAMPLING)
- DEGRADATION

SECURITY

LONG-TERM STORAGE

- AGING
- UNKNOWN EFFECTS OF ENVIRONMENT ON DIVERSE COMMODITIES
- CATASTROPHIC LOSS

TIMELY RESPONSE TO CHANGES

- PROGRAM NEEDS
- CONTRACTED ACTION

TRIDENT ADVANCED FUNDING PROGRAM

CONCLUSIONS

- MAINTENANCE OF RELIABILITY
- ABILITY FOR TIMELY ACTION TO COVER:
  - SCHEDULE PULLAHEADS
  - SUDDEN LEADTIME EXTENSIONS
  - UNPLANNED ATTRITION
- IMPROVES ABILITY FOR LOGISTICS SUPPORT
- FACILITATES FINANCIAL PLANNING
- SUPPLIERS PLANNING IMPROVED

APPENDIX H

BRIEFINGS RECEIVED

THE DEFENSE SCIENCE BOARD TASK FORCE

ON

INDUSTRIAL RESPONSIVENESS

BRIEFINGS RECEIVED

This appendix lists the briefings given to the Task Force either in Washington or San Diego. In addition to the briefings listed, informal discussions were held with General John Guthrie, USA, Commanding General, U.S. Army Materiel Development and Readiness Command; Admiral Al Whittle, Chief of Naval Material; and LGEN George Sylvester, USAF, Deputy Commander, Air Force Systems Command. Also, during the San Diego meeting, Mr. Adam Klein and Mr. Don Campbell, staff members of House Armed Services Committee, were briefed on the results of the study.

Subject	Presenter
Industrial Base Overview	R. E. Donnelly, Dep. Director, Production Resources, OUSDR&E
Current Guidance	J. E. DuBreuil, Staff Specialist, Production Resources, OUSDR&E
Defense Industrial Responsiveness and the New Economics	D. H. White, VP and Controller, Hughes Aircraft Company
DOD Sustainability Study	C. W. Groover, Dep. Asst. Secretary, Requirements, Resources & Analysis, MRA&L
National Security Council Mobilization Planning Study	Col. Charles Stebbins, USAF NSC Staff
Federal Emergency Management Agency Programs	F. Camm, Associate Director for Plans & Preparedness, FEMA
Department of Commerce Programs	J. E. Richards, Dep. Director, Office of Industrial Mobilization
DOD Mobilization and Deployment Steering Group (included report on Nifty Nugget - 1978)	Paul Donovan, Director, Mobilization Deployment Planning, OSD

Subject	Presenter
Summary of Interviews	R. G. Gibson J. F. Drake
American Defense Preparedness Association Views	Gen. Henry Miley, USA (ret.), President, ADPA
Strategic and Critical Materials - Use of Defense Production Act	Dr. John Morgan, Chief Staff Officer, Bureau of Mines
Multi-Year Contracting	H. L. Fisher, OUSDR&E (AP)
Production Competition	T. Baldwin, OUSDR&E (AP)
Manufacturing Technology & Productivity	C. Downer, Director, Defense Industrial Resources Support Office, OUSDR&E
Materials & Structures R&D (not presented - charts made available)	J. Persh, OUSDR&E (R&AT)

Basic Materials Panel - see Appendix D for details.

Electronics Base	J. Junkins, VP - Group Manager, Texas Instruments
Subcontractor Base	J. F. Drake, Corporate Director, Advanced Program Plans, Hughes Aircraft Company
F-16 Manufacturing Technology Program & Impact of Schedule Changes	J. Ashton, VP Operations General Dynamics - Fort Worth
Sustainability Study Critique	Dr. J. Gansler, Vice President, TASC
1976 DSB Study Highlights	Dr. R. D. DeLauer, Executive VP, TRW
The Munitions Base	Dr. M. Sutton, VP/GM Honeywell Defense Systems Division
The Trident Advanced Funding Program	A. R. Schroter, Vice President, Programs Lockheed Missiles & Space Co., Inc.

APPENDIX I

INTERVIEWS CONDUCTED

THE DEFENSE SCIENCE BOARD TASK FORCE

ON

INDUSTRIAL RESPONSIVENESS

INTERVIEWS CONDUCTED

To develop background material and to obtain views of some of the persons who have toiled in the vineyard of industrial response, R. G. Gibson and J. F. Drake conducted a number of interviews. Those interviewed and general subject matter are indicated below:

NAME	TITLE	GENERAL SUBJECT MATTER
Leonard Sullivan	Consultant, former Asst. SecDef, Program Analysis & Evaluation	Planning Policies
Charles Groover	Dep. Asst. Secretary, Requirements & Resources Manpower Reserve Affairs and Logistics, OSD	Planning Policies, Sustainability Study
Gene Porter	Principal Deputy, PA&E, OSD	Fiscal Guidance, Investment Strategies
Fred Iklé	Consultant, former Director, Arms Control and Disarmament Agency	Mobilization Issues
Don Carson, Captain, USN	Faculty, Industrial College of the Armed Forces	ICAF activities
John Blanchard	Principal Asst. Dep. for Materiel Development, DARCOM	Army Industrial Base activities
Everett Pyatt	Dept. of Energy, former Principal Deputy, Asst. SecNav - Logistics	Navy Industrial Base activities
G. Stolarow	Director, Procurement & Systems Acquisition Div., GAO	GAO activities
Tom Harvey	Principal Deputy, Asst. SecNav - Logistics	Navy Planning
Ron Thomas	ASN Office	Navy Planning

INTERVIEWS CONDUCTED

NAME	TITLE	GENERAL SUBJECT MATTER
Eckhard Bennewitz	Metro, Director of Budget, former Senior Official, OSD, Installation and Logistics	Vietnam, Production Buildup of Conventional Munitions
Rod Vawter	Office of Dep. Ch. Staff, Army, Research, Development and Acquisition	Army Mobilization Planning
Jere Sharp M/G, U.S. Army	Office of Dep. Ch. Staff, Logistics, U.S. Army	Industrial Preparedness Planning
Ed Otth RADM, USN	Naval Sea Systems Command, former Dep. Ch. NavMat for Acquisition	Navy Acquisition Planning
Richard A. Stubbing	Dep. Assoc. Director for National Security, Office of Management and Budget	Alternatives to full funding of multiyear contracts.
MG James W. Stansberry	DCS/Contracting and Manufacturing, AFSC	AFSC initiatives in capital formation and multiyear contracting.
Joseph B. Anderson	Director of Manufacturing, AFSC	AF studies of surge on F-16 and A-10, critical materials, MANTECH, financial initiatives and multiyear contracting.
Lt. Col. Larry Fahrenbacher	Mfg. Technology, Special Asst. to Director, DCS/ Contracting and Manufacturing	
Col. Vincent T. Kelty, Jr.	DCS/Contracting and Manufacturing	
Paul Donovan	Director of Mobilization and Deployment Planning	FEMA/OSD interface, OSD directives for mobilization, planning status, etc.
Congressman James D. Santini (D - Nev.)	House of Representatives	Congressional studies on critical materials stockpile. The geopolitical implications of critical materials, etc.

APPENDIX J

BIBLIOGRAPHY

THE DEFENSE SCIENCE BOARD TASK FORCE

ON

INDUSTRIAL RESPONSIVENESS

BIBLIOGRAPHY

This appendix lists the principal references used by the Task Force. A much more extensive bibliography was developed by the Executive Secretary of the Task Force. Copies of that bibliography can be obtained by contacting the office of Mr. Richard Donnelly, Deputy Director, Production Resources, OUSDR&E, Room 2A330, The Pentagon, Washington, DC, 20301.

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"Strategic and Critical Materials," Dr. John D. Morgan, Jr., Bureau of Mines. Paper presented to American Institute of Mining, Metallurgical and Petroleum Engineers, May 1980

"The State of U.S. Military Readiness," The National Security Record, July 1980

Letter: July 14, 1980, Dep. SecDef Claytor to General Bryce Poe, II, USAF, Commander, Air Force Logistics Command, subject: "Multi-year Acquisition"

"The Resource War in 3D - Dependency, Diplomacy, Defense," remarks by the Honorable James D. Santini, Chairman, Subcommittee on Mines and Mining, House of Representatives, June 17, 1980

"Defense Industrial Responsiveness and the 'New Economics'," presentation by D. H. White, Vice President and Controller, Hughes Aircraft Company, July 16, 1980

"The Peculiar Economy of the Defense Acquisition Regulations," Paul M. Carrick, Institute for Defense Analysis, 1980

"Defense Expansion Capability - On Improving the U.S. Capability to Expand Defense Production," Fred C. Iklé, paper prepared for a conference, October 11, 1979

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American Machinist, June 1979, special report: "Filling the Need for Skilled Workers"

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"Industrial Base Mobilization," working paper, R. Vawter, Office of Deputy C/S Research, Development and Acquisition, U.S. Army, undated

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Memorandum from Gen. A. D. Slay, Commander, Air Force Systems Command to Headquarters, USAF, subject: "Legislative and Policy Changes for Multi-year Contracting," 28 March 1980

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"The Expansion Capability of the Defense Industry," by Dr. Jacques S. Gansler, April 1979

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APPENDIX K

LETTER FROM HUGHES AIRCRAFT

TO

REPRESENTATIVE RICHARD ICHORD

(dated October 19, 1980)

HUGHES AIRCRAFT COMPANY
CULVER CITY, CALIFORNIA

ALLEN E. PUCKETT
CHAIRMAN OF THE BOARD AND
CHIEF EXECUTIVE OFFICER

October 29, 1980

The Honorable Richard H. Ichord
Committee on Armed Services
Subcommittee on Research & Development
U.S. House of Representatives
2302 Rayburn House Office Building
Washington, DC 20515

Dear Mr. Ichord:

Subsequent to my statement regarding the status of the Nation's defense industrial base, you requested that I comment for the record on how the annual authorization and appropriation process needs to be changed to allow for multiyear authorizations and appropriations and what changes would need to be made to the Defense Acquisition Regulations (DAR).

Hughes heartily endorses consideration by the House Armed Services Committee of this important issue. My remarks will be directed specifically at changes in Congressional, OMB and DoD acquisition policies and various Directives and DAR that stifle multiyear system contracting.

First -- Full Funding. There appears to be an unwritten policy in the Congress that acquisitions under the "procurement title" must be fully funded. This unwritten policy is implemented by OMB in Directive A-11 and by DoD in Directive 7200.4 titled, Full Funding of DoD Procurement Programs. These policies require all of the funding for recurring costs for a multiyear contract (that is, a contract calling for hardware deliveries over a period of several years) to be included in the first year's authorization and appropriation, plus the first year's portion of the total program nonrecurring cost, thereby creating a budgetary "bow wave." For major programs, this is a significant stumbling block to utilizing multiyear contracting.

Second -- $5M Cancellation Ceiling. The Defense Authorization Act of 1976, Public Law 94-106, Section 810, imposes a termination ceiling of $5M for multiyear procurement as defined in DAR 1-322, dated 26 September 1972. The $5M ceiling is far too low for major programs and the DAR further restricts its usage to only nonrecurring costs for system acquisitions. The latter is not a problem if the program is fully funded in the first year, but is a problem if an alternative to full funding is considered.

Third -- Flat Pricing. DAR 1-322 contemplates amortizing the non-recurring implementation and all associated costs on a flat unit price per year over the duration of the multiyear contract. With interest rates in a range of 12-20% and progress payments at the current 80% rate, it is financially impractical for a contractor to accept such an arrangement.

Fourth -- Flexibility. The Congress, to some degree, and the Executive Branch have expressed concern about the loss in flexibility to meet changing priorities if a substantial number of large DoD procurements were handled on fully funded multiyear contracts.

While we believe that the single most significant benefit to be derived from multiyear contracting would be our ability to place larger and more economical buys with our suppliers and thus to provide lower hardware costs to the government, we note two additional significant benefits:

(a) increased program stability at both the prime and sub-contractor levels, thereby attracting greater investment for productivity improvement

(b) over a period of time, the possibility of significantly increasing production rates in the event of an emergency.

The statutory and regulatory impediments can be corrected by the Legislative and Executive branches of the Government. However, the budgetary "bow wave" and loss in flexibility resulting from fully funding several large multiyear programs in a single year is believed to be undesirable from a budgetary point of view in spite of the long-term cost benefits. We, therefore, suggest an alternative providing the benefits of multiyear contracting without the problems associated with full funding. It involves a significant change in procurement policy, but is not precluded by any significant legislative barriers. In brief, the Congress would commit to a production buy spanning three or four years for those programs that:

(a) have been through low rate initial production (LRIP), operational test and evaluation (OT&E), and full rate production implementation;

(b) are stable in design; and

(c) have several years of planned production.

Such programs would be funded annually for:

(a) current program year hardware deliverables (recurring and nonrecurring costs), less any prior years' advanced funding; plus

(b) advanced funding for recurring production costs (including best economic buy of materials, parts, labor, etc.) applicable to future year requirements.

In addition, a termination ceiling would be contractually established for each program year to cover recurring costs applicable to future year production requirements.

This concept would permit the DoD to terminate at any time or to adjust each year's procurement within modest limits (± 10%) as conditions may demand.

Because of the savings anticipated with this multiyear contracting approach, it is judged that even in the event of termination, the funding of multiyear contracts, as described above, for each of the early years will not exceed the annual program funding under the current procurement process and the funding in the final year(s) of the multiyear contract would be considerably lower.

A summary of the proposed changes to implement the above is presented in Attachment A.

In conclusion, it is interesting to observe that the impediments to multiyear contracting are associated with policy, perceived policy, directives or regulations, all of which may be changed with a minimum of effort, given the commitment to capitalize on the opportunities that longer term contracting would offer.

Sincerely,

Allen E. Puckett

AEP:prs

Attachment

(a) Sec. 810 of Public Law 94-106

(1) Repeal Sec. 810 of Public Law 94-106

(b) DoD Directive 7200.4

(1) Revise this directive to require best economic buy of materials, parts, labor, etc., under multiyear contracts on an advanced funding and termination liability basis vs. the current 7200.4 full funding basis.

(c) DAR 1-322 Multiyear Contracting

(1) Revise DAR 1-322 to include a cancellation provision covering the recurring cost of best economic buy of materials, parts and labor, etc., applicable to future year production.

(2) Delete the cancellation ceiling.

(3) Provide policy guidance for best economic buy billing milestones, per paragraph (e) below.

(4) Revise 1-322.2 (f) to require inclusion of appropriate Economic Price Adjustment (EPA) and energy shortage clauses in all multiyear contracts.

(d) DAR, Appendix E-529

(1) Revise Appendix E to require billing milestones at price covering recurring costs for best economic buy of materials, parts, labor, etc., applicable to future year production. This revision is appropriate since the above costs would be incurred several years in advance of end item delivery and 80% progress payments do not adequately finance the cost of contract performance.