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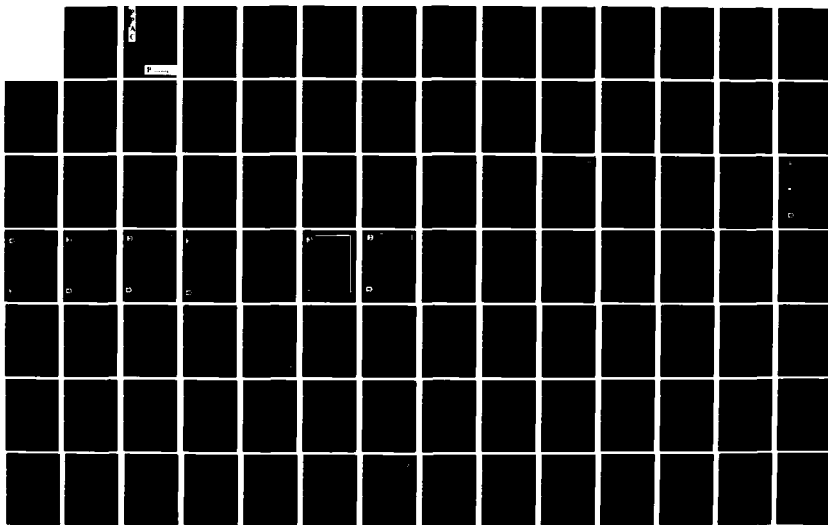
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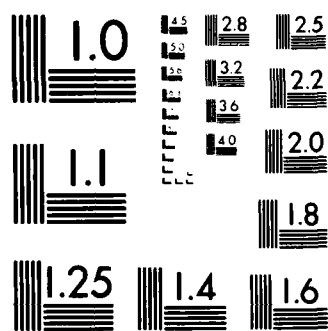
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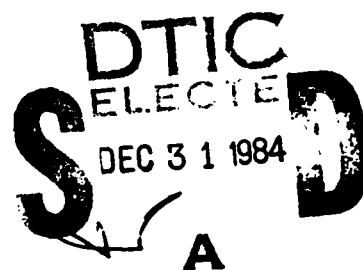


Symposium Sponsored by:

**AIR FORCE ACQUISITION
LOGISTICS CENTER**

18-19 June 1984

Dayton Convention Center
Dayton, OH 45402



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Proceedings

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Activities not listed in this Proceedings:

Proposed Changes to Warranty Law by Mr. Harvey H. Gordon,
Assistant Deputy Under Secretary (Acquisition), Department
of Defense

AGENDA

Product Performance Agreement Center Symposium

18-19 June 1984

Dayton Convention Center

22 Dave Hall Plaza

Dayton, Ohio 45402

Monday, 18 June

1000	Call to Order/Administrative Announcements	Lt Col Guenther
1015	Welcome	Lt Gen McMullen
1030	Keynote Address	Senator Andrews
1130	BREAK	
1145	PRESENTATION: Proposed Changes to Warranty Law	Mr. H. Gordon
1215	LUNCH (Stouffer's - Van Cleve III & IV and Dayton Room)	
1330	PRESENTATION: PPAs -- An AFSC View- point	Maj Gen Buck
1400	PANEL: Military PPA Objectives	Maj Gen Buck Brig Gen Weiss Brig Gen Harbour Lt Cmdr Schumann (JAG)
1445	BREAK	
1500	PRESENTATION: The Industry Estimate of Sec 794	Mr. Jim Lovett Dir Govt. Rel. Westinghouse
1530	PRESENTATION: Alternate Fighter Engine Warranty	Col Nelson ASD/YZ
1600	PRESENTATION: PPAC	Lt Col Guenther PPAC
1630	ADJOURN	

Tuesday, 19 June

0830	Admin. Announcements	Lt Col Guenther
0845	PRESENTATION: PPA's ... and the Logistician	Maj Gen M T Smith

Tuesday, 19 June

0915	PANEL: PPA Administration	Maj Gen M T Smith Brig Gen R. Smith Mr. Gallagher Mr. L. Brown (JAG)
1015	BREAK	
1030	PANEL: Contractor PPA Experience	Rand Allen The Firm of McCamish, Ingram, Martin, Brown, & McCullough Bob Fleischacker Delco Electronics Ernest Theisen Litton Bill Stroh Lear Siegler Dick Ross Rockwell Collins
1130	PRESENTATION: AFCOLR - Logistics R&D	Mr. Cieciwa AFCOLR
1200	CLOSING REMARKS	Lt Col Guenther
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WELCOMING ADDRESS

by

LT. GEN. McMULLEN

Good morning. It's my pleasure to welcome you to the first ever Product Performance Agreement Symposium. A few months ago, it became apparent to some of us in the Air Force acquisition business that it would be useful to get people in our system -- people from both industry and government -- together to discuss the application of warranties and guarantees to defense procurement. This is a dynamic time in that field. Policy is now being formed on the subject for a lot of reasons, some of the most obvious being our own interest, in the services, in providing systems to our operational forces that are better supported and hence more available -- as well as the interest in the Congress in seeing that we do. The confluence of these two pressures -- us wanting to do something and the Congress wanting to be in charge of telling us how -- generally leads to policy -- but often policy whose principal characteristic is its speed, and not necessarily its coherence. If that's the case here, we need to find it out -- and to take charge of reorienting it -- because it is a matter of great importance.

So it's time we got together to see where we're headed -- see if we like it and, if not, how we should reshape it. We welcome your participation in this process since it affects the way we do business together -- Now and for the foreseeable future. And, it's clearly a very timely subject, given the current level of interest and activity involved in warranties and other forms of product performance agreements.

So this symposium has an important mission; if it is to succeed, it requires that we have a candid exchange of views while you're here. We in government need to understand your thoughts, and you in industry, ours, since it's clear that both of us, government and industry, are learning as we explore new ways of doing business. We need to make sure that we're doing it the way that seems best while we keep one eye on our critics -- who seem legion in number. I'd like to set the theme for this symposium as one to foster a free and open exchange of views. I encourage you to

tell us what you think is right and, even more importantly, what's wrong about our approaches -- and most importantly, why! And what's more, we need to hear about what we should be doing but aren't.

Application of warranties in military procurement is not a new issue. It goes back as far as I can remember. For example, in instruments like "Correction of Deficiency" clauses. And, as you know, the application of warranties in defense procurements got a big push in the mid 70s with evaluation of the RIW -- the reliability improvement warranty -- as we applied it then to the F-16, for example. That was a big step forward, an undertaking we all had some doubts about since we had no experience on how it would work out. But we pressed on in those uncharted waters -- and it came out o.k.

We're in somewhat the same place now, with renewed interest in getting early contractor commitment to more serviceable products -- in getting attention up front on affecting how easy or how hard a system will be to live with. It's a notion that requires some new ways of thinking on the part of the supplier, that's obvious; but it requires lots of new thought on our part, as customers, as well. There's evidence of progress, however, such as in our alternate fighter engine program, whose roots in the warranty effort go back to Air Force dissatisfaction with fighter engine serviceability in the late seventies, and the beginning of the application of a "commercial practices" approach to warranting engine procurement.

In 1980, under the emphasis of the then commanders of Air Force Logistics Command and Air Force Systems Command, Generals Bryce Poe and Al Slay, the two commands issued a Product Performance Agreement Guide. It's still around, still alive, and still serving as the best source of guidance on these agreements available. It will serve as the basis for our discussion here as well as the departure point for the future evolution of warranty policy. For some time, we've had a joint AFLC/AFSC effort

to establish a Product Performance Agreement Center, an organization to formulate Air Force guidance and expertise on warranties -- as well as a brokerage to assist the unfamiliar Program Manager get started with applications in his program. The Center is in the process of coming on line, now -- and, as you've heard from it's chief, Lt Col Tony Guenther, is the sponsor of this symposium. Getting this Center -- which we, with our love of acronyms have termed P-PAC -- getting P-PAC going is just a beginning; no more than that. The hard part comes in trying to put an orientation on where they're going. And it comes at a time when lots of people want to take charge of that vector -- the Congress, certainly, but OSD as well, and clearly industry has an interest. And all this commotion within the system has created great interest in the media and, hence, in the public. And, of course, spokesmen for all these groups have notions on what we ought to be doing. As a result, there is a lot underway which is leading to a change in how we do business.

For example, Senator Andrews, who we are fortunate to have as our Keynote Speaker here today, has successfully sponsored passage of the guarantee statute embodied in the 1984 Defense Appropriations Act. And we have every reason to believe that this emphasis on warranties will continue for the foreseeable future. I think, in the main, lots of this outside interest is healthy. It provides a push to move our system more rapidly --and spurs us on to try to do what we need to do right before someone does it for us, wrong. Clearly, our challenge is to find ways to make it work; we need to take charge of it and get moving forward. And we must do this recognizing that we are operating in a very complex acquisition process, one that doesn't lend itself to neat, simplified solutions to complex issues. As we all know, the successful application of product performance agreements involve complex trade-offs and complex business decisions for both the buyer and the seller. Guarantees don't come for nothing; they require effort, if they're to do anything, and that means there is expense involved. The objective, obviously, is to let

small, up-front investments be made in the right critical areas -- and thereby preclude large downstream expense and lack of readiness. And while penalties for unavailability and lack of readiness and hence, cost risk, are important, basic elements involved in these agreements, the penalty is not the reason for the agreement. Avoiding the situation that motivates the penalty is. I think our predatory instincts sometimes lead us to lose sight of that objective. It's clear, then, that the characteristics of these warranty decisions are that they involve high stakes, they're operative in a complicated business structure -- in the buying/selling end as well as in their implementation in the using combat commands -- and the equipment that is involved is often complex in order to deliver the combat capability that makes it relevant on today's sophisticated battlefield. So, we have a challenge to do better in an area where there are lots of experts but, I conclude, not yet the requisite level of expertise; and, it's one in which there is a constant need to justify the decisions we make. We can only do that if we work together to understand the issues. As is so often the case, as we tread new ground in our business, a business that outsiders often misunderstand, while we deal at arm's length in so much that we do, here we have a common purpose which we must pursue as we try to figure out what makes sense. While I really don't believe there is a need for unanimity in all the details of the course we take, it is important -- in fact, it's necessary that we have understanding on both sides as we undertake charting that course. So, it is my sincere hope that each participant in this symposium has come to these proceedings with a willingness to receive as well as to transmit. We all need to press hard to sell our ideas, but we need to keep at least a couple of channels of brainpower open to the reception of new ideas -- ideas of how to do it differently. We need a candid exchange of views that will lead to a broader understanding of the issues by all of us so we can mold a course of action that will serve us all in a win-win situation.

I believe that's clearly in the cards. During this symposium we need to get closer by openly discussing mutual concerns and by investing in

individual views. So, don't hold back! I read something Charles Kettering once said, "You never stub your toe by standing still. In fact, the faster you go, the more chance there is of stubbing your toe -- but also the more chance you have of getting somewhere."

Well, we've got a lot of talent here today. I believe we have an interesting agenda for you -- hopefully one that provides a forum for all the relevant sides; that was certainly our intent. I think it is super that Senator Andrews, with all the important actions that are underway in Washington right now, would take the time to come talk to us on this important subject. I look forward to what he has to say -- and hope he will pick up a few ideas from us that will make his investment of time worthwhile. For the rest of us, we need to try to make sure that all the talent gathered here today proceeds forward with a common purpose so that we improve the status of this important business -- and all leave with a sense of achievement.

Thank you for coming.

KEYNOTE ADDRESS

by

SENATOR MARK ANDREWS
NORTH DAKOTA

(Not Available)

PROPOSED CHANGES TO WARRANTY LAW

by

HARVEY H. GORDON
Assistant Deputy Under Secretary (Acquisition)
Department of Defense

(Not Available)

PPAs -- AN AFSC VIEWPOINT

by

Major General Buck

Good afternoon, ladies and gentlemen. I am pleased to appear here today to present my views on where we have been and where we need to go relative to fully integrating product performance agreements (or PPAs) into the mainstream of the DOD acquisition process.

Let me first explain what we mean by the term "PPAs". It refers not only to the warranties and guarantees, such as reliability improvement warranties, mean time between failure verification tests and logistics support cost guarantees that we are all familiar with, but also to the warranty of supplies and correction of deficiencies type provisions in the defense acquisition regulations which are now replaced by similar provisions in the federal acquisition regulations. The term also refers to incentives, such as award fee payments and orbital performance provisions applied to the performance of equipment or software procured by the government.

The intended purpose of a PPA is to incentivize or motivate a contractor to achieve, or improve on, the specified performance or supportability characteristics of an end item produced by industry for the government.

I realize and appreciate the debatable differences between what we would like a PPA to do, and what it actually can do. There have been numerous studies on the subject and I am sure more will be done in the future. I will have more to say about this later, but for now let us reflect on what history says about our achievement of specifications on weapon systems and components.

As you may know, one of the first product performance incentives to be used on a government contract for equipment designed for manned flight was contractually implemented in 1908. The specifications of the contract required the contractor to quote a price not only for full achievement of

the aircraft speed, but also required for the submission of additional prices decremented by 10% for each mile per hour below the required speed, and prices incremented by 10% for each mile per hour above the required speed. The method of testing for the speed was clearly specified in the contract, and the ultimate remedy for failure to meet a minimum allowable speed was also specified in the contract as rejection of the equipment by the government. I am speaking, of course, about the Signal Corps contract with the Wright Brothers for a heavier than air vehicle that could fly at 40 miles an hour with two men aboard. The penalty for the craft flying at a speed of only 35 miles an hour over a measured course was rejection of the equipment. Those were tight specs for something that was truly state-of-the-art and revolutionary. Today a program manager might be very pleased to achieve field performance of 87% of his spec value which was grounds for rejection under the Signal Corps contract.

Today the DOD acquisition business is big business with the procurement budget for FY84 alone equaling over \$80 billion (according to my source) for the three services. We are pushing technology harder than ever before to achieve performance out of our equipment that only the wildest dreamer could have imagined back in the days of the Wright Brothers. We are success oriented, and, indeed, we -- the Government and Industry as partners -- have achieved monumental strides in the performance of both software and hardware acquired under the DOD acquisition process. And we have done so largely without the benefit of product performance agreements. Over the past 10 to 15 years the use of such arrangements including the use of insurance policies on commercial spacecraft such as the \$102 million policy on the INTELSAT 5 which was recently lost, has increased greatly. The utility of warranties and guarantees was being realized by the services, and we implemented them on a number of top priority programs, such as the F-16 program, the KC-10 program, the T-46, ALCM, the F-100 and T-700 engines, the standard inertial navigation unit for the F-16 and A-10, various satellite systems such as the Defense Satellite Communication

System Phases II and III, and others. There was no congressional mandate to put incentives on these programs. It was considered good business strategy by those involved at the time, and was done on that basis. As more and more programs were implementing PPAs, the need for an organization to manage these incentives was recognized first in the mid-70s and more recently in 1980 when Air Force Systems Command directed the establishment of a Product Performance Agreement Center (or PPAC) to gather and analyze data on PPAs. The PPAC was funded and got underway in late 1982 as an internal Air Force activity. Warranties were coming of age in the best possible environment of USD, the Services and industry working individually and as partners to balance the risks and to achieve the optimum benefits from PPAs.

Beginning in July 1983, senate press releases and hearings foreshadowed the possibility of requiring guarantees on all weapon systems and components procured by the DOD. The mandatory warranty provision known as Section 794 of the FY84 Appropriation Act was signed into law on 8 December 1983 despite protests from both DOD and industry. As a result, the use of warranties, guarantees and other incentives will now increase dramatically. The proposed changes to the law which could be enacted later this year or early next year could increase the flexibility and somewhat reduce the numbers of programs affected. But as compared with the circumstances before the FY84 warranty law, there will be a directed, major increase in the use of PPAs -- and I emphasize the "DIRECTED".

I would like to share with you an hypothesis on why, considering that we were already doing much in the area of PPAs, we have now been "directed" to obtain warranties on weapon systems and components. You do not have to believe this hypothesis, but both industry and the members of the DOD acquisition process should consider for a moment the possibility that it is true. There could be a valuable lesson here. Keep in mind throughout that perceptions are sometimes just as important as truth.

The acquisition process involves the expression of a need from an operating command after a changed or new threat has been defined which can at least partially be met with hardware and/or software. Development specifications are drawn up, a contract awarded, design work done, and prototype and pre-production models are fabricated. The development testing attempts to predict how the system or subsystem will function under simulated operational conditions of heat, vibration and other stresses. We are getting better at doing this type of testing, but under the most favorable circumstances, development testing cannot be 100% accurate in duplicating operational conditions, and we should not expect it to be. Nevertheless, we use the results of this testing to demonstrate the potential for the product to meet the user requirements in field use. Briefings are given at all levels, and test results on some of the more important developments are widely disseminated (within security constraints) throughout all levels of the Government. But when a system begins to have difficulty meeting specified requirements during operational testing or after it has been fielded operationally, both the DOD development agency and industry come under severe scrutiny by internal agencies, congress and/or the media. The perception is likely to be that the DOD and industry are not doing as good a job as they should be doing in fielding equipment vitally needed for the national defense. The notoriety we receive at such a time overshadows all else, including what I have described earlier as "monumental strides." The consequences that follow usually include increased oversight and increased direction. Now let's look at some of the demonstrated differences between lab testing and field performance of actual equipment.

An ARINC Corporation study which includes data from a report developed by Grumman Aerospace Corporation documents the ratios of field to demonstrated MTBFs for 95 distinct Navy replaceable assemblies. Only eighteen of these assemblies exhibited MTBFs greater than that demonstrated in the Labs, while 77 showed MTBFs lower than the demonstrated Lab values.

In a similar study done by Hughes Aircraft Corporation on 16 Air Force equipments, only 2 of the 16 had better reliability in the field than demonstrated in the Laboratory. Other studies and reports have concluded the same thing, that field MTBF is generally much lower than MTBFs observed in Laboratory testing. One study estimated that field failure rate was from three to ten times higher than that demonstrated through military standards procedures.

I realize that our MIL Standard testing is improving all the time, and I would expect that today we are doing much better at meeting specification requirements, but a gap still exists and we all know this primarily through data we have each personally assimilated through the years.

Even if the Services collectively meet a high percentage of specification requirements, the few cases that get the notoriety establish the perception that leads to increased oversight and direction. The lesson, I think, is that each of us needs to personally strive to assure the production and delivery of systems which meet or exceed specifications. To do less, will continue to subject us to consequences such as mandatory warranty legislation.

Now that significant weapon system performance requirements will be guaranteed, there is no need for any Government agency to overstate requirements which, in turn, lead to overly optimistic proposals. This has led to a vicious cycle where specifications were padded because we knew that laboratory demonstrations and acceptance testing were the only validation of equipment performance. We are now being forced by this public law to more accurately define what we really need, and you in industry are being forced to more accurately define what you can provide. It is a new ball game, but one that promises the opportunity for increased profit for industry, together with increased readiness for the DOD. It will take a concerted effort on everyone's part, but I am confident that we

are all up to the task of establishing equitable risk sharing arrangements so that it won't cost the Government half of the defense budget for warranties, and conversely industry won't have to worry about betting your company against a guaranteed spec value measured through actual field operations.

So that's something that we need to be doing today and for the future: Improve the accuracy of specifications, the realism of proposals, and the design of equipment to achieve real world field performance. In addition, I will mention that I don't think that any proposed changes to the FY84 warranty law will change this need for realism and accuracy. Mr. Gordon has outlined the form that the revised warranty law may take, but I feel very strongly that, despite any changes in wording, mandated warranties and guarantees are here to stay. So we all need to gear up for them, and implement them as logically and intelligently as possible, remembering that our objectives are improved availability and ultimately, maximum capability and readiness for our Armed Forces.

Having said this, I must hasten to add that there are a number of potential pitfalls inherent with mandatory warranties, and we collectively need to minimize the negative aspects to the maximum extent possible. You may have heard of many of these problems before, but let me briefly cover a few of the problems that we need to resolve early on.

First, and probably the most difficult to resolve, and the problem with perhaps the most far reaching consequences, is the impact of mandatory warranties upon technological innovation. The possible scenario goes something like this. DOD program managers could lean toward reduction of technological innovation in specifications, changing them to goals or otherwise trade-off the tough requirements during the acquisition process because of the perceived cost of obtaining meaningful guarantees. The scenario would, by itself, constrain the rapid growth of technology that is

our sole advantage against the numerical superiority of the Eastern Block countries. This scenario coupled with an industry perception of the need to reduce the risks associated with warranties through selection of only mature proven technology, could provide a two pronged impediment to the progress of technology within the United States.

I don't have an answer for this problem. The solution is definitely not to give up or trade off valid requirements, nor can the answer be found through ultra conservatism in design. Perhaps the best chance we may have to resolve this problem is to increase the pace at which technology is matured. More technology base and IR&D work coupled with more rapid movement of technologies through exploratory and advanced development could be the only answer. This is an area that we must collectively assign top priority to resolving so that we don't find ourselves in future years without the requisite technology to build the weapon systems that we need to counter the ever mounting and real threat of Soviet Block aggression.

Another area for concern at this time is the potential for the wider use of warranties to impact component breakout. When an item - such as a significant element of a weapon system which must be warranted - is designed by one company and, through a competitive process such as leader - follower, produced by another company, there may be a reluctance on the part of the producer to sign up to a hard and fast performance warranty. Moreover, a particular GFE component, which now will be separately guaranteed by the GFE contractor, may be critical to the overall performance at the system level thereby causing the system level contractor to absorb even more risk. Generally, this should not occur, because the normal arrangement would be for the system level contractor to be only responsible for correct installation of the GFE. If there is more risk, and it is real, then it deserves to be properly negotiated. The complexity of such negotiations will obviously increase considerably. But if the system or component has been in the field for a period of time, and there

is relevant performance data available, the risk should not then be significant. Any contractor who has ever bid on another contractor's design should know what they are doing and whether or not they can successfully produce the item. The DOD has the responsibility to assure that all bidders have the capability to produce before selecting a contractor, but we certainly don't want any contractors to bid if they are uncertain about their capability to successfully execute the design and produce the item with the required performance. The requirement for a guarantee on such items may very well flush out those incapable contractors which will increase the probability that the right contractor would get the job and the Government would get equipment that would perform as required.

Let there be no mistake about it. I am not referring to competent small businesses that we actively seek and encourage to become fully and productively involved in DOD's acquisition business. This is in our best interests, too. But there is a potential for an impact to small businesses because their business base may be perceived to be less able, or totally incapable of, withstanding the risks involved with a guarantee. I am convinced that small businesses, in general, pride themselves in the quality of their products, and for this reason should be more than able to compete for DOD business despite the economic threat of required warranties. Some small businesses may choose not to compete under existing circumstances, but if they are capable of producing a quality product, then there should be no fear of competition. We are obviously not interested in, (and industry should not support) contractors who are incapable of producing quality products.

The warranty requirement may well be beneficial in its effect of removing from competition the incapable or low quality producers whether they be small or large businesses.

However we must be aware that the economic consequences associated with warranties may well result in an undesirable reduction of the numbers of quality producers who are willing to do business with DOD.

Finally, what forms of problems do we foresee within the Government? Aside from the more lengthy and complicated negotiations and associated contract provisions, and the increased costs that were not programmed, and our real concerns about what the new warranty law might do to industry - and these are significant concerns - there is the matter of how do we keep track of all of the warranted items that will shortly enter the inventory. Components that are rolling off the assembly line today without a warranty, may require a warranty tomorrow. Are our marking systems and tracing systems adequate to handle the greatly increased volume? Are the tech data and instruction manuals adequate, and are the technicians of the right skill and adequately trained? And is there sufficient discipline to handle the circumstances involved with a malfunctioning part that has a warranty but needs to be fixed to generate a sortie during an operational readiness inspection? Will the maintenance technician break the seal that voids the warranty just to get the sortie airborne? In the event of combat operations, will the technician know anything about the internal workings of a component that he was previously unable to enter when it was under peacetime warranty provisions?

In summary, we know we have a long way to go before we get our arms around the Air Force warranty-related problems. We have just initiated a warranty administration study to help find some of the answers to the questions I have just now posed. The Product Performance Agreement Center is hard at work with very limited resources trying to find answers to a multitude of difficult problems. They can't do it alone - we all must do our fair share. And don't expect miracles from PPAs. They are but one more business strategy, albeit significant, that when properly and prudently used holds promise of improving the quality and performance of equipment procured for the Government.

I enjoin you all - industry and government alike - to plan on warranties being here to stay. We can jointly resolve the problems

involved, and make warranties work for us. It will take a great deal of effort, but I am confident that we are more than equal to the challenge.

Thank you for your attention. I will entertain your questions during the question and answer period for the PPA objectives panel which is next on the agenda.

THE INDUSTRY ESTIMATE OF SEC 794

by

JAMES F. LOVETT
WESTINGHOUSE ELECTRIC CORP

The principal parts of this statement covering Section 794 of the FY1984 Defense Appropriation Bill on the subject of warranties are from a statement by Mr. H. B. Smith, Executive Vice President of Westinghouse Electric Corporation in testifying before the Committee on Armed Services of the United States Senate, February 28, 1984. Mr. Smith could not be here today and I am his substitute.

Many Government contractors, including Westinghouse, must operate as both prime contractors and subcontractors and realize the problems associated with both roles. Our position today is clear and straightforward. We support warranties where they have been determined to be workable for both parties and where they will effectively improve the readiness posture of our national defense. However, we cannot support guarantees that are mandated for across-the-board implementation. Such directives and laws, as Section 794, cannot realistically work because of the all-encompassing complexity associated with the performance guarantee. Our concern is not with "guarantees" per se but with the specific guarantees and the circumstances of their use dictated by the statute.

Section 794 lacks the necessary preciseness for implementation, will be extremely costly, and is an administratively unworkable law. It will have a serious and far-reaching negative impact on the ability of contractors to furnish the type and quality of weapon systems so necessary for our Nation's defense.

NATURE OF PERFORMANCE GUARANTEES AND GENERAL IMPACT THEREOF

The language of Section 794 represents a marked departure from commercial guarantees which generally are limited to specific areas of coverage. Section 794 requires a comprehensive performance guarantee by every weapon system contractor. The guarantee will ultimately be passed on to all the subcontractors involved in the manufacture of existing or

future weapon systems including their subsystems and all components of those subsystems. Specifically, the guarantee provides that the weapon system and each component of the weapons system is designed and manufactured to meet the performance requirements set out in the government production contract and guarantees the product shall be free of defects in material and workmanship which would cause the system to fail to conform to the government performance requirements. The guarantee will require the contractor promptly to repair or replace parts as necessary or to reimburse the U.S. for procurement of such repair or replacement from another source. This all inclusive guarantee must be included in every contract awarded after the enactment of P.L. 98-212 which has been interpreted by DOD to include any contract modification resulting from the exercise of an option, any order under a Basic Ordering Agreement, or any amendment to existing fixed priced production contracts. The DOD implementing regulation will only exacerbate the insurmountable problems of costing and administering acquisition contracts. Identifying the warranty liabilities in the event there is a failure of the weapon system, any of its subsystems or components of subsystems, may be administratively impracticable due to its usage, design control, and field maintenance.

It must be recognized that virtually all defense contractors do in fact provide appropriate guarantees in many of the present weapons systems contracts. The DOD and each of the Services have long required appropriate guarantees. There are extensive regulations on the subject and both standard and specifically negotiated guarantee provisions have been in use for many years. Defense contractors routinely offer warranties that their products are free of defects in material and workmanship at the time of delivery and agree to repair or replace these defects with prompt notification. In addition, where commercial type products are sold to DOD, our contractors normally provide commercial type warranties.

FLOWDOWN TO SUBCONTRACTORS - CONSEQUENCES TO SMALL BUSINESSES

When data is available to adequately project the financial liability associated with the risks taken, warranties can be used. However, mandatory inclusion of performance guarantees in all DOD contracts would shift the risks to parties with little control over the design, operation and use of the equipment being warranted. Under these circumstances equitable cost projections of the risk would be virtually impossible.

Recognizing the fact that the warranty will be passed down to subcontractors, let us review some of the more apparent costing and administrative problems.

Any all-inclusive performance guarantee purchased by the Government must lead to a dollar value reflecting the cost of the guarantee as it will apply to the weapon systems. This must be apportioned to each of its subsystems, and component parts thereof. In order to establish the value of these performance guarantees they must be defined precisely at each of the subcontract tiers. As the performance guarantee risks are passed down through the many subcontract tiers the interrelationship between each successive guarantee becomes more complex. Each supplier will require contingency reserves for his part. The price of each subcontract, extending down to all tiers, must be changed to reflect the added total costs which in turn must be allocated to each unit produced and delivered under the contract. I believe you can understand that agreement on the applicable contract price would be very difficult and expensive for all parties.

The costs of weapons systems will increase as contractors necessarily cover their contingent liabilities through appropriate price increases. If the weapon system contractors or the subsystem or component manufacturers are unable to establish sufficient reserves through price increases to offset the contingent guarantee liability, (which must be disclosed on their financial statements to comply with the Generally Accepted Accounting

Principles (GAAP)) the ability of the defense contractors to obtain debt and equity financing at a reasonable cost will be adversely affected.

The assumption of unpredictable risk by lower tier contractors and small businesses will tend to make them avoid defense contracts thereby eroding seriously our Nation's industrial base. This is a very serious concern.

Furthermore, small disadvantaged businesses will be particularly hard hit by their lesser ability to raise capital and the cost of onerous negotiations.

SECOND SOURCE PROBLEMS - SOLE SOURCE CONSEQUENCES

Realistically one would not expect a contractor to guarantee that a weapon system designed by another contractor or by the Government itself would perform in the specified manner. Indeed pure performance specifications are rare. In large numbers of contracts the design is furnished by the Government or detailed specifications are provided and the contractor's obligation is to "build to print" with the guarantee flowing in the opposite direction, i.e., the Government warrants that if the contractor complies with the specifications, using the specified materials and designs, and performs with quality workmanship, a satisfactory product will result. This is especially necessary in contracts where the Government is enhancing competition by utilizing such historical techniques as the so called "leader-follower" or second sourcing in which the following or additional sources are required - to reproduce the designs of others furnished by the Government. Virtually every weapons system or component would be a "sole source" contract if every contractor were required to warrant such designs.

LESS COMPETITION

The statute will inhibit competition not only at the prime contract level but also at the subcontract level. Prime contractors can be expected

to refuse to participate in any production contract in which they must guarantee performance based on a design which is not their own. Prime contractors will likewise be forced to limit their selection of subcontractors to those who have either designed components themselves or are willing to guarantee another's design.

1. As more of the guarantee burden falls on prime contractors, it can be expected that they will be forced to perform more work in-house (make) rather than subcontracting (buy); often without competition and at a greater cost.

2. The participation of smaller businesses in weapons systems production will be reduced as prime contractors identify and weed out those companies unable (or unwilling) to demonstrate the financial capacity to stand behind the potential liabilities created by the statutory guarantees.

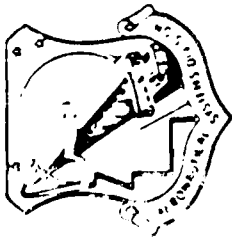
SUMMARY

In summary, the law, although well-intentioned, in practice would be unwieldy, expensive and run counter to efforts to increase competition and protect small businesses. The subject of guarantees is too complex for a vague and simplistic statement of law such as Section 794. We urge that the Section be repealed and the performance guarantee issue be reconsidered. The Department of Defense can and has contracted for appropriate warranties in the past and can be expected to continue to do so in the future. We are convinced that Congress need not dictate guarantee provisions. We believe that DOD is in the best position to recognize the necessities and complexities of utilizing warranties or performance guarantees when viewed from a defense perspective. Financial and operational risks must be considered jointly and warranties used only where appropriate and cost effective.

ALTERNATE FIGHTER ENGINE WARRANTY

by

COLONEL NELSON



ALTERNATE FIGHTER ENGINE COMPETITION

WARRANTY - RFP

● PURPOSE

- MOTIVATE/INCENTIVIZE THE CONTRACTOR
INFLUENCE DESIGN/MANUFACTURING/TEST/SUPPORT
DELIVER QUALITY PRODUCT INITIALLY, CONSISTENTLY
STABILIZE SUPPORT SYSTEM EARLY
RETAIN PERFORMANCE AND "ILITIES"
- SATISFY 1983 3000 TAC CYCLE WARRANTY STATUTE

● APPROACH

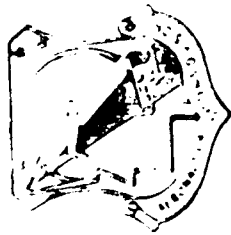
PART I - INTRODUCTION TO SERVICE

ASSURE QUALITY - AVOID INFANT MORTALITY
ASSURE CONSISTENCY - RETAIN PERFORMANCE

PART II - SPECIAL EMPHASIS ON HIGH COST/MAINTENANCE DRIVERS
ASSURE QUALITY - AVOID MAJOR SUPPORT DESTABILIZERS

PART III - LONG TERM STABILITY

ASSURE FLEET SUPPORT STABILIZED
INCENTIVIZE CONTRACTOR - RISK SHARING



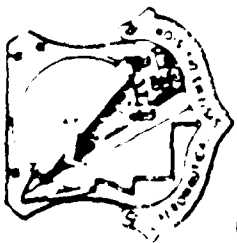
SOURCE SELECTION SENSITIVE

APE PROPOSAL ANALYSIS REPORT

SECTION 797 OF FY83 DOD APPROPRIATION ACT

"NONE OF THE FUNDS MADE AVAILABLE IN THE ACT OR ANY SUBSEQUENT ACT SHALL BE AVAILABLE FOR THE PURCHASE OF THE ALTERNATE OR NEW MODEL FIGHTER AIRCRAFT ENGINE THAT DOES NOT HAVE A WRITTEN WARRANTY OR GUARANTEE ATTESTING THAT IT WILL PERFORM NOT LESS THAN 3,000 TACTICAL CYCLES. THE WARRANTY WILL PROVIDE THAT THE MANUFACTURER MUST PERFORM THE NECESSARY IMPROVEMENTS OR REPLACE ANY PARTS TO ACHIEVE THE REQUIRED PERFORMANCE AT NO COST TO THE GOVERNMENT."

SOURCE SELECTION SENSITIVE



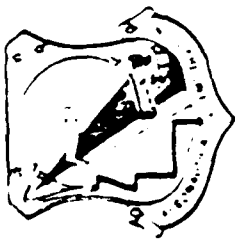
ALTERNATE FIGHTER ENGINE COMPETITION

WARRANTY - RFP

PART I - COVERAGE

REMEDY

● 3 YRS OR 1000 EFH	
● ENGINES, MODULES, COMPONENTS, PARTS	
● DEFECTS IN MATERIAL & WORKMANSHIP	PARTS AND LABOR
● UNUSEABLE/UNSERVICEABLE CONDITIONS	PARTS
● OPERATION OUTSIDE T.O. LIMITS	PARTS
● SUPPORT EQUIPMENT	
● DEFECTS IN MATERIAL & WORKMANSHIP	PARTS AND LABOR
● FUNCTION/OPERATION OUTSIDE REQUIREMENTS	PARTS AND LABOR
● 3000 TAC CYCLES OR 8 YRS	
● PERFORMANCE RETENTION	
● ≥ 98% INTERMEDIATE THRUST	PARTS AND LABOR
● ≤ 105% INTERMEDIATE SFC	PARTS AND LABOR
● PROVISION FOR AF TO DO WARRANTY WORK	
● CONTRACTOR LIABILITY - EACH OCCURRENCE	REIMBURSEMENT POLICY
● ENGINE OR MODULE	\$25K
● COMPONENT	\$10K OR REPLACE PART
● PART OR SUPPORT EQUIPMENT	\$10K OR REPLACE PART



ALTERNATE FIGHTER ENGINE COMPETITION

WARRANTY - RFP

PART II - COVERAGE

- 3000 TAC CYCLES OR 8 YRS

- COMBUSTOR/HIGH PRESSURE TURBINE
 - UNUSEABLE/UNSERVICEABLE CONDITIONS
 - OPERATION OUTSIDE T.O. LIMITS

- PROVISIONS FOR AF WARRANTY WORK

PART III - COVERAGE

- 3000 TAC CYCLE DEMONSTRATION

- ENGINE FLEETWIDE COMBINED UER & SER/1000 EFH
 - CONTRACTOR DESIGNATED RATE FOR F-15 & F-16
 - 1ST DEMO PERIOD SEP 87 - SEP 88 - ASSESSMENT JAN 89
 - ANNUAL DEMO'S THRU SEP 94 - ASSESSMENT EACH JAN
- CONTRACT ADJUSTMENT FOR RATE BETTER/WORSE

PARTS I, II INCLUDE PROVISIONS FOR LIQUIDATED DAMAGES, OTHER

PARTS I, II, III NECESSARY TO SATISFY 3000 TAC CYCLE WARRANTY STATUTE

REMEDY

PARTS
PARTS

REIMBURSEMENT POLICY

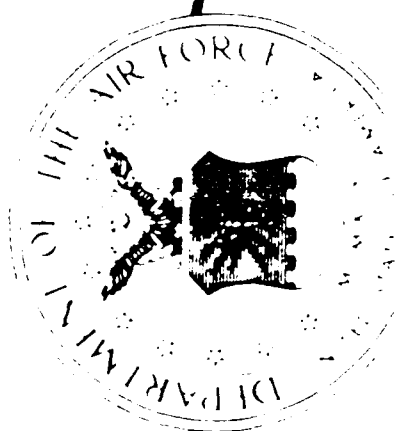
INCENTIVIZED RATE

± \$25K/REMOVAL

PPAC

by

LT. COL. GUENTHER

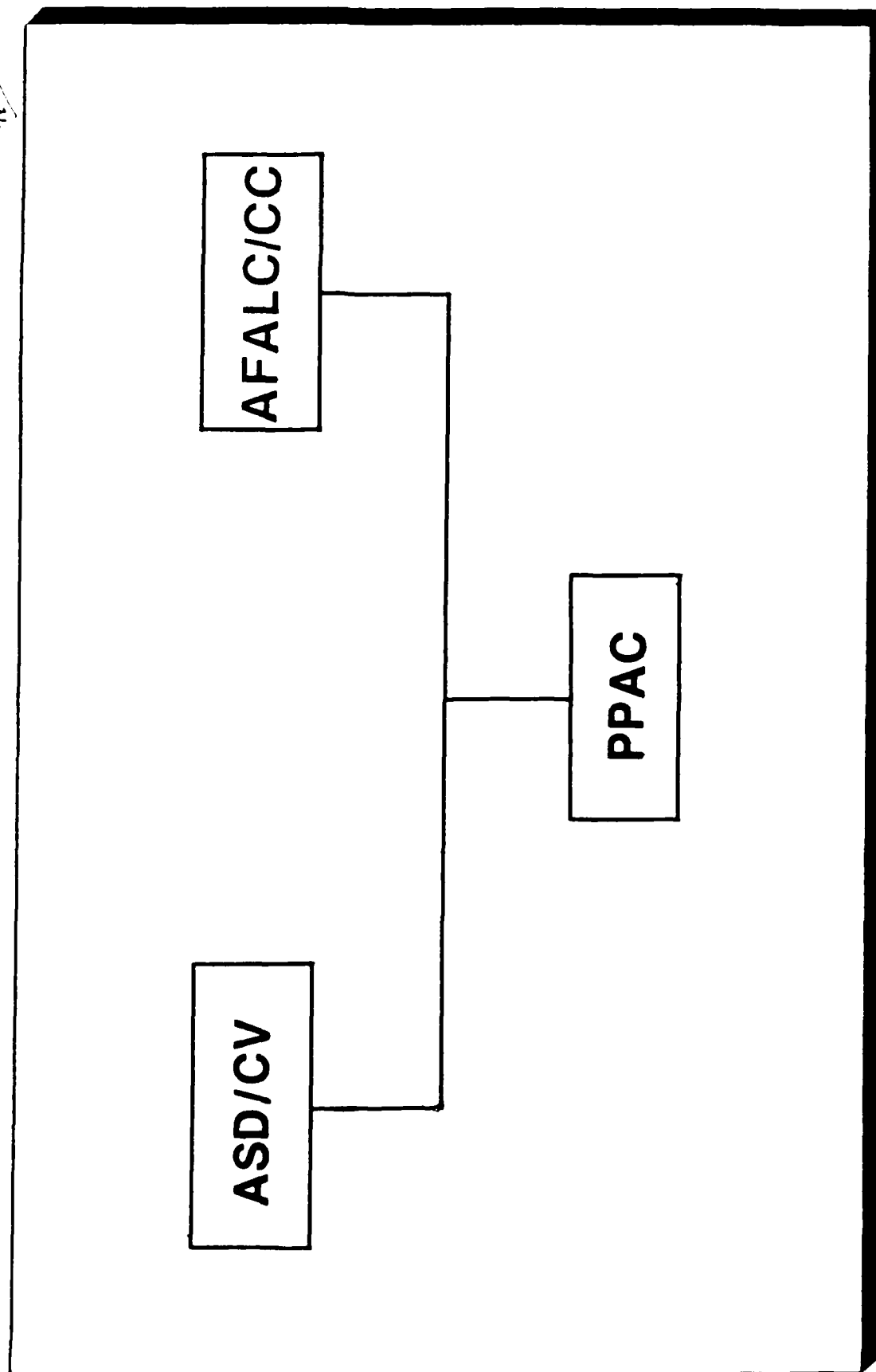


DEPARTMENT OF THE AIR FORCE PRODUCT PERFORMANCE AGREEMENT CENTER (PPAC)

LT COL M. A. GUENTHER
DIRECTOR



ORGANIZATIONAL STRUCTURE





PRODUCT PERFORMANCE AGREEMENTS

- **DEFINITION:**

ANY FORM OF WARRANTY, GUARANTEE, OR INCENTIVE USED TO ACHIEVE OR IMPROVE PRODUCT SUPPORTABILITY AND PERFORMANCE

- **EXAMPLES:**

- **RELIABILITY IMPROVEMENT WARRANTY (RIW)**
- **MEAN TIME BETWEEN FAILURE VERIFICATION TEST (MTBF-VT)**
- **AVAILABILITY GUARANTEE**
- **LOGISTICS SUPPORT COST GUARANTEE**
- **RIW WITH MTBF**
- **RELIABILITY GUARANTEE**
- **MAXIMUM PARTS COST GUARANTEE**



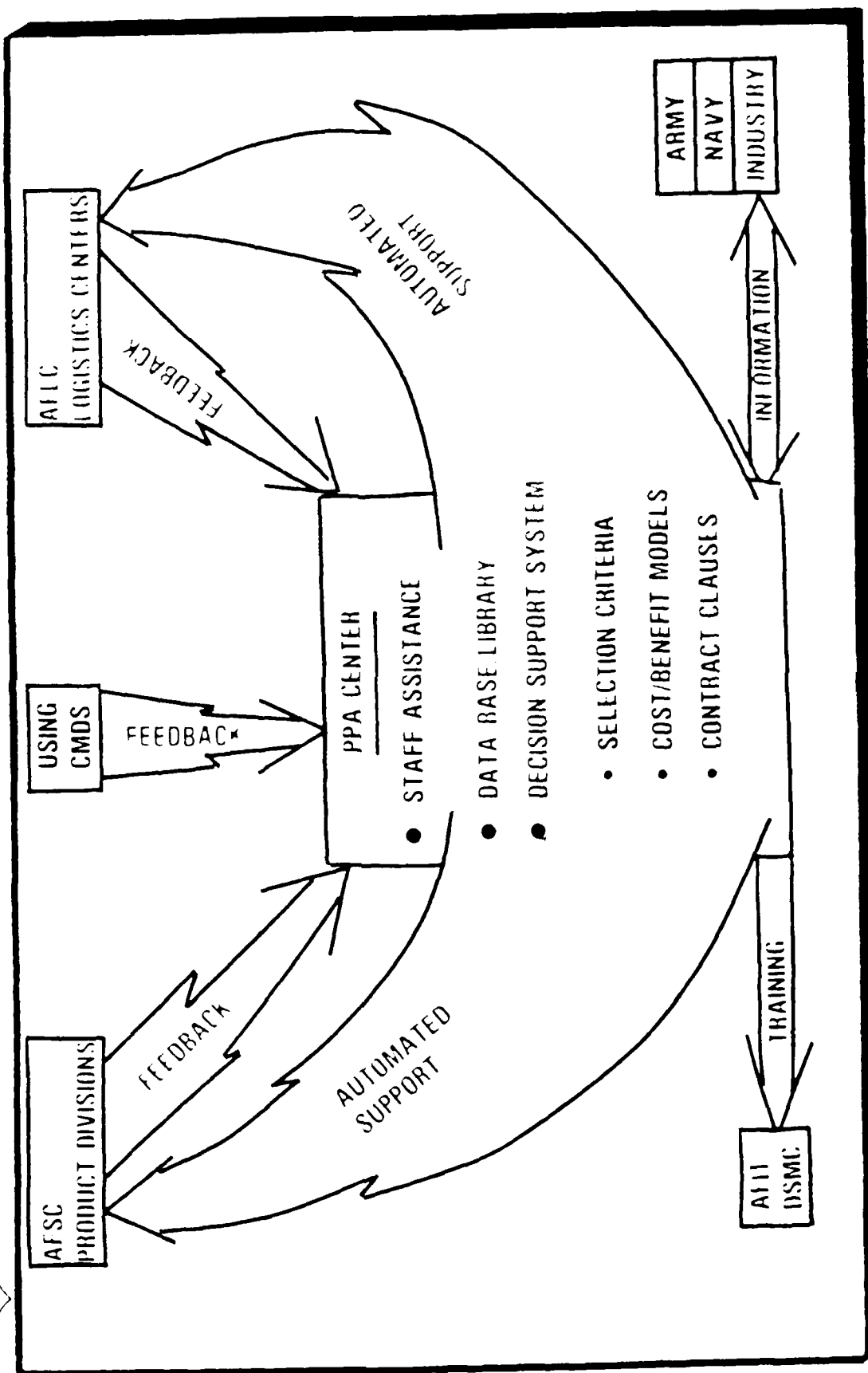
PPAC FUNCTIONS



- ASSIST ACQUISITION ACTIVITIES IN PPA SELECTION, TAILORING AND ADMINISTRATION
 - PROVIDE STAFF ASSISTANCE TO AFSC & AFLC
 - ESTABLISH & MAINTAIN PPA DATA REPOSITORY
 - ANALYZE EXISTING PPA'S
 - IMPROVE POLICIES, PROCEDURES, CONTRACT CLAUSES, PPA ADMINISTRATION
 - DEVELOP:
 - PPA SELECTION CRITERIA
 - COST/BENEFIT MODELS
 - AUTOMATED DECISION SUPPORT SYSTEM

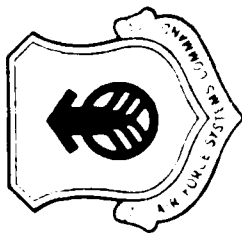


INITIAL OPERATIONS CONCEPT



PRODUCT PERFORMANCE AGREEMENT CENTER

PROGRAM SCHEDULE		SYSTEM NO. (PROJ)		AS OF MAY 84				COMPL DATE
L	PROGRAM MILESTONES	PRIOR SCHED	CALENDAR YEAR 1984	CALENDAR YEAR 1985	CY 1986	CY 1987	CY 1988	
1	DIRECTION (FORM 56)	09 82	J F M A M J J A S O N D	J F M A M J J A S O N D	1 2 3 4	1 2 3 4	1 2 3 4	
2	BUDGET AUTH # 42	08 82						
3	CONTRACT AWARD	09 82						
4	EXERCISE K OPTION	10 83						
5	DATA COLLECTION/ ANYL	10 82		↑				CONT
6	DELV IMPROVED PPAS	12 82		↑				CONT
7	LESSONS LEARNED	12 82		↑				CONT
8	STAFF ASSISTANCE	12 82						CONT
9	FACILITY S.O.P.S PLAN	12 82						
10	USERS GUIDE	01 83						
11	PPA GUIDE			↑	↑	↑	↑	
12	PMU			↑				
13	COST BENEFIT ANYL	10 83						
14	SELECTION CRITERIA	10 83	MANUAL	MANUAL				
15	DECISION SUPT SYS IOC		↑	↑				
16	DECISION SUPT SYS FOC			↑				CONT
17								
18								
19								



SUMMARY OF HISTORICAL EXPERIENCE

DATA IS LIMITED, BUT CONSISTENT. PPA PROGRAMS HAVE DELIVERED:

- HIGHER RELIABILITY WITH PPAs THAN WITHOUT
- MTBF PERFORMANCE ABOVE SPECIFICATION
- LOWER NET LIFE-CYCLE COSTS
- RELIABILITY GROWTH
- IMPROVED AVAILABILITY

BUT:

- PRE-PPA ANALYSIS IS PARAMOUNT
- SELECTIVE APPLICATION IS NECESSARY
- RIGOROUS MANAGEMENT IS REQUIRED



SUMMARY

- PPAC HAS BEGUN OPERATIONS
- PPA'S IMPROVE RELIABILITY/REDUCE LCC
- PPAC WILL PROVIDE SIGNIFICANT CONTRIBUTION

PPAs AND THE LOGISTICIAN

by

MAJ. GEN. M. T. SMITH

Instead of a title of "PPAs and the Logistician," for this talk, I thought something with a little more pizzazz like "Till Death Do Us Part" might be better. I really didn't have a marriage in mind with that title, but I think it's a pretty good reminder of the business we're in and the importance of building a product that will do what it's intended to do. It's clear to me -- and I hope it's clear to you, too -- that it's not how much equipment you've got that's important; what really matters is how much of that work will keep on working -- sortie after sortie after sortie. That's the way we've been preaching for years ... some years ago, when we thought no one was listening. And I guess that's why we're getting funding from Congress and the American public -- they want to see their tax dollars to buy equipment that will work as intended. In order to achieve that objective, we in the buyer community must say what we want in unambiguous terms, and you in industry must build that system with a mutually agreed to reliability. And those of us on the buying side of this business must be willing to pay that up front cost and to accept nothing less than what we contracted for. That's why I am interested in product performance agreements and the final product ... combat capability ... to get there I must be particularly concerned about PPAs and the maintainer ... the supply clerk ... the contract negotiator and administrator ... the two striper on the flight line ... all the folks who have to be involved in the process. The point is, we need to think about how a warranty will affect all those people and any others involved in fielding a supportable piece of equipment.

I am particularly interested in the impact of warranties on the logistics community. Now that may sound parochial, and it is ... but logistics is my job. It needs to be your job, too! It is my responsibility to think about warranties in the context of their logistics impact, and I ask each of you to consider, up front, the impact of your warranty decisions on the logistician. All the activities leading up to

the guarantee statute and subsequent hearings have revolved around its contracting and military impacts. Obviously, these are important issues, and we all know, we live in a goldfish bowl ... and, presently contracting issues and budgetary matters are those which are most easily understood by the public and thus the most inviting for sensational headlines. It is important that those up-front decisions that affect the contracting and budgetary aspects of our business be dealt with in an open and orderly manner if we are to avoid the bad press that so frequently works to erode public confidence in the way we do business. And as you know, the erosion of that public confidence carries with it the threat that Congress may pick up on that and decide to legislate our business for us more than they already do ... I don't need that ... you don't need that ... and I'm not convinced that it adds one thing to the way we do business except to make it more complicated, more cumbersome, and more time consuming. Additional time and effort are required to prepare warranty provisions ... to negotiate them into our contracts. They may increase the cost of weapon systems and equipment by amounts not yet determined. Contracting and budgeting are important, there's no question about that. But I believe the most important issue may be the impact this requirement will have on logistics and on our capability to manage and administer the programs to which it has been applied. A great deal of work has been done within DOD and certainly by the commercial world to improve the use, the application and the administration of warranties, both within and outside of the defense arena. This was done without the benefit of legislation, and I suggest we do not need to have good business judgment legislated by the Congress. I do not mean to imply that I think the legislation is all wrong. On the contrary, I support the intent of the legislation which, simply stated, is that the Government should get what it pays for. We expect quality products from industry, and we expect the quality of your product to be reflected in your profit and loss statements. As such, I do not suggest that the law be repealed as some do, but rather that it be revised to allow it to be applied where it makes sense and to allow alternative forms of corrective action by the contractor when performance requirements are not achieved.

When I think about the reaction of many of us to the warranty statute, I am reminded of the five emotional stages described by Elizabeth Kubler-Ross (in her book, "On Death and Dying"), which a person experiences as he goes through his own death. Some seem to view the warranty legislation that severely, so I consider it fitting that I try to draw an analogy between these two emotional traumas. Kubler-Ross outlines the five emotional stages as follows:

1. DENIAL -- "It can't be happening -- it's not true!"
2. ANGER -- "Why has it come to this? Why me?"
3. BARGAINING -- "Can't we postpone this?"
4. DEPRESSION -- "All is lost"
5. ACCEPTANCE -- "I'm ready"

With only minor modification, these stages can be adapted to the person learning to cope with current warranty requirements. The excruciating overlapping syndromes now being manifested in your daily postulations and emotional reverberations may be for very short periods of time or may extend over years...now...that's government-ese for "I know you're concerned, but it won't last forever." But whatever the circumstances that brought us to where we are today, it's a safe bet we're not neutral on the subject of warranties. Let us examine these stages one at a time and see if our responses are, indeed, valid.

First, DENIAL. "It can't be--it's not true!" Well, what makes you think it can't be true? If you read Section 794 of the 1984 Defense Appropriations Act, you'll know it's true. It's law! Let's just think of it as "Creative suffering." But while you are floundering to overcome peace of mind, think of the poor logisticians who didn't even know what hit them. Are logistics factors affected by the warranty? Are any special storage or transportation requirements created by the warranty? Any impact on maintenance? Have we set up a large infrastructure...and now can't use

it? How about the people who have to keep track of the warranted item? Now they are the ones who should be saying "No, this can't be happening to me!" Remember, they have to put up with everything we do in response to the statute, so it is important to keep the logistician in mind when we construct these warranties. I'll venture to say that if you don't keep the logistician in mind, you won't have a warranty that will work...if that happens, shame on all of us--because someone else will relegislate another fix!

The next stage is ANGER. "Why has it come to this? Why Me? We might sub-title this section, "How to Whine Your Way to Alienation." Why you? Why me? I'll tell you why. If anything goes wrong, those of us in the buyer-seller relationship are seen as the culprits. And that's probably fair--even if it makes us angry. The way our system works, let one thing go wrong, let one small perturbation occur, and someone, somewhere, will make a rule, write a regulation, or pass a law to fix it. And it's hard not to admit that we have only ourselves to blame. Given the goldfish bowl environment of our business, any failure to field a reliable and supportable product will be seen as a failure in the acquisition system: Not in the weapon system. But think about the poor logistician at the other end of our procurement chain who has to live with our mistakes, who has to make the system work, who has to beg, borrow, steal, and improvise because we didn't give him what he needed. Think of the poor logistician who needs something fixed in a hurry or needs extra spare parts because the piece of equipment we sent him wasn't what he thought it would be. More importantly, perhaps, wasn't what it should have been. Yes, think of the poor logistician.

The third state in Kubler-Ross' list is BARGAINING. Now, all of us who have ever been in negotiation understand the fine art of bargaining. This says, "Can't we postpone this? Can't we put it off a little longer?" This is a good way to tap dance your way to public ridicule. You know as

well as I do that there is no postponing the law...you either comply with it...or violate it...and I think someone has already said that we are a Government of laws...not individuals. It's a shame that we have to resort to shock treatment to get our point across, but the simple fact is we've been clamoring for product quality in the things we buy for as long as I can remember. And when Congress and the public perceived that we weren't buying quality, rightly or wrongly, we had it legislated for us. So now we have to live with it! But think about the poor logistician. When he has a mean-time-to-repair or a turnaround time that's biting him on his time sheet, he has no opportunity to postpone correction of defects. We can save him that agony by building in quality from the outset and by giving him a piece of equipment that works like it was intended to work.

Fourth in the list of emotional states is DEPRESSION. The feeling that "Woe is me: All is lost." This tendency to become depressed stems from the fact that not only do we not like what's going on around us, but also because there is no way of stopping the process. Every delaying tactic, every maneuver have failed to slow the grim process of the sun rising and setting on a world filled with mandatory warranties. Now our depression takes on a new dimension. We are even more depressed when we realize that we are moving at an ever-increasing pace toward the termination of the flexibility and judgment we once enjoyed. But think of the poor logistician. He once had procedures and regulations that he could follow as he settled in to do his job with a comfortable routine--one with which he was totally familiar. And now we write a warranty that requires an entire new dimension of procedures--and he didn't even have a voice in the matter. We owe it to him to simplify his procedures as much as we possibly can. If only we had thought of the poor logistician!

The last phase in this series of responses to the inevitable is ACCEPTANCE--HAH! That's the hard part--the "I'm ready" phase. The movement into the acceptance stage is almost unnoticed at first, even

to a man himself. It's like the movement of a wave to the shore. You look at the ocean, and it's almost impossible to pick up an individual wave. But as it moves closer to the shore, it begins to take form and rises higher and higher. And so it is with warranty requirements. We've looked long enough at the shapeless warranty ocean...they ought to be taking form and becoming clearer and clearer. Just as that wave breaks on the shore, and you sense its power, so we all must now read the warranty statute and begin to grasp its individual form and substance. As in the last phase of death, we must begin to see life differently. Only weeks before you had.

CONTRACTOR PPA EXPERIENCE

1. Delco Systems Oprs - GMC
Bob Fleischacker
2. Litton
Ernest Theisen
3. Lear Siegler
Bill Stroh
4. Rockwell Collins
Dick Ross

DELCO SYSTEMS OPRS - GMC

BOB FLEISCHACKER

PRODUCT PERFORMANCE AGREEMENTS

JUNE 19, 1984

**DELCO SYSTEMS OPERATIONS - GMC
(FORMERLY DELCO ELECTRONICS)**



AGENDA

I. PRODUCT PERFORMANCE AGREEMENT'S (PPA'S)

- REQUIREMENTS
- BENEFITS

II. DELCO'S APPROACH TO PPA'S

- PHILOSOPHY
- CONSIDERATIONS

III. DELCO'S EXPERIENCE WITH PPA'S

- COMMERCIAL/GOVERNMENT PRODUCT COMPARISON
- C-IVE INS-RIW PROGRAM
- FSA/CAS PROGRAM

IV. SUMMARY



Delco Systems

I. DELCO'S UNDERSTANDING OF PRODUCT PERFORMANCE AGREEMENTS.

- REQUIREMENTS
 - WARRANTY
 - RELIABILITY PERFORMANCE
MTBF/MTBR GUARANTEES
 - MAINTENANCE PHILOSOPHY
REPAIR TURNAROUND-TIME GUARANTEES
 - PENALTIES
ACCEPTABLE RISK'S
 - PERIOD OF PERFORMANCE
 - PERSONNEL TRAINING
- BENEFITS
 - CUSTOMER
 - PRODUCT WITH HIGH RELIABILITY
 - MAINTENANCE COST PROTECTION
 - AN ASSESSMENT OF OVERALL SUPPORT REQUIREMENTS
 - MANUFACTURER
 - REASONABLE ROI
 - COST/PROFIT INCENTIVES
 - MARKET PERFORMANCE RECOGNITION



Delco Systems

II. DELCO'S APPROACH TO PRODUCT PERFORMANCE AGREEMENTS.

- PHILOSOPHY
 - SIMILAR FOR BOTH COMMERCIAL & GOVERNMENT PROGRAMS.
 - EXISTING PRODUCTS.
 - NEW DESIGNS.
- CONSIDERATIONS
 - COMPETITIVE PROCUREMENT.
 - APPLICATION/ENVIRONMENT.
 - SYSTEM INTERFACE.
 - MAINTENANCE REQUIREMENTS.
 - COST VS. PRODUCT PERFORMANCE REQUIREMENTS.
 - ABILITY TO MEET ALL REQUIREMENTS AT A REASONABLE PROFIT.



Delco Systems

III. DELCO'S EXPERIENCE WITH PRODUCT PERFORMANCE AGREEMENTS (PPA'S)

- COMMERCIAL/GOVERNMENT PROGRAMS - PPA'S COMPARISON

<u>PPA FUNCTION</u>	<u>COMMERCIAL</u>	<u>C-IVE INS</u>	<u>FSA/CAS</u>
WARRANTY	1 - 3 YRS	4 YRS	2 - 3 YRS
RELIABILITY GUARANTEES	5 YRS	4 YRS	V.T. PROGRAM
PENALTIES	CONSIGNMENT LRU'S	CONSIGNMENT LRU'S	SPARE LRU'S
REPAIR TAT (LRU'S)	7 - 10 DAYS	4 DAYS ON SITE 7 DAYS - MFG.	6 DAYS - ICS 35 DAYS - DEPOT
PENALTIES	CONSIGNMENT LRU'S	CONSIGNMENT LRU'S	*

*A FACTOR INCLUDED IN CONSIGNMENT FORMULA.



Delco Systems

- C-IVE INS RIW PROGRAM RESULTS (1977 - 1981).
 - OUTSTANDING HIGH AIRCRAFT READINESS STATUS.
 - EXCEEDED CONTRACT MTBF GUARANTEES.
 - SYSTEM INS 16% BETTER THAN CONTRACT GUARANTEE (1,313 HRS. VS. 1,128).
 - INERTIAL NAV UNIT MTBF 39% BETTER THAN CONTRACT GUARANTEE (2,091 HRS VS. 1,500).
 - ACHIEVED 4.3 DAY REPAIR TAT.
 - PRICE ADJUSTMENT OF \$500,000 TO GOVERNMENT DUE TO REDUCED FLIGHT HOURS.
 - (17) ECP TYPE ACTIONS AT NO COST TO GOVERNMENT.
 - HIGHLY EFFECTIVE FAILURE/REPAIR DATA SYSTEM (DELCO DESIGNED SYSTEM).
 - COOPERATIVE/OUTSTANDING AIR FORCE PERSONNEL SUPPORT.
 - POST RIW PROGRAM RECOMMENDATION.
 - RIW WITH PROPER CONTRACT & CANDIDATE PRODUCT PROVIDES TANGIBLE BENEFITS BOTH TO GOVERNMENT AND MANUFACTURER.
 - GOVERNMENT/MANUFACTURER TEAM APPROACH ESSENTIAL TO RIW SUCCESS.
 - POST RIW GOVERNMENT ACTION NECESSARY TO MAINTAIN ENGINEERING CURRENT WITH MARKET PLACE IN HIGH TECHNOLOGY ITEMS.



Delco Systems

- FSA/CAS PROGRAM
 - INTERIM CONTRACTOR SUPPORT (ICS) PROGRAM.
 - 2 - 3 YR CONTRACTOR SUPPORT MAINTENANCE.
 - ESTABLISHMENT OF TWO (2) ICS FACILITIES AT AIR FORCE BASES.
 - DEPOT MAINTENANCE PERFORMED BY CONTRACTOR.
- MTBF PROGRAM
- VERIFICATION TEST PROGRAM.
 - START 18 MONTH AFTER INITIAL PRODUCTION DELIVERY.
 - TEST PROGRAM 6 MONTHS.
 - PROVIDE CONSIGNMENT LRU'S PER CONTRACT FORMULA AT NO COST TO GOVERNMENT.
 - PROGRAM CONDUCTED JOINTLY BY GOVERNMENT AND MANUFACTURER.
- RELIABILITY QUALIFICATION TEST PROGRAM.
- PRODUCT VERIFICATION TEST PROGRAM.



Delco Systems

IV. SUMMARY

- PRODUCT PERFORMANCE AGREEMENTS (PPA'S).
 - ARE NOT NEW TO THE INDUSTRY.
 - MUST BENEFIT THE BUYER AS WELL AS THE SELLER.
 - MUST HAVE SHARED RISKS (TWO-WAY STREET).
 - MUST CONTAIN A REASONABLE PERIOD OF TIME TO DEMONSTRATE PERFORMANCE.
 - MOST EFFECTIVELY APPLIED TO NON R & D PROGRAMS.
 - A STANDARD SHOULD NOT BE APPLIED DIRECTLY TO ALL SYSTEM TYPE PROCUREMENT.
 - EACH PPA SHOULD HAVE SPECIFIC REQUIREMENTS TO MEET REASONABLE CUSTOMER OBJECTIVES.
 - NEED NEW TECHNIQUES FOR DEMONSTRATION AND CONSIGNMENT FORMULAS FOR HIGH REL ITEMS (MTBF 5,000 HRS).



Delco Systems

LITTON

ERNEST THEISEN



GUIDANCE & CONTROL SYSTEMS

STANDARD NAVIGATION UNIT

RELIABILITY IMPROVEMENT WARRANTY

● LN-39 RIW

● DEFINITION

● EXCLUSIONS

● TURNAROUND TIME

● MTBF

● PENALTY SPARES

● RIW REPORTING

● SUMMARY

E. J. THEISEN
15 JUNE 1984



GUIDANCE & CONTROL SYSTEMS

LN-39 STANDARD INERTIAL NAVIGATION UNIT

RELIABILITY IMPROVEMENT WARRANTY

- RIW BEGAN APRIL 20, 1981 - ENDS APRIL 20, 1986
- TO DATE 294 INSTALLED LN-39 SYSTEMS IN A-10 AIRCRAFT UNDER WARRANTY
- RIW MANAGED AT 7 BASES
 - BENTWATERS AFB U.K.
 - MYRTLE BEACH AFB
 - ENGLAND AFB
 - NELLIS AFB
 - HANCOCK FIELD
 - SUWON AB KOREA
 - EIELSON AFB



- DEFINITION

- CONTRACTOR WILL CORRECT OR REPLACE ANY INU WHICH FAILS DURING THE 5 YEAR WARRANTY PROGRAM
- CONTRACTOR GIVEN MAXIMUM LATITUDE TO MAKE NO COST CHANGES TO IMPROVE RELIABILITY AND MAINTAINABILITY HOWEVER GOVERNMENT RETAINS RIGHT TO APPROVE CLASS I CHANGES

- CONTRACTOR INCENTIVIZED IN TWO AREAS

- MEAN TIME BETWEEN FAILURE (MTBF) GUARANTEE
- REPAIR TURNAROUND GUARANTEE



GUIDANCE & CONTROL SYSTEMS

Litton

- MTBF GUARANTEE
- INU RELIABILITY GROWTH PROFILE STATED IN CONTRACT
- GROWTH CHECKED AT 6 MONTH INTERVALS
- RTOK RATES IN EXCESS OF 5% COUNTED AS FAILURES
- IF RELIABILITY GUARANTEE NOT MET, CONTRACTOR PROVIDES
CONSIGNMENT SPARES
- QUANTITY DETERMINED BY FORMULA PROVIDED IN CONTRACT
- MONETARY PENALTY FOR LATE DELIVERY OF CONSIGNMENT SPARES
FOR EACH LATE DAY



GUIDANCE & CONTROL SYSTEMS

STD NAV RIW

- MTBF CALCULATION

- $$\frac{\text{AOT X DAYS X INSTALLS}}{\text{FAILURES}} = \text{TOT} \div \frac{\text{FAILS}}{\text{MTBF}}$$

- AVERAGE OPERATING TIME CALCULATION (AOT)

- WHEN INU IS REMOVED FROM AIRCRAFT THE INSTALLATION/REMOVAL
DATES AND ETI READINGS ARE RECORDED

- ADD THE NUMBER OF DAYS AND HOURS INSTALLED FOR ALL FAILED UNITS,
DIVIDE THE NUMBER OF HOURS BY NUMBER OF DAYS TO DETERMINE AOT



GUIDANCE & CONTROL SYSTEMS

- TURNAROUND TIME GUARANTEE
- CONTRACTOR MUST AVERAGE 22 DAY TURNAROUND FROM RECEIPT TO REPAIRED AND STORED
- CHECKED AT 6 MONTH INTERVALS
- IF GUARANTEE NOT MET, CONTRACTOR PROVIDES CONSIGNMENT SPARES
- MONETARY PENALTY FOR LATE DELIVERY OF CONSIGNMENT SPARES FOR EACH LATE DAY
- REPLACEMENT SPARES MUST BE SHIPPED WITHIN 1 WORKING DAY AFTER RECEIPT OF MATERIAL RELEASE ORDER (MRO)



GUIDANCE & CONTROL SYSTEMS

TURNAROUND TIME

- | | | |
|--------------|---|---|
| <u>FIELD</u> | ● | CLOCK STARTS WHEN AF GIVES FAULTY UNIT TO LITTON FSR |
| | ● | CLOCK <u>STOPS</u> WHEN LITTON FSR GIVES UNIT BACK TO AF BECAUSE: |
| | | 1. UNIT WAS REPAIRED |
| | | 2. UNIT IS TO BE SHIPPED TO FACTORY FOR REPAIR |
| <u>PLANT</u> | ● | CLOCK <u>STARTS</u> WHEN UNIT ARRIVES ON DOCK |
| | ● | CLOCK <u>STOPS</u> WHEN UNIT MOVES TO BONDED STORES |
| | ● | TIME IN TRANSIT (SHIPPING TIME) DOES NOT COUNT |
| | ● | SATURDAYS & SUNDAYS COUNT AS REGULAR DAYS |



GUIDANCE & CONTROL SYSTEMS

- FAILURE DEFINITION
 - ALL REMOVALS DUE TO A FAILURE INDICATION ARE CLASSED AS FAILURES
 - REMOVALS CAUSED BY PILOT ERROR, I.E.: WRONG PRESENT POSITION OR WRONG DESTINATION ENTERED, TAXI BEFORE NAV READY LIGHT, ETC. ARE NOT COUNTED
 - UNITS THAT RE-TEST OK (RTOK) ARE COUNTED AS FAILS WHEN THEY EXCEED 5% OF THE TOTAL FAILURES
 - EXCESS RADIAL ERRORS (RER) FAILURES ARE COUNTED UNLESS LAST CALIBRATION OF THE INU WAS MORE THAN 60 DAYS PRIOR



GUIDANCE & CONTROL SYSTEMS

- EXCLUSIONS FROM RIW

- CONTRACTOR SHALL NOT BE OBLIGATED TO CORRECT OR REPLACE ANY INU DAMAGED OR LOST DUE TO:

- MAINTENANCE BY UNAUTHORIZED PERSONNEL
- NON INU INDUCED FIRE OR EXPLOSION
- AIRCRAFT ACCIDENT
- SUBMERSION
- ACTS OF GOD
- COMBAT



GUIDANCE & CONTROL SYSTEMS

RIW REPORTING

- RIW WARRANTY DATA REPORT (QUARTERLY)
 - FAILURE DATA BY S/N
 - MTBF
 - TURNAROUND TIME
 - FAILURE ANALYSIS
 - AOT & TOT
- RIW EFFECTIVENESS REPORT (ANNUALLY)
 - GENERAL SUMMATION OF FAILURE TRENDS, CORRECTIVE ACTION TAKEN & PLANNED FOR FUTURE
- PARTS CONSUMPTION REPORT (E.O.C.)
 - A LISTING OF ALL PARTS CONSUMED TO ACCOMPLISH REPAIRS UNDER THE RIW CONTRACT
- RIW MANAGEMENT
 - DEDICATED RIW MANAGER
 - DIRECT NEGOTIATION OF MTBF WITH USAF
 - COORDINATES ALL QUALITY ASSURANCE REQUESTS



GUIDANCE & CONTROL SYSTEMS

IMPLEMENTATION FEATURES

- **FIELD ENGINEER PERFORMS "I" LEVEL MAINTENANCE AT EACH BASE**
- **FIELD ENGINEER PROVIDES TRAINING AND FAMILIARIZATION INSTRUCTION TO CREW AND MAINTENANCE PERSONNEL**
- **RIW TEAM IN DAILY COMMUNICATION WITH BASES**
- **INCORPORATION OF ECP'S WITH RELIABILITY IMPROVEMENT FEATURES**
 - **SIX IN 18 MONTHS**



GUIDANCE & CONTROL SYSTEMS

RIW ADVANTAGES TO CONTRACTOR (LITTON)

- IT IS A LITTON PRODUCT REGARDLESS OF WHO MAINTAINS IT!
- LITTON HAS DIRECT HANDS-ON CONTACT TO HELP PRODUCT THROUGH GROWING PAINS
- DIRECT IMMEDIATE FEEDBACK ON PERFORMANCE
- LITTON HAS SOME IMPACT ON ORDERLY PLANNING OF ACQUISITION AND IMPLEMENTATION OF SUPPORT
- RIW FINANCIAL IMPLICATIONS OF CONTRACT ENSURES TOP MANAGEMENT ATTENTION TO PRODUCT
- CONTRACTOR HAS MOTIVATION TO IMPROVE; INTERNAL OPERATING PROCEDURES; REPAIR AND TEST PHILOSOPHIES; RELIABILITY ANALYSIS TECHNIQUES
- SUCCESS RESULTS IN ADDITIONAL BUSINESS AND PROFIT ENHANCEMENT



RIW PROBLEMS

- VERY DIFFICULT TO COST RISK
- ECO INCORPORATION DIFFICULT
- PLACING EMPHASIS ON PENALTIES INSTEAD OF INCENTIVES CREATES ADVERSARY SITUATION

LEAR SIEGLER

BILL STROH

Lear Siegler/Instrument Division PPA experience includes products such as the attitude and heading reference for the C-141 aircraft, a navigation and weapon delivery system for the F-4, and the performance data computer system for the 737 and 727 aircraft, this latter instance being a commercial application.

I must point out, however, that almost 15 years ago we launched into this arena with the Failure Free Warranty. Although this was not, strictly speaking, a product performance guaranty as it finally evolved, the philosophy that guided the formation and negotiation of this pioneering effort embodied such concepts. Stated simply, we told the Navy that if we repaired the gyro platform which was the sensor of the AJB-3 Bombing System, and were allowed to decide the extent of the repair and were further allowed to make design changes, that we could increase the MTBF of the gyro platform. They called our bluff and agreed to write such a contract. Now where performance entered into the equation, was that we and the Navy knew the then current MTBF and fixed the number of repairs to be compensated during the five year duration of the contract at something less than that which would have resulted from that MTBF. Thus, while MTBF and its improvement were not contractual requirements, as such, failure to achieve the results we predicted would have been expensive for us. I am happy to report that we did better than promised which made all parties to the bargain very happy. So pleased were they that the contract was renewed for an additional five years, once again with MTBF growth demanded to make the program profitable for us. And once again the results were mutually rewarding.

With that program as background, we competed for and won a program to retrofit the C-141 fleet with an Attitude and Heading Reference System of a later generation. The ground rules of the competition and the resulting contract called for a Reliability Improvement Warranty with a minimum acceptable MTBF which had to be attained by the end of the warranty period. We guaranteed an MTBF of 1300 hours and achieved 2658 hours.

In the case of the Nav/Wep system for the F-4, and by the way this was with a foreign government, our contract contained a Reliability Improvement Warranty with a specified minimum MTBF and, in addition, a guaranty of navigation accuracy as measured in all flights flown during the first 24 months of operation. In this case, while we came close to attaining the MTBF goal, we did miss and were required to provide additional spares, free of charge, as a consideration. The accuracy guaranty was successfully met. All-in-all, a good program from both the LSI and customer viewpoints.

Now, lest you think that all of our experience has been pleasant, let me tell you about some of the scar tissue we acquired in the commercial part of our business. As the slide shows, we have had guarantees that covered both MTBF and MTBUR. In the case of MTBF our experience has been similar to that in the government realm. However, in the case of MTBUR, the results have not been nearly so rewarding. Why? Because, included in the statistics which produce that parameter are the effects of operating procedures, training of both maintenance and flight crews, and motivational issues.

These effects, being outside of our control, preclude success --- or at least they have to date. I must say that some airlines are as unhappy as we are with the very high false pull rates they are experiencing and are studying potential changes in procedures and operating techniques in order to realize the good MTBFs that are being demonstrated.

This last experience underscores the significance of having control of your destiny in PPAs. In our RIW and guaranteed MTBF contracts, we controlled those elements necessary to achieve success. Specifically, we controlled the repair procedures, we controlled the parts used, we controlled the original manufacturing labor as well as the repair labor, in that repairs were performed at our facility or at authorized repair stations only, and we controlled the design. These programs were success-

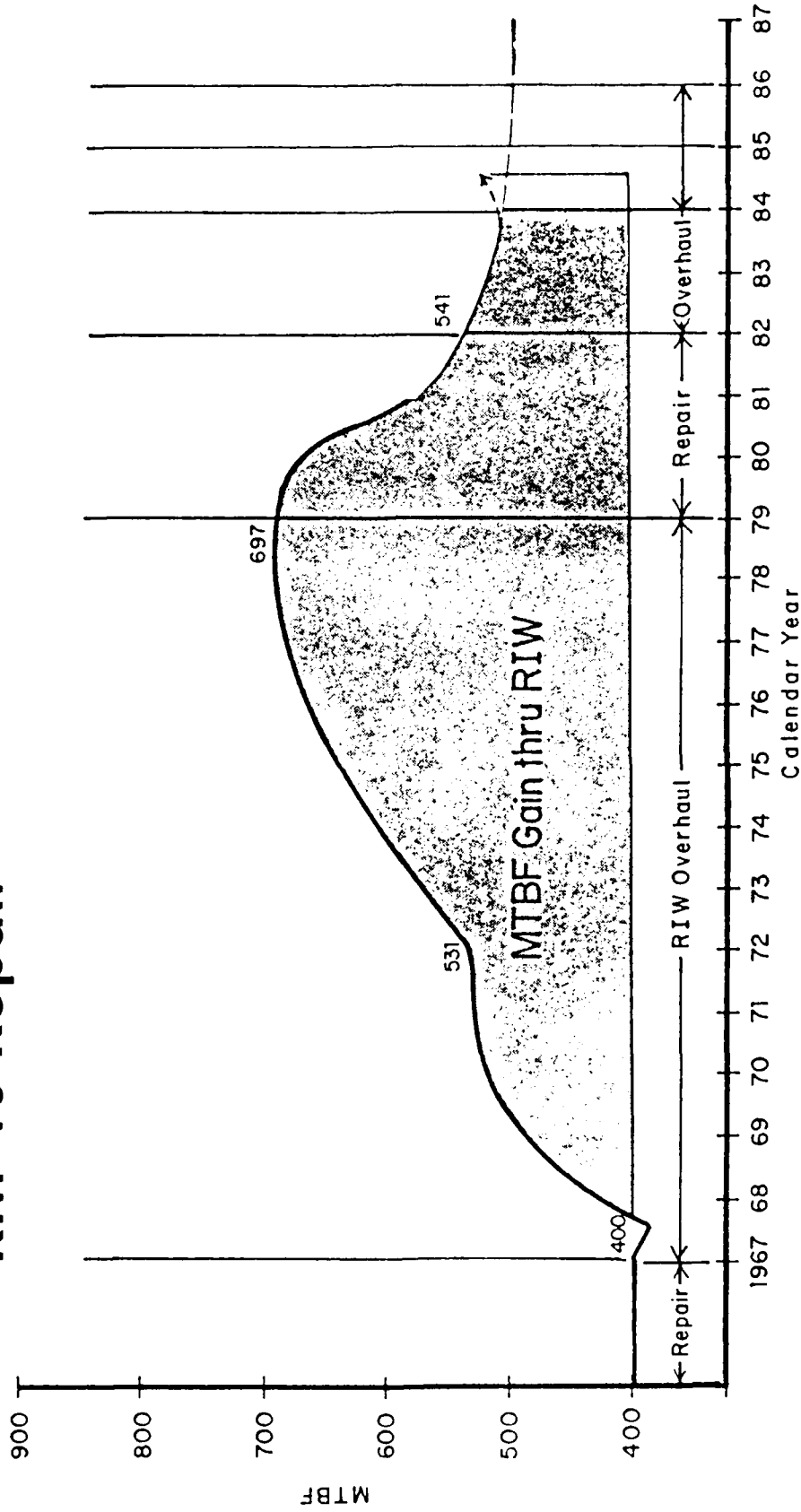
ful. When we came to MTBUR, too many success critical parameters were out of our control, and these programs have not been successful.

LSI PPA EXPERIENCE

- C-141 Attitude & Heading Reference System.
- F-4 Navigation/Weapon Delivery System.
- 727/737 Performance Computer.



2171P PA MTBF History RIW vs Repair



C-141 AHRS

- RIW

- MTBF

5

NAVIGATION/WEAPON DELIVERY SYSTEM

- RIW
- MTBF
- Navigation Accuracy
- Bombing Accuracy



COMMERCIAL PDC SYSTEM

- MTBF
- MTBUR

9.3.8

5

CONTROL

RIW & MTBF

- Repair Procedures
- Parts
- Labor
- Design

MTBUR

- Training (N)
- Operating Procedures (N)



LESSONS

1. Define, Precisely, what is to be Guaranteed
2. Define how Guarantee Parameters will be Measured
3. Avoid Guaranteeing what you can't Control
4. Define how the Guarantee ends (when or under what conditions)
5. Risk Value must have Reasonable Relationship to Business Value
6. Risk must be Quantifiable



ROCKWELL COLLINS

DICK ROSS

ARN-118(V) TACAN
RELIABILITY IMPROVEMENT WARRANTY

PREPARED BY:
INTEGRATED LOGISTICS SUPPORT DEPARTMENT
OF
COLLINS GOVERNMENT AVIONICS DIVISION
ROCKWELL INTERNATIONAL

VIEW-CELL #1

BACKGROUND

- PRIOR EXPERIENCE
- PROGRAM HIGHLIGHTS

SIGNIFICANT RIW REQUIREMENTS

KEY RIW OPERATIONAL CRITERIA

RESULTS

SUMMARY

VIEW-CELL #2 - PRIOR EXPERIENCE

ROCKWELL-COLLINS EXPERIENCE BASELINE

- COMMERCIAL WARRANTIES
- EXTENDED REPAIR WARRANTIES (KC-135 ASQ-141)
- INTERIM CONTRACTOR SUPPORT

We have had considerable experience with commercial warranties, some experience with extended repair warranties such as the KC-135 ASQ 141 Program and had performed some interim contractor support.

LESSONS LEARNED FROM PRIOR EXPERIENCE

- FIELD MODIFICATIONS TO RAISE MTBF ARE EXPENSIVE
- EXCESSIVE UNVERIFIED FAILURES TIE-UP SPARES AND FACILITIES
- INDUCED FAILURES CAN BE EXCESSIVE

During the KC-135 extended warranty program mentioned above, we did experience some MTBF problems and were required to perform a number of field modifications. This involved sending personnel to the field with parts and support equipment to several locations.

On this same program, we experienced nearly 80% unverified failure rate and had absolutely no protection in the warranty program. We had a situation where we had an intermittent failure on a radio altimeter due primarily to the antenna placement on the aircraft. It turned out that when the gear was lowered in some installations, the gear door interfered with the RF pattern from the antenna and would cause intermittent operation in the altimeter and pilot squawks. This obviously ties up innumerable spares, the retest time and so forth to find no particular problem in the equipment.

In the line of induced failures, there was at this time no protection for the contractor in the warranty and therefore, we wound up with some installation problems where boxes were damaged and had to be repaired at our cost. They were then counted as a failure rather than being excluded from MTBF calculations.

VIEW-CELL #3 - PROGRAM HIGHLIGHTS

GRANDFATHER OF RELIABILITY GUARANTEES - 1975

ESTABLISH A STANDARD TACAN WITH NEW TECHNOLOGY

The ARN-118 was to replace several different types of TACANs that were in the field and to introduce new technology, and obviously have better reliability.

PRIOR TACANS HAD AN MTBF OF $\approx$ 300 HOURS

MAINTENANCE NIGHTMARE

CONTRACT REQUIREMENTS

- DESIGN TO UNIT PRODUCTION COST
- LONG TERM WARRANTY WITH PENALTIES

The contract allowed for a unique mix of requirements in this case. The contractor was allowed to choose commercial parts to take advantage of the cost savings, but had to be careful to insure the reliability goals were achieved to avoid penalties under the warranty.

VIEW-CELL #4 - SIGNIFICANT RIW REQUIREMENTS

PROGRAM LENGTH WAS 60 MONTHS

MTBF MEASURED AND REPORTED ANNUALLY

The government read the ETI's on the TACAN's monthly and provided the data to Collins. We then prepared a progress report every six months and an annual report on the MTBF.

MTBF PENALTY - REDESIGN, MODIFY, AND PROVIDE PIPELINE SPARES UNTIL MTBF ACHIEVED

CONTRACTOR OPERATED SPARES STORAGE

SPARES SHIPMENT WITHIN 72 HOURS AFTER REQUEST

We were totally responsible for all spares activity, initial quantification, the stockage and control of the bonded storage area and issuing the spares to the field immediately upon request.

15 DAY REPAIR TURNAROUND WITH LIQUIDATED DAMAGES

30% UNVERIFIED FAILURE LIMIT WAS NEGOTIATED

VIEW-CELL #5 - KEY R/W OPERATIONAL CRITERIA

SEALED LRUS TO AVOID IMPROPER MAINTENANCE

MAINTENANCE ACTION CARD ON EACH LRU

The cards provided space to put the installation date, removal date and a code selected from a group of maintenance actions, to log the maintenance activity on stayed with the LRU throughout its life in the program.

APPROVED FAULT VERIFICATION PROCEDURE

The government and Collins agreed upon a fault verification procedure which became a part of the contract and was published in the tech orders. It was performed in the field when a unit was removed from an aircraft and the same identical procedure was performed on the same support equipment in the factory to confirm the failure. This enabled us to be able to negotiate a limit on unverified failure exposure.

LIMIT ON UNVERIFIED FAILURES FOR CONTRACTOR EXPOSURE

INDUCED FAILURE PROTECTION FOR CONTRACTOR

RELIABLE SYSTEM BUILT-IN-TEST

A real key to ensuring and also to help hold down unverified failures is to do everything possible to keep the equipment from being removed from the aircraft. A very successful built-in-test helps insure that the right component is pulled the first time.

EASY TO USE BENCH SUPPORT EQUIPMENT

FIND AND FIX RELIABILITY PROBLEMS AS EARLY AS POSSIBLE

Collins did everything possible in the early stages of flight test on the program including very careful analysis of problems that came out of PRAT and additional testing during IOT&E to locate any suspect component problems in the equipment. Action was immediately taken to replace parts that could cause a problem and be a factor in the reliability of the equipment in the field.

VIEW-CELL #6 - RESULTS

FIVE YEAR TACAN SET MTBF PERFORMANCE

YEAR	CONTRACTUAL REQUIREMENT	MEASURED
1	500	1763
2	625	2237
3	800	2225
4	800	2268
5	800	2057

HARDWARE KIT MODIFICATIONS

ONE MINOR MOD ON MOUNT AFTER RIW BEGAN

ISSUED ONE KIT AT RIW END TO MODIFY MOUNT

VIEW-CELL #7 - SUMMARY

ADVANTAGES

STRONG INCENTIVE FOR CONTRACTOR TO PERFORM

There was both a positive and negative incentive with the TACAN RIW program. The negative obviously was the tremendous penalties associated with pipeline spares and costs of modifying equipment in the field should the MTBF not come up to its guaranteed value. But there was a plus incentive for some costs savings primarily due to the reduced repair costs should the MTBF be better than the committed value. On typical warranty programs, this positive incentive is not there because there is no opportunity for the contractor to receive a reward.

EXCELLENT FOR RETROFIT PROGRAMS

In retrofit programs, history is available for current and past performance of the equipment MTBF in the field and therefore, new goals can be established for a new generation of equipment in a realistic realm. Prospective contractors have a better understanding of how they will perform on newer generation equipment as opposed to new technology performing a new function.

PROVIDES FOR CONSIDERABLE SAVINGS ON SPARES INVESTMENT

Contractor is totally responsible for quantifying the number of spares with a very short fixed turnaround time on repairs, thereby minimizing the spares on the front end of the program. The contractor also, should he not perform to the guaranteed MTBF, must consign spares to the program therefore providing another benefit.

PROVIDES FOR SMOOTH TRANSITION TO ORGANIC MAINTENANCE

Provides considerable amount of time to systematically organize the support program. Provisioning of spare parts can be carefully performed using historical data collected as a part of the RIW repair enabling more accurate procurement of spare parts. Technical data can be developed and supplied in a timely manner for transitioned organic maintenance.

REDUCES OVERALL LIFE CYCLE SUPPORT COSTS

DISADVANTAGES

REQUIRES UPFRONT GOVERNMENT INVESTMENT

Funding comes from the procurement activity and not the logistics activity. This is sometimes difficult to secure as the procurement activity would probably rather buy more end items rather than a warranty program.

INCREASED DATA AND ASSOCIATED ADMINISTRATION COST

Both the contractor and the government must commit significant resources to tracking and accumulating data and the compilation thereof for an accurate measurement of MTBF. This is not an easy task and requires many man hours and should not be underestimated in its importance in securing real data on the life of a program.

UNCLASSIFIED

AT DAYTON OHIO ON 18-19 JUNE 1984(U) PRODUCT
PERFORMANCE AGREEMENT CENTER WRIGHT-PATTERSON AFB OH
19 JUN 84 F/G 15/5

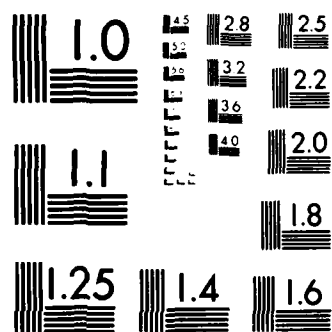
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NL

END

FILMED

OTN:



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

ARN-118(V) TACAN RELIABILITY IMPROVEMENT WARRANTY



**Rockwell International
Collins Government
Avionics Division**

**Collins Government Avionics Division
ARN-118(V) TACAN RIW**

- **Background**
 - **Prior Experience**
 - **Program Highlights**
- **Significant RIW Requirements**
- **Key RIW Operational Criteria**
- **Results**
- **Summary**

PRIOR EXPERIENCE

- **Rockwell-Collins Experience Baseline**
 - Commercial Warranties
 - Extended Repair Warranties (KC-135 ASQ-141)
 - Interim Contractor Support
- **Lessons Learned From Prior Experience**
 - Field Modifications To Raise MTBF Are Expensive
 - Excessive Unverified Failures Tie Up Spares And Facilities
 - Induced Failures Can Be Excessive

PROGRAM HIGHLIGHTS

- **Grandfather Of Reliability Guarantees - 1975**
- **Establish A Standard TACAN With New Technology**
- **Prior TACANs Had An MTBF of $\approx$ 300 Hours**
- **Maintenance Nightmare**
- **Contract Requirements**
 - **Design To Unit Production Costs**
 - **Long Term Warranty With Penalties**

SIGNIFICANT RIW REQUIREMENTS

- Program Length Was 60 Months
- MTBF Measured And Reported Annually
- MTBF Penalty — Redesign, Modify, And Provide Pipeline Spares Until MTBF Achieved
- Contractor Operated Spares Storage
- Spares Shipment Within 72 Hours After Request
- 15 Day Repair Turnaround With Liquidated Damages
- 30% Unverified Failure Limit Was Negotiated

KEY RIW OPERATIONAL CRITERIA

- Sealed LRUS To Avoid Improper Maintenance
- Maintenance Action Card On Each LRU
- Approved Fault Verification Procedure
- Limit On Unverified Failures For Contractor Exposure
- Induced Failure Protection For Contractor
- Reliable System Built-In-Test
- Easy To Use Bench Support Equipment

Find And Fix Reliability Problems As Early As Possible

RESULTS

- Five Year TACAN Set MTBF Performance

Year	Contractual Requirement	Measured
1	500	1763
2	625	2237
3	800	2225
4	800	2268
5	800	2057

- Hardware Kit Modifications
One Minor Modification On Mount After RIW Began
Issued One Kit At RIW End To Modify Mount

SUMMARY

Advantages

Strong Incentive For Contractor To Perform
Excellent For Retrofit Program
Provides For Considerable Savings On Spares Investment
Provides For Smooth Transition To Organic Maintenance
Reduces Overall Life Cycle Support Costs

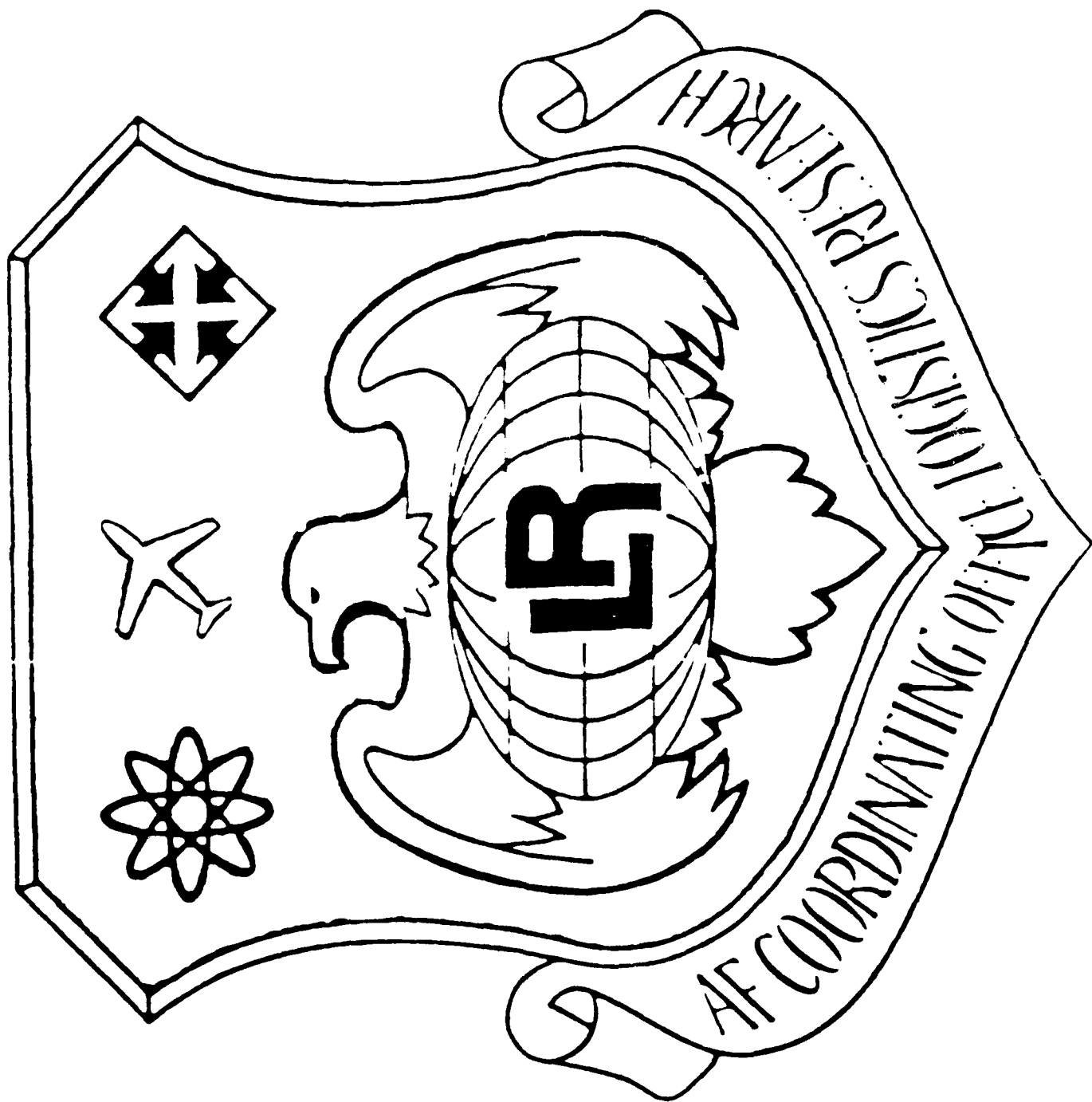
Disadvantages

Requires Upfront Government Investment
Increased Data And Associated Administration Cost

PRESENTATION: AFCOLR - LOGISTICS R&D

by

Mr. Ciecwa



*There is no limit to what an organization can accomplish
if it doesn't care who gets the credit*

WILLIAM

The Barber

AFCOLR CHARTER

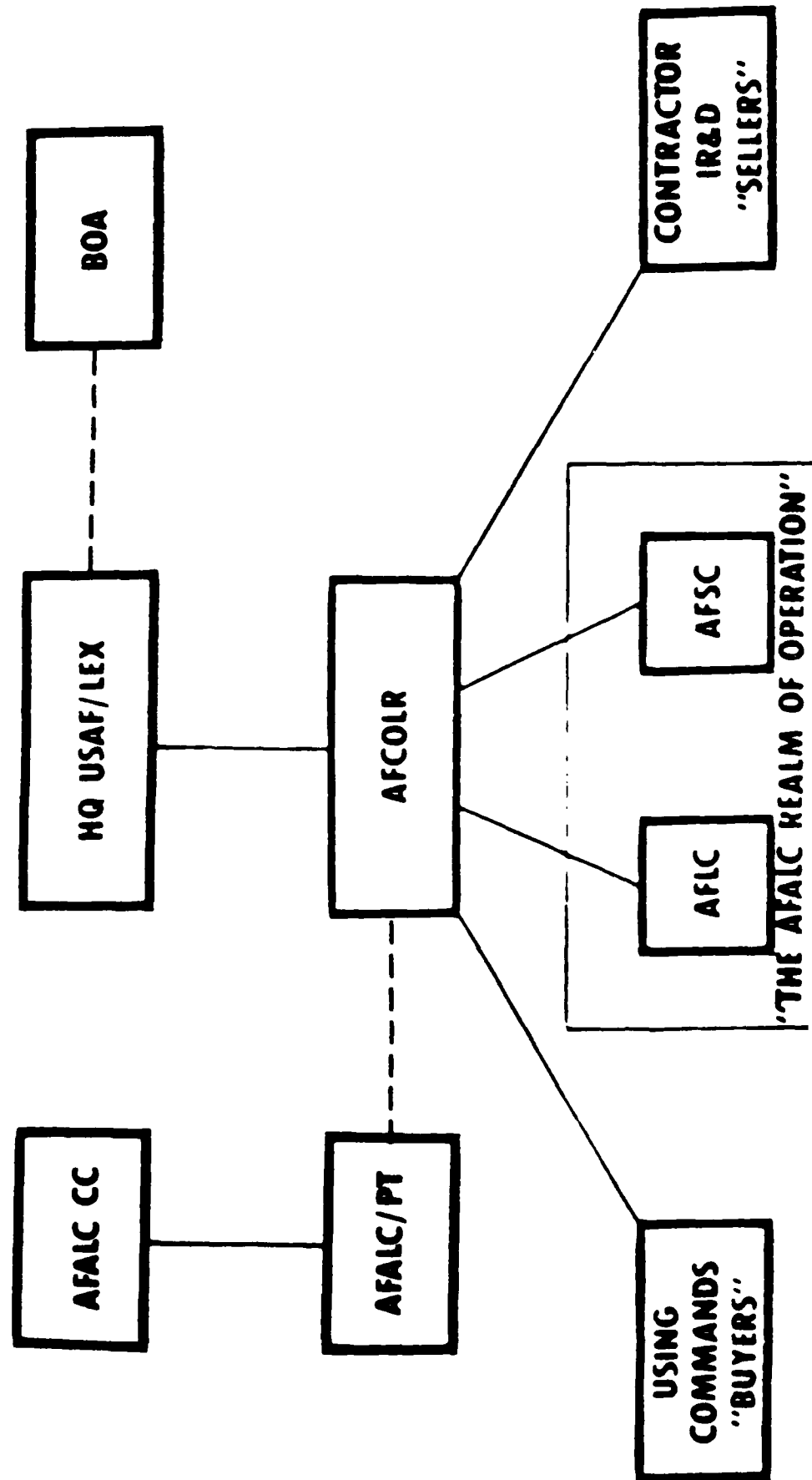
0 MISSION ELEMENTS

- 0 ADMINISTER THE AIR FORCE LOGISTICS RESEARCH,
DEVELOPMENT, AND STUDIES PROGRAM
- 0 FACILITATE THE TRANSITION OF TECHNOLOGY
- 0 SERVE AS THE AIR FORCE FOCAL POINT FOR LOGISTICS
INDEPENDENT RESEARCH AND DEVELOPMENT (IR&D)

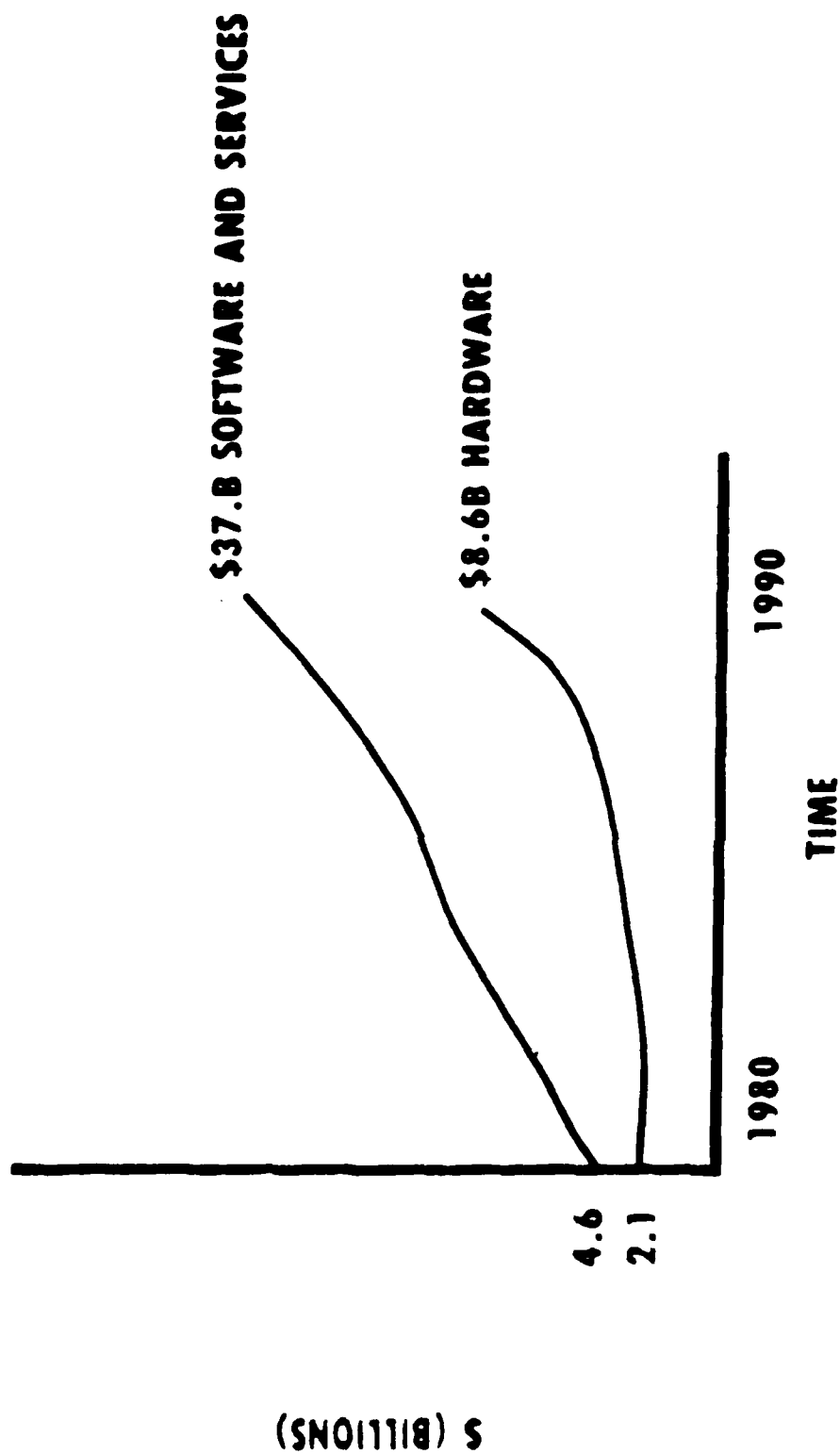
-- BOTTOM LINE --

IMPROVE OPERATIONAL SUPPORT CAPABILITIES

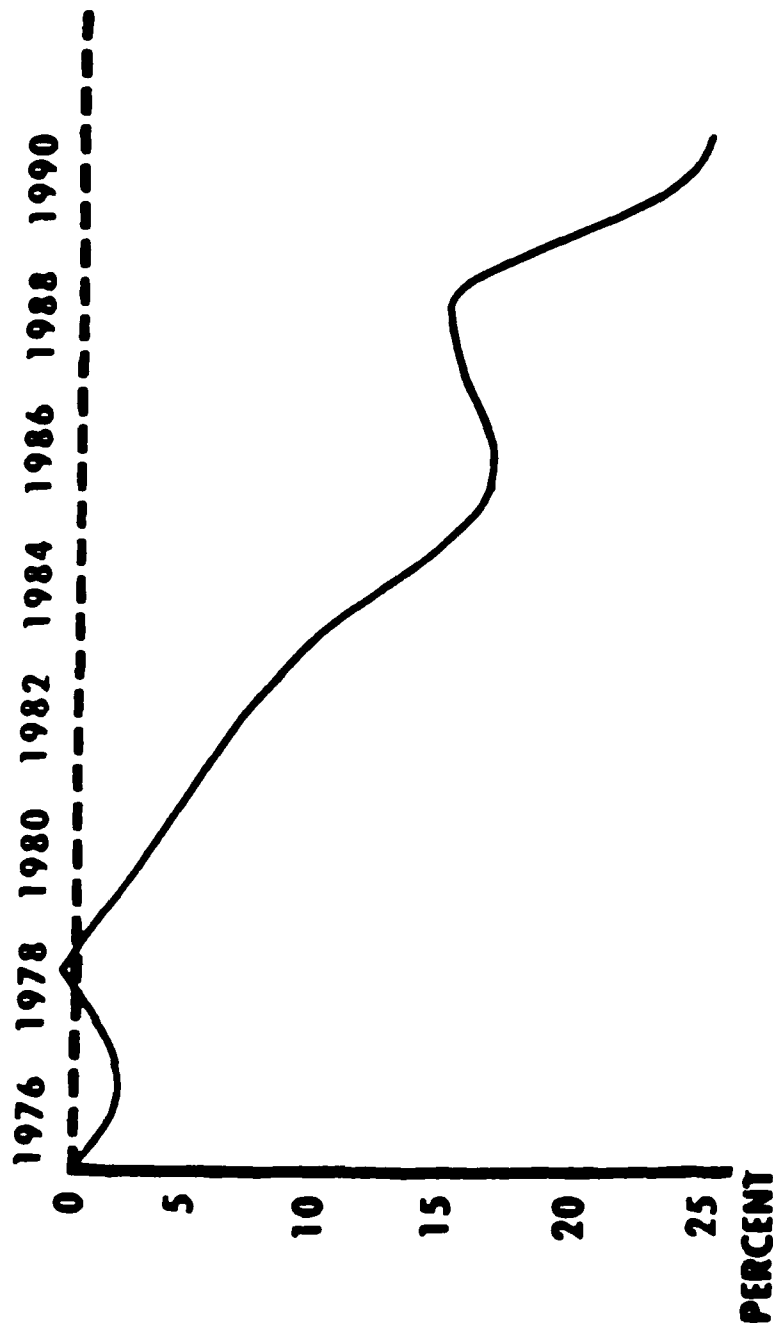
AFCOLR/ORGANIZATIONAL RELATIONSHIPS



SOFTWARE COSTS & MAINTENANCE



MANPOWER CONSTRAINTS



**MILITARY MANPOWER POOL PERCENTAGE CHANGE IN 17 TO 19 YEAR
OLD U.S. MALE POPULATION, 1976-1990**

- DECREASED SUPPLY → TIGHTENED LABOR MARKET →
INCREASED WAGES → INCREASED USAF FIXED COSTS

AF 2000 STUDY - RECOMMENDATION

- 0 DEVELOP WAYS TO REDUCE OR ELIMINATE COMBAT DEPENDENCE ON A LIMITED NUMBER OF FIXED-SITE AIR BASES AND THEIR VULNERABLE SUPPORT STRUCTURES.
- 0 INTEGRATE WEAPON SYSTEMS DESIGN, WEAPON SYSTEMS EMPLOYMENT CONCEPTS, AND OPERATIONAL SUPPORT STRATEGIES TO ACHIEVE MAXIMUM COMBAT EFFECTIVENESS.
- 0 ORGANIZE SUPPORT PROCESSES, SUPPORT RESOURCES, AND SUPPORT STRUCTURES FOR WARFIGHTING, AND CONDUCT PEACETIME OPERATIONS WITHIN THAT WARFIGHTING FRAMEWORK.

AF 2000 STUDY - RECOMMENDATION

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- 0 ORGANIZE SUPPORT PROCESSES, SUPPORT RESOURCES, AND SUPPORT STRUCTURES FOR WARFIGHTING, AND CONDUCT PEACETIME OPERATIONS WITHIN THAT WARFIGHTING FRAMEWORK.

IMPLICATIONS FOR THE FUTURE

- 0 AF PLANNER "UP AGAINST THE WALL"
- 0 THREAT EXPLOSION - MANPOWER MATERIALS SHORTAGES
- 0 WHERE, WHEN, HOW LONG, WHAT LEVEL OF CONFLICT
- 0 WHO WILL PLAY - LOC DISRUPTION - REDUCED SANCTUARY
- 0 TECHNOLOGICAL COMPLEXITY
- 0 AF 2000
 - 0 OPERATIONAL SUPPORT STRUCTURE
 - 0 MOBILE-FLEXIBLE-SURVIVABLE
 - 0 TRADITIONAL OPERATIONAL SUPPORT STRUCTURE

"HOBBLES" ON THE WARRIOR

AFCOLR MISSION ELEMENTS

0 ADMINISTER THE LOGISTICS RESEARCH AND
DEVELOPMENT PROGRAM

0 FACILITATE LOGISTICS TECHNOLOGY
TRANSITION

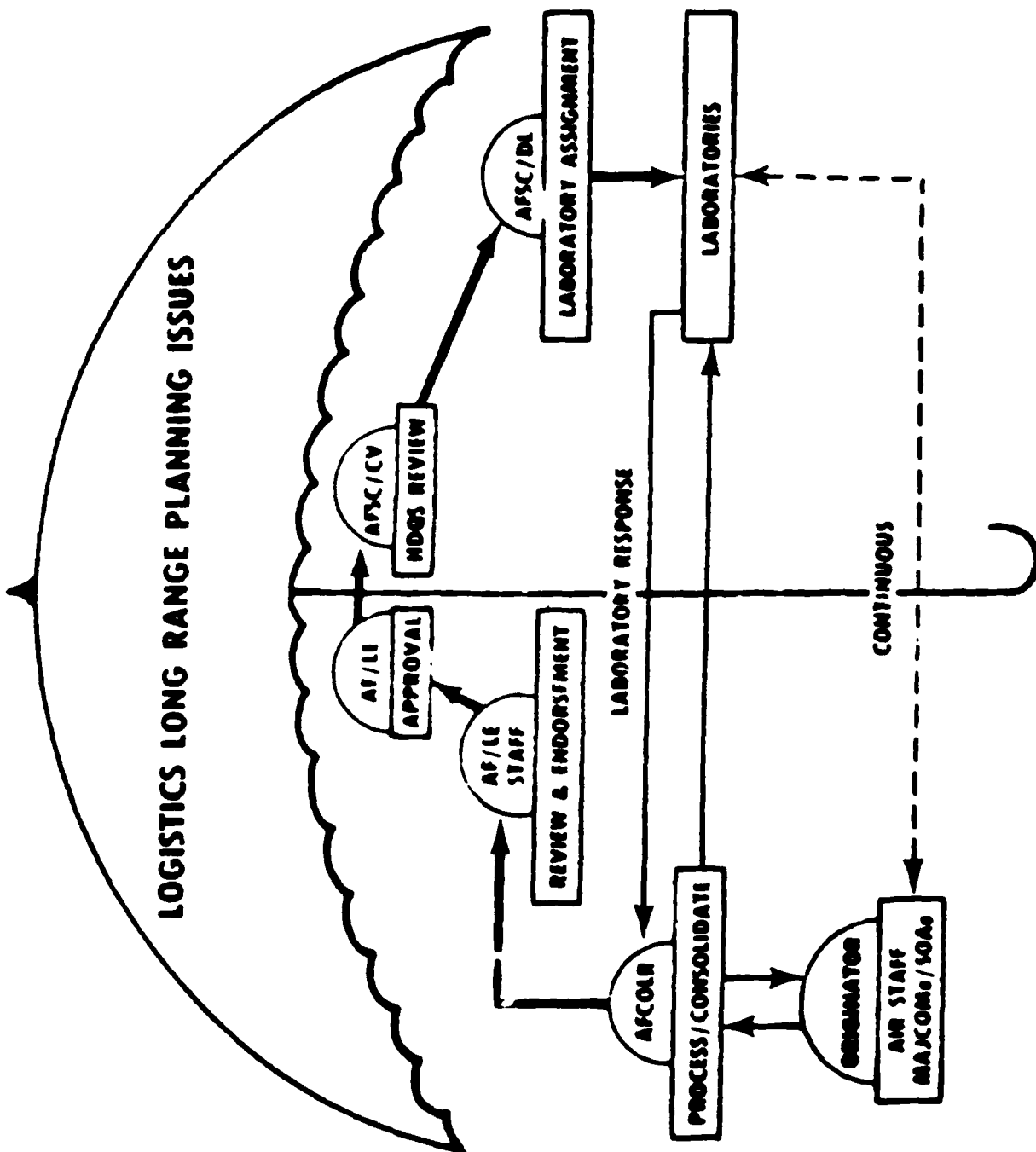
0 PROVIDE ASSISTANCE AND TECHNICAL
GUIDANCE TO INDUSTRY FOR IR&D

- 0 LOGISTICS RESEARCH AND DEVELOPMENT
FORMAL PROGRAM
- 0 LOGISTICS NEEDS PROGRAM
- 0 LOGISTICS RESEARCH AND STUDIES PROGRAM
DOCUMENT (FEB 85)
- 0 ANNUAL LOGISTICS RESEARCH AND
DEVELOPMENT WORKSHOP (JUN 84)
- 0 LOGISTICS RESEARCH AND DEVELOPMENT
INFORMAL PROGRAM
- 0 OPPORTUNITY DRIVEN
- 0 MARKETING ORIENTED
- 0 DIALOGUE BASED

LOGISTICS NEED

A LOGISTICS RESEARCH REQUIREMENT SUBMITTED TO THE VARIOUS AIR FORCE LABORATORIES AND STUDY CENTERS FOR CONSIDERATION AND POSSIBLE SOLUTION. LOGISTICS NEEDS REFLECT PERCEIVED LOGISTICS SHORTFALLS BY PERSONNEL IN THE MAJOR COMMANDS (MAJCOMS), AIR LOGISTICS CENTERS (ALCS), SEPARATE OPERATING AGENCIES, AND THE AIR STAFF. THE AFCOLR COORDINATING PROCESS INCLUDES REVIEW AND EVALUATION OF THE REQUIREMENT FOR VALIDITY, DUPLICATION, AND APPLICATION TO THE AIR FORCE LOGISTICS LONG-RANGE PLANNING OBJECTIVES.

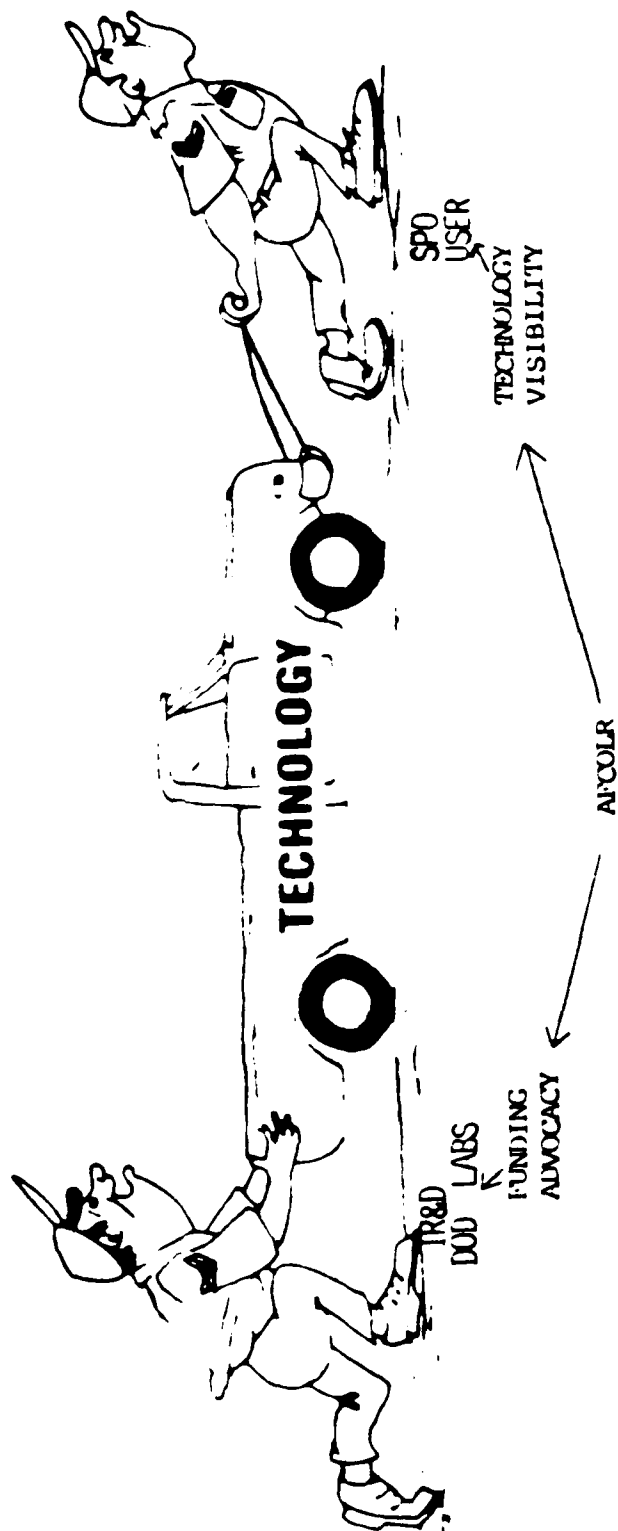
LOGISTICS R&D REQUIREMENTS PROCESS



ASD TECHNOLOGY TRANSITION DEFINITION

TECHNOLOGY TRANSITION IS THE RECOGNIZED AND
ACCEPTED TRANSFER TO A DEVELOPMENT/PRODUCTION
AIR FORCE WEAPON SYSTEM(S)/SUBSYSTEMS(S) OF A
CAPABILITY, METHOD, PROCESS, OR TECHNIQUE
RESULTING FROM AIR FORCE LABORATORY ACTIVITIES.

"PUSH - PULL DILEMMA"



"THE GREASE"

NEW STRATEGY

1986

0 TOTAL SYSTEM RESPONSIBILITY

0 "WRENCH FREE" AND "GUARANTEED" - 2000 HOURS ATBF

0 BUY ACCESS TO CONTRACTOR DATA BASE FOR LIFE OF SYSTEM

LABS CONCENTRATE ON REALITY
THE MOST IMPORTANT "ILITY"
OF THEM ALL

- 0 LAB/DESIGN EFFORTS REFOCUSED 1984
- 0 DOD/CORPORATE LEADERSHIP DRIVE EARLY READINESS/
SUSTAINABILITY IN R&D EFFORTS
- 0 "DO IT RIGHT THE FIRST TIME" PAYS BIG DIVIDENDS
IN OUT YEAR SYSTEMS
- 0 "REVELATION" - "IT'S CHEAP AND AVOIDS COSTS"

TEAMING FOR REDUCED
LIFE CYCLE COST - 1993

- 0 CONSORTIUM CONTRACTOR TEAMING FREE OF ANTI-TRUST CONCERNS, DOD SPONSORSHIP PAY BIG DIVIDENDS IN MATURE LOGISTICS, RELIABILITY/MAINTAINABILITY TECHNOLOGIES AFTER 10 YEARS OF RESEARCH EFFORTS
- 0 FI/FD TECHNOLOGY INTEGRATED WITH VHSIC REACHES 100% BY 1987
- 0 PARTITIONING/DESIGN DERATING PROVIDES 5,000 TO 50,000 HOURS COMPONENT LIFE BY 1988
- 0 LINE REPLACEABLE MODULES DESIGNED FOR THROW AWAY (NO DEPOT OVER HEAD). SORTIE GENERATION TURN IMPROVED BY

INNOVATIVE WARRANTY APPROACH

P-3C APN-227 DOPPLER

LCC DRAMATICALLY REDUCED

0 DEVELOPMENT

0 SPECIFIED MTBF DETERMINED SPARES

0 NO RELIABILITY IMPROVEMENT WARRANTY

0 NO ATE HARDWARE/SOFTWARE DEVELOPMENT COSTS

0 PRODUCTION

0 NO REPAIR FOR INTERMEDIATE/DEPOT LEVEL FOR 5 YEARS

0 NO RETEST COSTS FOR 5 YEARS

0 NO ATE HARDWARE/SOFTWARE SUSTAINING COSTS FOR 5 YEARS

INNOVATIVE WARRANTY APPROACH

P-3C APN-227 DOPPLER

LCC DRAMATICALLY REDUCED

- 0 PRODUCTION (CONT)
- 0 NO RELIABILITY IMPROVEMENT ECP'S
- 0 NO ADMINISTRATIVE COSTS COMPARED TO RIW
(NO CALCULATION OF MTBF'S)
- 0 ONLY ONE DATA ITEM - QUARTERLY REPAIR REPORT
- 0 LONG TERM
- 0 MATURE DESIGN FROM WHICH TO DEVELOP ATE
- 0 UPFRONT COSTS
- 0 ADD 35% TO UNIT PRODUCTION COST (7% / YEAR)

ADVANCED NIGHT VISION SYSTEMS HAVE ALREADY DENIED CONCEALMENT BY DARKNESS, AND ATTENTION IS TURNING TO PEELING AWAY THE COVER OF WEATHER AS SURELY AS ONE PEELS AWAY THE LAYERS OF AN ONION. IT THUS SEEMS LIKELY THAT SOON THE ONLY REMAINING PLACES TO HIDE WILL BE IN "DEEP" SPACE, UNDER THE WATER OR UNDER THE GROUND.

A MAJOR AIM OF THE 1980'S FOR BOTH FREE WORLD AND COMMUNIST NATIONS WILL BE TO ELIMINATE THESE LAST SANCTUARIES AND IN PARTICULAR TO MAKE THE OCEANS TRANSPARENT.

IF THE 1970'S WITNESSED THE ADVENT OF MILITARY SYSTEMS THAT WILL HIT THEIR INTENDED TARGETS AND THE 1980'S CAN BE EXPECTED TO CONSTRUCT THE GROUND WORK FOR FINDING THE TARGET, WHAT THEN REMAINS? TO SURVIVE!

NORMAN R. AUGUSTINE, 1982
CHAIRMAN DEFENSE SCIENCE BOARD

A T T E N D A N C E L I S T

Rockwell International
Charles Adams
Mgr., Contract Analysis & Policy Div
2230 E. Imperial Hwy. MS 001-C04
El Segundo, CA 90245
213/647-5153

McCamish, Ingram, Martin, Brown & McCullough
Rand Allen

The Analytic Sciences Corporation
Brenda Allen
Logistics Engineer
One Jacob Way/Logistics Engr.
Reading, MA 01890
617/944-6850

State of North Dakota
Mark Andrew
Senator

North Dakota

Garrett Pneumatic Systems Division
Gordon Arnsperger
Manager, Contracts
2801 E. Washington St., MS 1301A
Phoenix, AZ 85034
602/231-3808

Reus West
Mal Baca

1130 Hawk Circle
Anaheim, CA 92807
714/632-6880

Litton Systems
Ken Baine
Mgr., U.S. Military Contracts
25 Cityview Drive
Toronto, Canada M9W5B7
416/249-1231

Arinc Research Corporation
Harold Balaban
Mgr., Adv Research & Development
2551 Riva Road
Annapolis, MD 21401
301/266-4064

Canadian Marconi Company
Alan Barker
ILS Manager
2442 Trenton Avenue
Montreal, Canada H3P1A9
514/341-7630

Hercules, Inc.
James Baughman
Mgr., Navy Programs
P.O. Box 98, MS KLG
Magna, UT 84044
801/250-5911

General Electric/Aircraft Engines
Kenneth Bell
Mgr., Warranties & Coproduction
One Neumann Way, MS J-137
Cincinnati, OH 45215-6301
513/243-1900

Texas Instruments, Inc.
William Benfer
Manager, Contract Services
P.O. Box 660246/MS 3131
Dallas, TX 75266
214/995-6244

The Garrett Corporation
Thomas Bennett
Vice President
9951 Sepulveda Blvd.
Los Angeles, CA 90009
213/417-6587

U.S. Air Force
William Bentley
Dir., Policy & Source Selection
ASD/PMP
Wright-Patterson AFB, OH 45433
513/255-6445

Pneumo Corporation
Dennis Biety
Counsel
2220 Palmer Avenue
Kalamazoo, MI 49001
616/384-3753

Rockwell International Corp.
Ralph Bobbitt
Contract Administrator
1800 Satellite Blvd., MS D398-DL24
Duluth, GA 30136
404/476-6369

Bendix Energy Controls Division
James Boehnlein
Mgr., Contract Administration
717 North Bendix Dr., Plant 3
South Bend, IN 46620
219/237-3132

Colt Industries
David Bowe
Dayton Representative
1314 Keystone Trail
Centerville, OH 45459
513/435-0693

U.S. Air Force
Milton Brickson
Acting Chief, Common Support
ASD/AEGA
Wright-Patterson AFB, OH 45433
513/255-6145

Defense Systems Management College
Calvin Brown
Prof of Engineering Mgmt.
DRI-R
Ft. Belvoir, VA 22060
703/664-5783

U.S. Air Force
Leroy Brown
Attorney Advisor
Hq AFLC/JAN
Wright-Patterson AFB, OH 45433
255-2304

TRW
T. Brown
Vice Pres., Law Dept.
One Space Park, MS E2/7000
Redondo Beach, CA 90708
213/536-3536

U.S. Air Force
John Buck
Major General, USAF
HQ USAF/AFSC/ASD/CV
Wright-Patterson AFB, OH 45433
513/255-5832

Defense General Supply Center
George Burroughs
Chief, Quality Assurance Div

Richmond, VA 23297
804/275-4156

U.S. Air Force
Ronald Butler
Physical Science Administration
AFWAL
Wright-Patterson AFB, OH 45433
513/255-5953

U.S. Air Force
William Byers
Ground Generator Pro. Mgr.
ASD Office AEGA
Wright-Patterson AFB, OH 45433
513/255-6145

Harry Diamond Laboratories
John Carroll
Procurement Analyst
2800 Powder Mill Road
Adelphi, MD 20783
301/394-1087

U.S. Air Force
Alex Cassity
Procurement Analyst
Armament Division, AD/PHP
Eglin AFB, FL 32542
904/882-3091

USAF Civil Service
William Cathey
Reliability Engineer
AD/YMED
Eglin AFB, FL 32542
904/882-9456

Sundstrand Advanced Tech. Group
A. Chapel
Director, Business Planning
4747 Harrison Ave., PO Box 7002
Rockford, IL 61125
815/226-7967

Boeing Company
Craig Childress
Contracts Representative
333 W. First St., Suite 450
Dayton, OH 45402
513/222-3711

Ingersoll-Rand Company
Lawrence Chuslo
Marketing Manager
39 Olympia Avenue
Woburn, MA 01801
617/935-9050

U.S. Air Force
Gregory Cieciwa
Deputy Director of AFCOLR
Area B
Wright-Patterson AFB, OH 45433
513/255-4028

U.S. Air Force
John Ciucci
Deputy Staff Judge Advocate
HQ AFLC/JA
Wright-Patterson AFB, OH 45433
513/257-4123

Atlantic Research Corporation
Michael Clark
Sr. Contract Administrator
7511 Wellington Road
Gailesville, VA 22065
703/642-6457

U.S. Air Force
Grover Cleveland
ASD Product Assurance Office
ASD/EN
Wright-Patterson AFB, OH 45433
513/255-5874

Texas Instruments Inc.
Jim Coffey
Mgr., Quality & Reliability
P.O. Box 405
Lewisville, TX 75067
214/462-4068

Magnavox Government & Ind. Elec.
John Connors
Mgr., Contract Administration
1313 Production Road
Fort Wayne, IN 46808
219/429-6450

U.S. Army
Gregory Conway
Dir., Data Mgmt. & Analysis
Product Assurance/PAD
Watervliet, NY 12189
518/266-5263

Litton Applied Technology
Joseph Conway
Marketing Manager
4130 Linden Ave., Ste. 225
Dayton, OH 45432
513/253-3194

U.S. Army
Gerald Cooper
Warranty Coordinator
CECOM
Ft. Monmouth, NJ 00703
201/532-4269

U.S. Army
Ronald Crosier
Operations Research Analyst
4300 Goodfellow Blvd.
St. Louis, MO 63120
314/263-1179

U.S. Army Natick R & D Ctr.
Thomas Cunniff
Supervisory General Engineer
Kansas Street
Natick, MA 01760
617/651-4284

The Analytic Sciences Corporation
Donald Czech
TASC PPAC Manager
3040 Presidential Drive
Fairborn, OH 45324
513/426-1040

Rockwell International
Paul Dasher
Senior Contracts Advisor
3370 Miraloma Ave/MS 052-AE09
Anaheim, CA 92803
714/632-4368

Moog, Inc
Glyn Davis
Senior Program Manager
Seneca St. & Jamison Rd.
East Aurora, NY 14052
716/652-2000

Goodyear Aerospace Corporation
Edward Davis
Group Manager
1210 Massillon Road
Akron, OH 44315
216/796-7237

Hydra-Electric Company, Inc.
Frank Davis
Marketing Manager
3151 Kenwood Street
Burbank, CA 91505
213/843-6211

The Analytic Sciences Corp.
Gene DeNezza
Division Director
3040 Presidential Drive
Fairborn, OH 45324
513/426-1040

Aerospace Industries Association
Douglas Dillon
Director, Contract Administration
1725 DeSales Street, NW
Washington, DC 20036
202/429-4642

Hydra-Electric Company, Inc.
Dan Dirksen
Sales Rep-Military
Box 20039, Dabel Station
Dayton, OH 45420
513/294-5266

The Analytic Sciences Corp
Stephen Dizek
PPAC TECH Director
3040 Presidential Drive
Fairborn, OH 45324
513/426-1040

Hughes Helicopters, Inc
Thomas DuHamel
Mgr., Systems Engineering Dept
Centinela at Teale/MS 6/C303
Culver City, CA 90230
213/305-5497

The Analytic Sciences Corp
Gloria Dunphy
Staff Analyst
3040 Presidential Drive
Fairborn, OH 45324
513/426-1040

Garrett Manufacturing Limited
George Elliott
Comptroller & Treasurer
255 Attwell Drive
Rexdale, Ontario, Canada M9W5B8
416/675-1411

Rockwell International Corp.
Roger Engebretson
Program Manager
1800 Satellite Blvd/MS D364-DL23
Duluth, GA 30136
404/476-6349

The Garrett Corporation
L. Elston
Manager, Contracts
111 S. 34th Street
Phoenix, AZ 85031
602/231-1936

Ares, Inc
Richard Eureka
Marketing
Bldg. 818/Front St./Erie Ind. Park
Port Clinton, OH 43420
419/635-2175

U.S. Army Electronics R&D Command
John Falkenham
Procurement Analyst
2800 Powder Mill Road
Adelphi, MD 20733
202/394-3690

Teledyne CAE
Joe Ferro
Manager, Contracts
1330 Laskey Road
Toledo, OH 43612
419/470-3048

Delco System Operations-GMC
Robert Fleischacker
Avionics Support Services Mgr.
7929 S. Howell Avenue
Oak Creek, WI 53154
414/768-2243

Moot & Sprague
James Forton
Attorney
Main Place Tower
Buffalo, NY 14202
716/845-5200

Boeing Military Airplane Co.
Monty Frazier
Manager, Contracts
P.O. Box 7730
Wichita, KS 67277-7730
316/526-3461

The Analytic Sciences Corporation
Andrea Fritz
Analyst
3040 Presidential Drive
Fairborn, OH 45324
513/426-1040

Curtis-Wright Flight Systems, Inc
Jayne Furman
Manager
300 Fairfield Road
Fairfield, NY 07006
201/575-2319

McDonnell Douglas Corporation
James Gardner
Staff Vice President
P.O. Box 516
St. Louis, MO 63166
314/232-7074

The Analytic Sciences Corporation
Robert Gates
Department Manager
3040 Presidential Drive
Fairborn, OH 45324
513/426-1040

U.S. General Accounting Office
Cynthia Giacona
Auditor
477 Michigan Avenue/Rm 865
Detroit, MI 48226
313/226-6044

Beech Aircraft Corporation
Michael Goetz
Regional Manager
4130 Linden Avenue/Ste. 300
Dayton, OH 45432

The Analytic Sciences Corporation
Gary Good
Analyst
3040 Presidential Drive
Fairborn, OH 45324
513/426-1040

Harvey Gordon

ARINC Research Corporation
Larry Graham
Principal Engineer
1222 East Normandy Place
Santa Ana, CA 92705
714/547-7594

Eaton Corporation, AIL Division
Richard Graham
Dir. of Customer Relations
Commack Road
Deer Park, NY 11729
516/595-3428

U.S. Air Force
Tony Grayson
Acquisition Manager
Hq AFSC/PMPS
Andrews AFB, MD 22034
301/981-6237

U.S. Army
Lester Griffin
Director, Product Assurance
Hq AMCCOM
Rock Island, IL 61299
309/794-5953

U.S. GAO
Robert Hadley
Evaluator
441 G St. N.W.
Washington, D.C. 20548
202/275-4136

Helpar Division of E-Systems
Emery Hampton
Engineering Supervisor
7700 Arlington Blvd.
Falls Church, VA 22046
703/560-5000

Fred S. James Company
James Harrington
System Vice President
55 Water Street
New York, NY 10041
212/747-8546

Goodyear Aerospace Corporation
James Harry
Division Manager
1210 Massillon Road
Akron, OH 44315
216/796-7235

U.S. Air Force
Ronald Hart
Procurement Analyst
ASD/PNPP
Wright-Patterson AFB, OH 45433
513/255-4531

U.S. Army
Edwin Hawkins
General Engineer
4300 Goodfellow Blvd
St. Louis, MO 63120
314/263-1575

Rockwell International
Harold Hawkins
Contract Administration
6633 Canoga Avenue
Canoga Park, CA 91304
818/710-5648

Northrop Corporation
Donald Haworth
Manager, Special Programs Contracts
One Northrop Ave/MS 8320-92
Hawthorne, CA 90250
213/970-5639

Bell Aerospace Textron
John Hedges
Administrative Director
P.O. Box 1/MS Ct 5
Buffalo, NY 14240
716/696-6916

U.S. GAO
John Henderson
Evaluator
441 G Street, N.W.
Washington, D.C. 20548
202/275-4136

U.S. Army
Lamar Hickman
Procurement Analyst
DRSEL-PC-SP-P-2
Ft. Monmouth, NJ 07703
201/532-1104

Teledyne Ryan Electronics
Jim Hobbs

3650 Balboa
San Diego, CA 92123
619/569-2440

Defense General Supply Center
George Hofer
Chief, Competition & Pricing Office
DLA
Richmond, VA 23892
804/275-3746

Sperry Corporation
Richard Hoke
Supervisor Control Admin
9201 San Mateo Blvd. N.E./Box 9200
Albuquerque, NM 87119
505/822-5030

U.S. Army
Edward Hollman
Dir., Product Assurance
4300 Goodfellow Blvd.
St. Louis, MO 63120
314/263-1500

Moog, Inc
Philip Hubbell
Vice President & Controller
Seneca St. & Janison Rd
East Aurora, NY 14052
716/652-2000

Ingersoll-Rand
Jim Hudson
Local Sales Engineer
3080 Cox Road
W. Chester, OH 43659
513/777-9071

Menasco, Inc
Ronald Hughes
Director of Marketing
First & Cedar Sts/PO Box 7071
Hurbank, CA 91510
818/847-9231

U.S. Air Force
Mark Ingran
First Lieutenant
ASD/YPLF
Wright-Patterson AFB, OH 45433
513/255-4571

U.S. Army
Alan Jacques
Maintenance Management Spec
AFLG/SMM
Ft. McPherson, GA 30330
404/752-2211

Boeing Military Airplane Company
Michael Janke
Contract Specialist
P.O. Box 7730/MS K11-53
Wichita, KS 67277-7730
316/526-7470

Cubic Corporation
James Jenkins
Vice President, Contracts
9333 Balboa Avenue/MS 10-13
San Diego, CA 92123
619/277-6780

U.S. Air Force
Joseph Johnson
AASM/USM
ASD/YYLA
Wright-Patterson AFB, OH 45433
513/225-7231

Interstate Electronics Corp
Kenneth Johnson
Sr. Contracts Administrator
1001 E. Ball Rd/MS 0400
Anaheim, CA 92805
714/758-4008

Lockheed Corporation
Robert Johnson
Director, Contract Policy
1825 Eye St., N.W./Ste 1100
Washington, D.C. 20006
202/955-3325

Rockwell International
Vern Jones

Cedar Rapids, IA

Rockwell International
William Jones
VP & Asso. Program Mgr
P.O. Box 92098/MS ZT07
Los Angeles, CA 90009
213/414-1817

Curtis-Wright Flight Systems, Inc
Ed Keane
Program Administrator
300 Fairfield Road
Fairfield, NY 07006
201/575-2236

IBM Federal Systems
Gregory Keane
Sr. Contract Administrator
Bodle Hill Road
Owego, NY 13837
607/751-4119

Sperry Corporation
Doug Keeling
Mgr., Phoenix Support Center
Box 29222/MS T-17M
Phoenix, AZ 85038
602/863-7237

U.S. Army
Christopher Kernan
Attorney/Advisor
Signals Warfare Lab
Warrenton, VA 22186
703/347-6338

U.S. Army
Eugene Kirchmer
Chief, Contr & Mfg
ASD/PM
Wright-Patterson AFB, OH 45433
513/255-3783

Hayes International Corporation
Edward Kissel
Assistant Vice President
P.O. Box 2287
Birmingham, AL 35201
205/592-0011

McDonnell-Douglas Astronautics
Walter Klass
Manager, Logistics Support
5301 Bolsa Avenue
Huntington Beach, CA 92647
714/896-1713

The Analytic Sciences Corporation
Elton Klibanoff
Contracts Administrator
One Jacob Way
Reading, MA 01867
617/944-6850

Harris Corporation
Lee Knopf
Director of Contracts
P.O. Box 94000/MS 101-2951
Melbourne, FL 32902
305/729-7352

ALCOA
Vern Koch
Manager, Product Safety
1500 ALCOA Building
Pittsburgh, PA 15219
412/553-4187

Allison Gas Turbine Div
Michael Kren
Manager, Engine Operations
P.O. Box 420
Indianapolis, IN 46204-0420
317/242-6334

U.S. Army
Julie Kron
Attorney/Advisor
AMCCOM/MS DRSMC-GCP(R)
Rock Island, IL 61299
309/794-4051

U.S. General Accounting Office
Gilbert Kruper
Auditor
477 Michigan Ave/Rm 865
Detroit, MI 48226
313/226-6044

U.S. Army
Daniel Kruvand
General Engineer
4300 Goodfellow Blvd
St. Louis, MO 63120
314/263-1575

Precision Monolithics, Inc
Robert Kubacki
Sr Staff Legal Administrator
1500 Space Park Drive
Santa Clara, CA 95050
408/727-9222

Hughes Aircraft Company
John Kuelbs
Group Counsel
2000 El Segundo Blvd
El Segundo, CA 90254
213/616-0299

U.S. Army
Johnny Lambert
Deputy for Quality & Production
Office of Asst. Secy of Army/Pentagon
Washington, D.C. 20310
202/695-4101

General Electric Company
Joseph Lander
Mgr., F110 Installations
One Newmann Way/MS J-137
Cincinnati, OH 45214
513/243-5502

U.S. Air Force
James Lane
Asst Dir., Contract Policy
Electronic Systems Div (PKP)
Hanscom AFB, MA
861-2693

U.S. Army
Stephen Lee
Administrative Contracting Officer
740 W. 154th St/USARPKO-HU
Gardena, CA 90247
213/305-5515

Ultrasystems, Inc.
Lewis Lemon
Member, Professional Staff
P.O. Box 3093/DSSI
San Bernadino, CA 92404
714/889-8803

Teledyne Systems Company
Mel LeVine
Vice President
19601 Nordhoff St/No 22
Northridge, CA 91324
818/886-2211

The Singer Company
Arthur Levy
Corporate Counsel
8 Stanford Forum
Stamford, CT 06904
203/356-4200

Ingersoll-Rand Company
Robert Littlefield
Mgr., Govt. Sales
1627 K St., NW
Washington, DC 20006
202/955-1450

U.S. Air Force
Patricia Livingston
Procurement Analyst
AD/AL
Eglin AFB, FL 32542
904/882-5801

United Technologies Corporation
Patrick Loftus
Manager, Dayton Office
Hulman Building/Rm. 714
Dayton, OH 45402
513/224-8394

The Analytic Sciences Company
Roger Lorelle
Regional Manager, Bus. Dev
3040 Presidential Drive
Fairborn, OH 45324
513/426-1040

Westinghouse Electric Corporation
James Lovett
Dir., Federal Govt. Relations
1801 K Street, N.W.
Washington, D.C. 20006
202/833-5056

U.S. Air Force
Phillip Macri
Director, Contracting
ASD/DPCT
Wright-Patterson AFB, OH 45433
513/255-3385

U.S. Air Force
Franklin Martin
Safety Policy Project Office
Hq AFISC
Norton AFB, CA 92409
714/382-2244

U.S. Air Force
Jim Martin
Logistics Engineer
ASD/YYLE
Wright-Patterson AFB, OH 45433

Hughes Aircraft Company
Warren Mathews
Staff Vice President
P.O. Box 1042/MS C2-B195
El Segundo, CA 90245
213/414-6004

Teledyne Continental Motors
Jim Matteson
Program Control Manager
P.O. Box 90
Mobile, AL 36601
205/438-3411

Logicon, Inc
Dennis Meronek
Technical Director
255 West Fifth Street
San Pedro, CA 90731
213/831-0611

Simmonds Precision
Thomas Merrifield
Manager, Contracts
Panton Road
Vergennes, VT 05491
802/877-2911

U.S. Air Force
Claude Messamore
Logistics Office
Pentagon
Washington, D.C. 20330
202/697-7714

Northrop Corporation
Pete Meyer
Technical Manager
One Northrop Avenue
Hawthorne, CA 90250
213/970-5639

HR Textron, Inc.
Ross Miles
Director, Legal/Contracts
25200 W Kye Canyon Rd/MS 125-1
Valencia, CA 91355
805/259-4030

Parker Hannifin Corporation
Richard Miller
Group Director Marketing
18321 Jamboree Blvd/MS D-16
Irvine, CA 92715
714/851-3260

Rexnord Corporation
John Moodey
Chief Engineer
3000 W. Lomita
Torrance, CA 90505
213/530-2220

General Motors Corporation
George Mosher
Senior Counsel
3044 W. Grand Blvd
Detroit, MI 48202
313/556-4036

General Motors Corporation
Roger Mosser
Director, Contracts/Leases
P.O. Box 420/MS U26A
Indianapolis, IN 46206-0420
317/242-2355

Boeing Aerospace
Alex Munro
Senior Counsel
P.O. Box 3999/MS 84-10
Seattle, WA 98124
206/773-3764

The Analytic Sciences Corporation
Jonathon Myer
EMS
1700 N. Moore St., Ste 1220
Arlington, VA 22209
703/558-7400

Menasco Canada LTD
Linda McCrory
Spare Parts Admin
3495 Coat Vertu
Montreal Quebec A4R1R3
514/332-3330

Teledyne CAE
James McKenna
Legal Counsel
1330 Laskey Road
Toledo, OH 43612-0971
419/470-3231

General Electric Company
Edmond McKeown
Counsel/Mil/Small Comm Eng. Oper
1700 Western Ave/MS 34502
Lynn, MA 01910
617/594-3406

U.S. Air Force
Thomas M. Mullen
General

Wright-Patterson AFB, OH 45433

U.S. Air Force
William McNally
Contract Negotiator
6308 Draco St/MS JCM-28413
Burke, VA 22015
202/692-8937

General Dynamics Corporation
Douglas McPherson
Staff VP Taxes Insurance
Pierre LaCleda Center
St. Louis, MO 63105
314/689-8672

U.S. Air Force
Robert Neff
Director, Product Assurance
Hq AFSC/ALK
Andrews AFB, D.C. 20334
301/981-6429

U.S. Air Force
James Nelson
Colonel
ASD/YZ
Wright-Patterson AFB, OH 45433

Hercules, Inc
Adonis Nielson
Manager, Contract Admin
P.O. Box 98
Hagna, UT 84044
801/250-5911

The Analytic Sciences Corporation
Garland Oates
Section Manager
3040 Presidential Drive
Fairborn, OH 45324
513/426-1040

U.S. Army
Thomas Oberg
Procurement Analyst
AMCCON/BRSMC-PPC(R)
Rock Island Arsenal, IL 61299
309/794-3402

The Boeing Company
John O'Hara
Director, Contract Policy
P.O. Box 3707/MS 13-28
Seattle, WA 98124
206/655-0723

U.S. Army
Frederick Owens
Quality Assurance Specialist
DRSMI-JTE
Redstone Arsenal, AL 35898
205/876-2256

U.S. Air Force
Jeffrey Parsons
Contracting Officer
ASD/TAFK
Wright-Patterson AFB, OH 45433
513/255-5939

Shorts Aircraft
David Pearson
Marketing Manager
1725 Jeff Davis Hwy
Arlington, VA 22202
703/685-0360

U.S. Air Force
Anthony Peguese
Executive Officer
Pentagon/MS 4C261
Washington, D.C. 20330
202/697-7764

LTV Aerospace & Defense Company
Edward Peters
Manager-Contracts
P.O. Box 225907/MS 49R-09
Dallas, TX 75265
214/266-4231

Harris Corporation
Richard Pettit
Director of Administration
P.O. Box 94000/MS 101-2920
Melbourne, FL 32902
305/727-5020

Bourns Instrument Inc
Kenneth Pinkham
Director, Marketing
6135 Magnolia Ave/MS 25
Riverside, CA 92506
714/781-5433

General Electric
Philip Pittman
Manager F101 Contracts
One Neumann Way, Box 156301
Cincinnati, OH 45215-6301
513/243-6768

U.S. Air Force
Francis Poast
Program Manager
AFALC/BAOF
Wright-Patterson AFB, OH 45433
513/255-3442

U.S. Army
Ronald Powell
Chief, RAM Division
4300 Goodfellow Ave MS DRSAV-PR
St. Louis, MO 63120
314/263-1575

U.S. Air Force
Eilanna Price
Program Analyst
ASD/YZLR
Wright-Patterson AFB, OH 45433
513/255-4125

Litton Systems, Inc.
Stanley Przybylski
Vice President, Contracts
5500 Canoga Ave/MS 68
Woodland Hills, CA 91365
818/715-2026

General Dynamics Corporation
Donald Putnam
Corporate Director of Tech. Analysis
Pierre Laclède Center
St. Louis, MO 63105
314/389-8615

U.S. Air Force
Daniel Quirk
Procurement & Production Spec
WRALC/PMDHP
Robbins AFB, GA 31098
912/926-6074

U.S. Army
Thomas Reardon
Chief, Warranty Program
CDR USATACOM DRSTA-MS
Warren, MI 48090
313/574-8279

Garrett Airline Services Division
Guy Renfro
Manager, Contracts & Quotations
2202 E Univ/MS 99-79/1101W
Phoenix, AZ 85038
602/231-3716

Avco Lycoming Division
Charles Richardson
Manager, Contracts
500 South Main Street
Stratford, CT 06497
386-3504

United Technologies Corp
John Robaczynski
Legal Officer
P.O. Box 50015
San Jose, CA 95150-0015
408/778-4509

U.S. Air Force
Kenneth Roberts
Major
AF1771AN
Wright-Patterson AFB, OH 45433
513/255-5270

Teledyne GAE
Richard Rood
Manager, Washington Operations
2001 Jefferson Davis Hwy/Suite 312
Arlington, VA 22202
703/392-2114

Loral Electron
Jim Ross
Director, Cont
Ridge Hill
Yonkers, NY 1
914/964-3535

Rockwell Inter
Richard Koss

Cedar Rapids,

General Dynam
Fred Roth
F16 Contract A
P.O. Box 748/M
Ft. Worth, TX
817/777-4174

Aerojet-Genera
Omer Ruiz
Director, Cont
10300 N. Torre
La Jolla, CA
619/455-8601

Fairchild Repu
Walter Rupinsk
Director, Cont
Conklin Street
Farmingdale, N
516/531-3353

Litton Systems
John Rutledge
Director, Cont
25 Cityview Dr
Toronto, Ontario
416/249-1231

U.S. Air Force
Rick Salisbury
Logistics
ASD/YYLE
Wright-Patters
513/255-4082

Air Force Audi
David Sapp
Audit Manager
1129 Stilltree
Centerville, O
513/257-5431

Canadian Marce
Antoine Sayegh
Contracts Mana
2662 Trenton
Montreal, Cana
516/361-7630

Aerofet Tactical Systems Co
Donald Schaefer
Vice President, Contracts
PO Box 13400/D2000, 82019
Sacramento, CA 95813
916/365-5124

U.S. Air Force
Warren Schoenknecht
Supervisor, Equip Spec
HSMMLC
Redstone Arsenal, AL 35898
205/376-3311

Rockwell International
W. Schultz

Cedar Rapids, Iowa

U.S. Air Force
Ronald Schumann
Asst Staff Judge Advocate
Hq, AFSC/JAN
Andrews AFB, MD 20334
AV 858-3941

Thermo Systems
Tim Schutt
Division President
13920 S. Broadway
Los Angeles, CA 90061
213/321-4356

Westinghouse Electric Co
Arthur Schwarz
Chief, Contract Admin. Div
PO Box 1693, MS 4200
Baltimore, MD 21203
301/765-3029

The Analytic Sciences Corporation
Daniel Seger
Department Manager
3040 Presidential Drive
Fairborn, OH 45324
513/426-1040

Cleveland Pneumatic Company
Vincent Serlanni
Consultant
3781 East 77th Street
Cleveland, OH 44105
513/299-3701

U.S. Air Force
William Gerra
Project Manager
ASD/AFEM
Wright-Patterson AFB, OH 45433
513/255-3227

Hughes Helicopters, Inc
Harold Sharp
Asst to VP Financial Mgmt
Centinela at Teale Sts
Culver City, CA 90230
213/305-5676

U.S. Air Force
Larry Smith
Dean, School of Systems/Logistics
AFIT
Wright-Patterson AFB, OH 45433

U.S. Air Force
Richard Smith
Brigidiere General
Wright-Patterson AFB, OH 45433

DRCPM-M-60-PP
Sue Staggemeier
Procurement Analyst
Van Dyke Ave & 11 Mile Road
Warren, MI 48066
313/574-6752

U.S. Army
Bosko Stanenik
Chief, Policy & Application
Hq, AMHCOM
Rock Island, IL 61299
309/794-4021

General Electric
Michael Stanko
Manager, GE37 ILS and Warranties
One Neumann Way, MS H108
Evendale, OH 45215
513/243-4682

Hydra-Electric Company, Inc
Ken Starbird
General Manager
3151 Kerwood Street
Burbank, CA 91505
213/843-6211

Sperry Corporation
Norman Steiger
General Counsel
Marcus Avenue, MS 2T105
Great Neck, NY 11020
516/574-1024

Magnavox
James Stelle
Asst for Contracts & Adm, TSD
1313 Production Road
Fort Wayne, IN 46808
219/429-5455

The Analytic Sciences Corp
Ben Stetzler
Staff Analyst
3040 Presidential Drive
Fairborn, OH 45324
513/426-1040

Harris Corporation
Charles Stewart
Staff Dir to Sector Counsel
P.O. Box 37, MS 2/109
Melbourne, FL 32902
305/727-4108

Sargent-Fletcher Company
Lloyd Swanson
President
9400 East Flair Drive
El Monte, CA 91731
213/283-7171

Western Gear Corporation
Frank Taylor
Regional Manager
1235 Jefferson Davis Hwy, Ste 406
Arlington, VA 22202
703/892-1673

TRW
Frank Teta
Manager, Contract Admin
23555 Euclid Ave/MS 1901
Cleveland, OH 44117
216/692-6556

Litton C & C Systems Division
Ernest Theisen
ILS Program Manager
5500 Canoga Ave., MS 80/32
Woodland Hills, CA 91365
213/715-2171

Michigan Aeronautics Commission
Robert Thomas
Director
Capital City Airport
Lansing, MI 48906
517/373-0213

Pratt & Whitney
Richard Timm
F100 Business Manager
P.O. Box 2691/MS 702-56
West Palm Beach, FL 33402
305/840-6137

Norden Systems, Inc
J. Tobin
Manager of Contracts
Norden Place, PO Box 5300
Norwalk, CT 06856
203/852-7489

Hesserschmitt, Bolkow, Blohm
Mark Treat
Consultant
Fairmont Avenue
Dayton, OH 45419
513/293-8298

U.S. Air Force
Laurence Trowel
Log Ass Contracting Mgr Officer
Pentaton
Washington, DC 20330
202/697-7714

Honeywell, Inc
Arvid Tveit
Manager of Contracts
Honeywell Plaza, MS MN12-6151
Minneapolis, MN 55408
870-2649

Lockheed Corporation
Joseph Twomey
Vice Pres. & Gen. Counsel
2555 N Hollywood Way, Box 551, B61
Burbank, CA 91520
818/847-6631

The Analytic Sciences Corporation
John Underwood
EMS
1700 N. Moore Street, Ste 1220
Arlington, VA 22209
703/558-7400

U.S. Air Force
Mark Vajskop
Chief Logistics Engr Div
ASD/YVL
Wright-Patterson AFB, OH 45433
513/255-4082

Grumman Aerospace Corporation
Harlyn VanSloten
Asst Director, Contracts
South Oyster Bay Rd/MS C-1205
Bethpage, NY 11714
516/575-2007

Hesserschmitt-Bolkow-Blohm
Frank VanderWert
Manager
Postfach 801160, MS FB-4
3000 Munich 80, W Germany
089/6000-5042

U.S. Air Force
Juanita Vertrees
Warranty Specialist
ASD/YZYL
Wright-Patterson AFB, OH 45433
513/255-5313

Raytheon Company
Frederick Vitall
Manager of Contracts
PO Box 740, MS 108
Lowell, MA 01853
617/458-7211

U.S. Air Force
Vernon Vogt
Program Manager
ASD/AECA
Wright-Patterson AFB, OH 45433
513/255-6145

Teledyne CAE
William Wagner
Engineering Section Mgr
1330 Laskey Road
Toledo, OH 43612
419/470-3335

ITT Avionics Division
W. Waldenberg
Vice President
500 Washington Avenue
Nutley, NJ 07110
201/284-3378

Teledyne Continental Motors
Earl Wallace
Vice Pres/Ground Power Systems
P.O. Box 90
Mobile, AL 36611
205/438-3411

U.S. Army
John Weatherly
Procurement Analyst
DRSMI-IBD, Bldg 4488
Redstone Arsenal, AL 35898
205/876-2563

U.S. Air Force
Bernard Weise
Brigidiere General
Wright-Patterson AFB, OH 45433

Lear Siegler, Inc.
Ralph Wilcox
Mgr., Support Marketing
4141 Eastern, S.E. MS 225
Grand Rapids, MI 49508
616/241-8640

U.S. Air Force
Thomas Williams
Program Manager
ASD/YYHD
Wright-Patterson AFB, OH 45433
513/258-4140

General Motors
Dennis Woilcott
Legal Staff
3044 W. Grand Blvd
Detroit, MI 48202
313/556-0157

Ingersoll-Rand Company
Richard Worthen
Program Manager
P.O. Box 869
Mocksville, NC 27028
704/634-3561

Menasco, Inc
Clare Wright
Program Manager
P.O. Box 500
Euless, TX 76039-0500
817/283-4472

General Dynamics Corp
Harry Wurtz
Director of Contracts
PO Box 85357/Kearny Mesa Plant
San Diego, CA 92138
619/573-5894

U.S. Air Force
Ray Zaun
Product Assurance Engineer
ASD/TAES
Wright-Patterson AFB, OH 45433
513/255-3321

U.S. Army
Richard Zawalski
Warranty Administrator
DRSTA-MS
Warren, MI 48090
313/574-7431

Avco Corporation
Sumner Zorfus
Vice Pres, Contract Mgmt
201 Lowell Street
Wilmington, MA 01887
617/657-2139

U.S. Air Force
Michael Zaak
Engineer
Hq., AFSC/ALK
Andrews AFB, DC 20334
301/981-4076

Hazeltine Corporation
Barbara Zuckerman
Attorney
Contracts Dept.
Greenlaw, NY 11740
516/351-4145

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