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The TFX/F-111 has been making headlines for nearly 10 years and is still an emotionally charged case in military management. The elements of the case and the implication for the defense manager are profound and deserve the sincere attention of all who have a function or interest in this Nation's security.

THE TFX F-111 AIRCRAFT: A PERSPECTIVE IN MILITARY COMMAND AND DEFENSE MANAGEMENT

An article prepared
by

Rear Admiral Henry E. Eccles, U.S. Navy (Ret.)

Introduction. In the last 15 years, U.S. military affairs have been dominated by three highly controversial matters:

- Heavy combat involvement in Southeast Asia.
- The design and production of advanced weapons systems.
- The introduction of sophisticated management concepts in the Department of Defense.

These matters share three major attributes: all have aroused strong emotions, all are very complex, and all three illustrate the conflict between established concepts and habits of thought and the new ideas of ambitious, aggressive young men. More important, however, is the fact that sophisticated management concepts played an important part in the latter two problems.

While we cannot hope to resolve all the differences among the contending ideas on these subjects, we nevertheless should learn what we can as soon as possible. The first step in such a learning process is to understand what has happened and then we must, to the best of our ability, determine why it happened. Such an investigation must necessarily be a continuing historical analysis of the pertinent military-political events that bear on the problem. In a broader context and as illustrated in figure 1, historical analysis such as this is an essential to military theory and education,* and it should include case histories of both success and failure, for instance:

*See Henry E. Eccles, "Military Theory and Education; the Need for and Nature of," *Naval War College Review*, February 1969, p. 70-79.

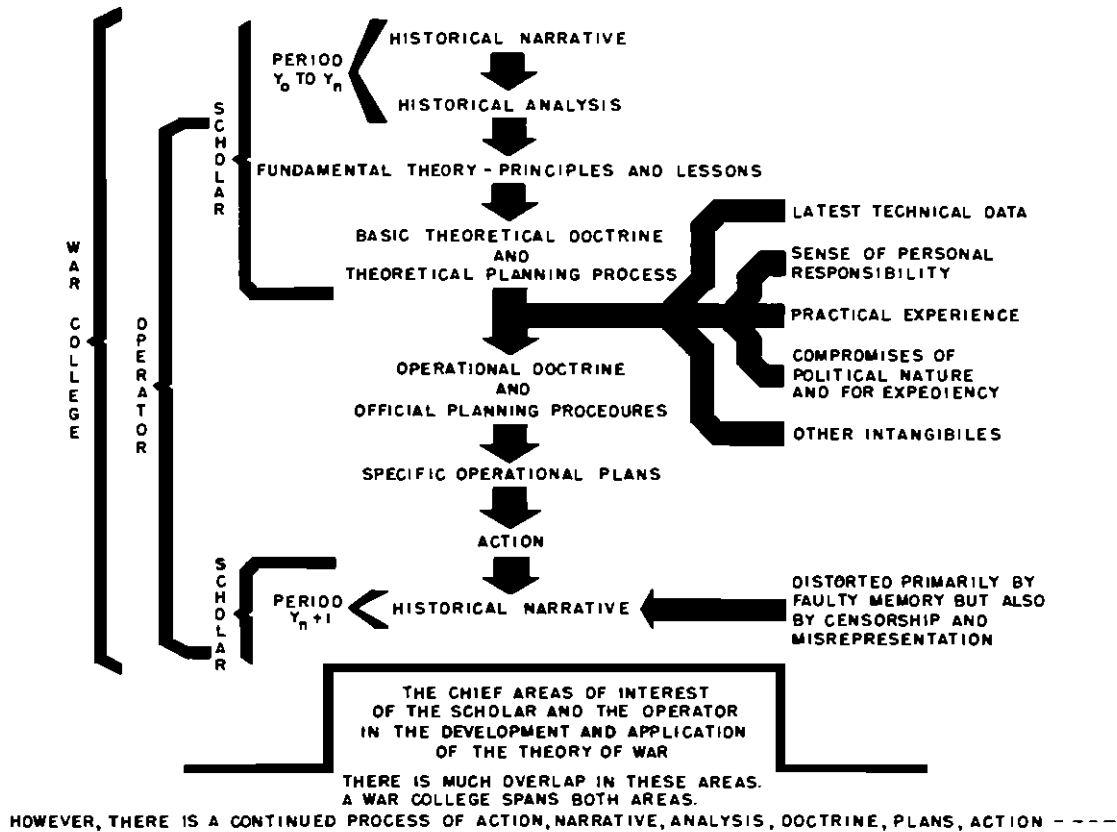


Figure 1

Examples of Success:

Grant's Vicksburg Campaign—1863
 Fleet tng *Navajo*--1940
 Marshall Islands and
 Marianas Campaign—1944
 General Motors 271 diesel
 Jeep
 F-4 fighter
 U.S.S. *Nautilus*

Examples of Failures:

Loading out for Santiago—1898
 British Flanders Campaign—1917
 Suez—1956
 Bay of Pigs—1961
 TFX/F-111—1961-1970

The full story of the TFX/F-111 aircraft probably can never be adequately told in a single book. Nevertheless, with the release of the McClellan Subcommittee Report,^{*} the mass of authoritative evidence is now adequate to draw significant conclusions and relearn important lessons.¹ This paper is based on unclassified sources, particularly the U.S. Senate TFX Investigating Committee report of 1963,² the Senate and House Armed Forces Committee hearings on military procurement and posture of 1967 and 1968,³ Robert Art's book, *The TFX Decision*,⁴ and special articles in *Barron's*⁵ and *Fortune*.⁶

What I present is therefore only an introduction to a fascinating and important case history which, like the Suez crisis of 1956 and the Bay of Pigs in 1961, will affect the security of the United States for many years.

As with many other national problems, the case of the TFX/F-111 has been an emotional controversy. For example, in an editorial on 29 December 1970, *The Washington Post* stated:

It was eight years ago this month when the Senate Perma-

nent Subcommittee on Investigations first began poking into the contract that the Pentagon was about to sign for an airplane called the TFX. In the years since, no single military contract has stirred so much controversy, so much rancor, and so much distortion of the truth. The TFX is flying now as the F-111 and the Air Force says it is a superb airplane. Secretary McNamara, on whose head most of the rancor fell, has been gone from the Pentagon almost two years. But last week, in came the Senate Subcommittee with another report on the TFX just as full of bitterness and just as one-sided as was its first round of hearings on this subject in 1963.⁷

And on 2 January 1971, *The New York Times* editorial stated:

The final report of the Senate Permanent Investigations Subcommittee on its long inquiry into the F-111 airplane contract might well be called "The Revenge of the Military-Industrial Complex." . . . As part of his successful effort at the Pentagon to make civilian control a functioning reality for the first time, he cut across service routines and rivalries to insist, wherever possible, on the concept of "commonality"—use of the same weapon or equipment by all the services. . . . The mistakes which Mr. McNamara made in this instance qualify but do not offset his many brilliant successes in managing the huge Pentagon establishment and increasing its effectiveness by these same managerial methods.⁸

It is unlikely that the opposing protagonists could even agree on precise, quantifiable criteria by which to judge

^{*}See appendix I for the summary and conclusions of the McClellan Subcommittee Report of the *TFX Contract Investigation*.

this program, let alone accurately analyze the ensuing mass of statistical data. Therefore, it is necessary to go to fundamental theory and principle to achieve understanding.

Strategic realism requires the analysis of *Objectives and Assumptions* and the appraisal of *Expectations*. Its very nature requires that the first two processes be largely intuitive or, in other words, political and military objectives—including related assumptions—are largely the fruits of intuitive judgment. The study of *Systems Analysis* as related to *Operational Readiness* and *Combat Effectiveness* is essential to the realistic practical appraisal of military expectations.

The essence of these very basic fundamentals is that the military professional must be able to combine rigorous quantitative analysis* with sound intuitive judgment. Jerome Bruner's comments on intuition are therefore pertinent:

In contrast to analytic thinking, intuitive thinking characteristically does not advance in careful well-defined steps. Indeed, it tends to involve maneuvers based seemingly on an implicit perception of the total problem. The thinker arrives at an answer, which may be right or wrong, with little if any awareness of the process by which he reached it. He rarely can provide an adequate account of how he obtained his answer, and he may be unaware of just what aspects of the problem situation he was responding to. Usually intuitive thinking rests on familiarity with the domain of knowledge involved and with its structure, which makes it possible

for the thinker to leap about, skipping steps and employing short cuts in a manner that requires a later rechecking of conclusions by more analytic means, whether deductive or inductive. [Emphasis added.]

The complementary nature of intuitive and analytic thinking should, we think, be recognized. Through intuitive thinking the individual may often arrive at solutions to problems, which he would not achieve at all, or at best more slowly, through analytic thinking. Once achieved by intuitive methods, they should if possible be checked by analytic methods, while at the same time being respected as worthy hypotheses for such checking.

Professional judgment and intuition are almost synonymous. In both, the mental process draws on patterns of experience and study imbedded in the subconscious. The recognition of similarities and differences in these matters seems completely unpredictable but it also seems dependent on a special kind of involvement that is akin to the tuning of a radio circuit. An experienced acute mind develops a special feel for a situation which enables it to respond perceptively to an aberration or fault of reason or action which will escape the notice of the untuned mind.⁹

The Perspective. In dealing with this case, we first should recognize the distinction between command and management. The *Army Staff Manual* states this clearly: "Good management is one expression of effective command and leadership. Management is inherent in command, although it does not include

*For further discussion on this point, see Stuart J. Yuill, "Quantitative Information for Strategic Decisions," *Naval War College Review*, November 1970, p. 16-29.

the extensive authority and responsibility of command."

The President of the United States is the Commander in Chief. He is not titled "The General Manager"! His management responsibilities come from his command status. He delegates his authority in various ways as prescribed by law and his own judgment.

Regardless of what blend of civilian and military authority emerges from these laws and judgments, military command has the responsibilities to create combat forces, to support combat forces, and to employ combat forces; all in order to attain political purposes.

In discharge of these responsibilities, the major political-military decisions are command decisions, the administrative and the routine decisions which result from these major decisions frequently are matters of the applying of management techniques, and thus can be considered "Military Management."

This differentiation is important for many reasons but chiefly because command decisions may involve the issue of peace or war—they involve the issue of life or death for individuals and for groups. Management education and literature do not discuss such issues nor should we expect trained managers to decide them on the basis of their management experience.

For these reasons, the decisions made in the case of the TFX should be discussed from the perspective of command if their true implications are to be understood, for they involved the three major responsibilities of command: to create, to support, and to employ combat forces.

The Issues. The central issues posed by the TFX are:

- Civilian control of the military.
- Concepts of operational readiness and combat effectiveness.
- Concepts of requirements determination.

- Concepts of procurement.
- Concepts of logistics and military management.

All of these have many complex subordinate issues; all five are inextricably interwoven, and all are important elements of military theory. All must be dominated by a clear sense of the objective.

Because of its complexity and its far-reaching political, economic, and military implications; the number of powerful personalities involved; and the tens of thousands of pages of evidence the thorough study of the TFX, by itself, would constitute an excellent year's advanced course in logistics and military management. Throughout the whole story there are the twin themes—the nature and use of professional judgment and intuition and the inexorable operation of the law of diminishing returns, particularly as they affect operations research and systems analysis. Ironically, the specific issue of procurement—that of contract award—which raised the greatest furor was almost completely irrelevant from the military point of view for there is no evidence that Boeing could have done a significantly better job than General Dynamics. For that reason I will not dwell on the events which apparently took place concerning the contract award in October-November 1962, but for those who do wish to read a good yarn, I recommend Mr. Seth Kantor's testimony before the McClellan Committee.¹⁰

The program objectives were stated on 21 March 1963, when Mr. McNamara in testifying stated:

As a basis for today's discussion, perhaps I can summarize very quickly in 2 or 3 minutes my position. It is simply this: It is my responsibility to make a decision such as this. I made it and I assume full responsibility for it.

My objectives with respect to the TFX Program were three: First, it was my objective to endeavor to introduce during the latter part of this decade into the Air Force and Navy an advance fighter aircraft to replace the F-105's, and F4II's which will be the backbone of the tactical fighter forces of those two forces during the decade of the sixties.

It was my objective to introduce this aircraft in the latter part of the decade, with substantial performance advantages over fighters of the two earlier models, the F-105 and F4II. That was my first objective.

The second objective was to maximize the dependability of the new aircraft, and the third was to minimize its costs.¹¹

The TFX History. The chronology in appendix II sketches the history of the TFX with special emphasis on the critical phase from its inception to the award of the contract in late 1962. The construction and test periods from 1963 to 1967 are extensively discussed in the June 1967 issue of *Fortune*¹² and in the reports of the House and Senate Committee Hearings on the Armed Forces Procurement and Appropriations for Fiscal 1969.¹³

It is significant that by mid-1967 it was crystal clear that the Navy F-111B was so completely unsatisfactory that it could never be effectively produced and operated. The Navy then officially hedged its position by initiating the VFX study with Grumman in October.

The status of current procurement is shown on figure 2. The later version of the Air Force planes (F-111F's) now in service are performing reasonably close to the original standards (see conclusions of appendix I). The Navy is using its few planes for test purposes. Both

the Air Force and Navy are developing their own follow-on planes, the F-14 and the F-15, which incorporate many of the features of the TFX. While the TFX has performed certain functions in a creditable manner, it is obvious that it failed to meet its stated objectives. This failure has been enormously expensive in money, in energy, and in time.

- 23 R&D aircraft (18 F-111A-USAF/
5 F-111B-USN)
- 2 F-111B production aircraft (USN)
- 2 F-111K for Great Britain (salvaged)
- 24 F-111C for Australia
- 76 F8-111 for SAC
- 141 F-111A for TAC—Nellis AFB
- 96 F-111D for TAC—Cannon AFB
- 82 F-111F for TAC—MacDill AFB
- 94 F-111E for USAF Europe—
— RAF Upper Heyford

540

Fig. 2—October 1970 Status of F-111 Program

The TFX case, however, is quite different than the usual case of 20-20 hindsight. In this case, the foresight of the military professionals and their experienced civilian assistants was specifically reversed by Secretary McNamara. This is shown by his statement read to the Senate Investigating Subcommittee on 13 March 1963:

The concept of a major multi-service weapons system is new. I would be less than candid with you if I did not admit that the majority of experts in the Navy and Air Force said it couldn't be done. As late as the 22d of August 1961, after the Navy and the Air Force had been working together for almost 8 months, it was reported to me by both services that development of a single TBX aircraft to fulfill stated requirements of both services was not technically feasible.

While this attitude, based on years of going separate ways, was understandable, I did not consider it was a realistic approach,

considering the versatility and capabilities that could be built into a modern aircraft because of advances in technology. I was also convinced that, if we could achieve a single tactical fighter, we would save at least \$1 billion in development, production, maintenance, and operating costs. In short, after study and review, I believed that the development of a single aircraft of genuine tactical utility to both services in the projected time frame was technically feasible and economically desirable. I directed that we continue to work toward this objective. Because this decision was peculiarly my own, I kept myself fully advised of the development of the TFX as it progressed over the succeeding 14 months.

The basic judgments on my part which determined my decision were:

Both the General Dynamics and the Boeing designs met stated military requirements and would provide significant improvements in combat capabilities of the Navy and the Air Force.¹⁴

Mr. McNamara's statements are in sharp contrast to the statements of several naval officers. For example:

On 16 May 1962, Rear Admiral Masterson, the Chief of the Bureau of Naval Weapons, in forwarding the report of the Source Selection Board stated:

...concurring in the position taken by the Navy member of the Source Selection Board. . . . It is significant that current proposals fail to meet performance requirements and weight goals by a greater margin than the original submission. . . . Therefore any further effort to meet the joint

requirements as presently established cannot be recommended.¹⁵

Rear Admiral Ashworth testified:

The Chairman. Let's see what that meant.

Admiral Ashworth. The following paragraphs explain that, sir. Shall I proceed?

The Chairman. In other words, they were getting further away from an acceptable plane than they were coming closer to it, is that what this meant?

Admiral Ashworth. Yes, sir; exactly.

The Chairman. All right, proceed.¹⁶

And later:

I have added the emphasis to point out that it would appear that the best efforts of the two contractors had proved that it was impossible to arrive at a single design capable of meeting simultaneously the requirements of each service as then defined in the work statement.

... You will recall at the end of the second round, the performance of both aircraft was degraded attempting to meet the requirements of the Air Force and the Navy.¹⁷

Nevertheless, in spite of this sincere opposing point of view, Mr. McNamara on 21 March 1963 testified:

The decision to proceed with the new fighter program was relatively easy to arrive at in November 1962 because by then it was clear that we could meet all our objectives. However, the selection of a source for the development and production of that aircraft was far more difficult.¹⁸

After the initial major decision in 1961, the studies proceeded, and the Source Selection Board was formed to evaluate the proposals of industry. The program gathered momentum and began to occupy more and more time of Government, military, and industrial officials. Although the story is voluminous documented, there are still some obscure aspects which may never be completely clarified. In particular, no one has satisfactorily explained:

- The Seth Kantor story in the *Fort Worth Press* which announced the selection of General Dynamics as the prime contractor one week before the Source Selection Board selected Boeing.

- The precise influence of President Kennedy, Vice President Johnson, and President Johnson upon Secretary McNamara's decisions.

- What was said in the discussions between the Chiefs of Naval Operations and the Secretaries of the Navy and Secretary of Defense in the period 1961-1967.

However, we do know that:

- At the time it was made, the contract was the largest single contract ever made.

- The Source Selection Board spent about 275,000 man hours in its studies, only to have their recommendations reversed.

- The time of the contract decision—late October and early November 1962—coincided with the critical period of the Cuban missile crisis, 14-28 October, in which top Government officials were intensively involved.

- The total production of F-111's is now forecast at 540, all but 28 for the U.S. Air Force, in contrast to the 1,700 originally planned.

- The development of improved fighters for Navy and Air Force was delayed at least 5 years by the assumption that the F-111 would succeed.

- Once Secretary McNamara left office, the hedge position that he had accepted in 1967 was adopted and the

F-111 program was drastically cut as the F14-AF15 program began to pick up.

- As of late 1970, service experience with the F-111A indicates that the basic concept of a swing-wing fighter bomber combination equipped with advanced avionics is sound and produces a very effective aircraft.

The real tipoff as to the progress of the program occurred when in late 1966 or early 1967 McNamara implicitly acknowledged his personal failure by taking over as F-111 Project Manager. Every other Saturday he held his personal hearings with the presidents of the contracting companies, making the major decisions as the contractors strove to compensate for the fatal, inescapable, and previously predicted consequences of massive overweight.

The magazine *Ordnance* in November 1967 commented:

Air Armament—F-111 Project Managers

Both the Air Force and the Navy have replaced their program managers in the controversial F-111 program . . . There probably has never been a military weapons system development program in which so much administrative interference has been present.

The new managers will, at least, be allowed to attend the biweekly meetings with Secretary McNamara and the respective presidents of the contractors. This was a privilege not afforded their predecessors until recently.¹⁹

The Significance of Events. Since the chronology gives many details of the course of events up to 1968 and since the June 1967 issue of *Fortune* provides an excellent account of the problems and the efforts being made to handle them,²⁰ I will mention only what I consider most significant.

By January 1966 the reports of the initial tests of the F-111B disclosed serious fundamental defects, primarily caused by excessive weight. The performance was so poor and the nature of the overweight so fundamental that it was abundantly clear that no series of fixes would produce a plane satisfactory for its designed use aboard a carrier.

By this time it was also apparent that the performance of the Air Force version had been fundamentally degraded by incorporating features required only by the Navy version.

In spite of this, the Department of Defense maintained its adamant insistence on proceeding with the original concept.

Fortune commented:

... No matter what contractors did in the way of weight removal they were under strict Department of Defense orders to do it to both the Air Force and the Navy planes... From the Secretary down, most of the participants—though not all—often seem to be entangled in what seems to be the half-truth or the half-lie because of lack of candor.²¹

In November 1967 *Ordnance* stated:

... the controversial F-111B (once the TFX) has been declared unsuitable as of now for use by the Navy.

Because of its overweight (as of now 16,000 pounds over) further modifications will be necessary in test models.

When the TFX was in the daily headlines at the start of the venture 3½ years ago, the then Assistant Secretary of Defense, Roswell L. Gilpatrick, [sic] would brook no opposition or stand for

any professional criticism of the TFX program. He has departed for other fields of endeavor, leaving carrier commanders, crews, and pilots to sweat it out in their inability to meet battle missions efficiently.²²

The hearings of the Senate Armed Services Committee in February 1968 clearly show how the officials of DOD were still strongly supporting the F-111B long after its failure was well recognized by the Navy.²³ The testimony of these officials on critical questions was frequently irrelevant or evasive or simply uninformed. For example, no one revealed in 1962 that Secretary McNamara had rejected the Weapons System Evaluation Group's (WSEG) first study of the TFX with the words, "This is not the answer I want." Within 6 months after, a second WSEG study and second unfavorable report, the Director of WSEG was relieved.

I particularly recommend the careful study of Robert Art's book, *The TFX Decision*,²⁴ not only as an invaluable bibliographic reference, but also for some of the special comments which he makes almost parenthetically or in his footnotes. On page 161, without apparently appreciating the disastrous results of McNamara's TFX decision, he writes almost admiringly:

The revolutionary manner in which McNamara made his decisions (revolutionary, that is, for the Defense Department) transferred the "expert" career bureaucrat into the "novice" and the "inexperienced political appointee" into the "professional." By demanding that decisions be made through a cost-effectiveness analysis, McNamara freed himself from the Secretary's usual dependence on the experience and knowledge of the military officer and the career civil servant. By

demanding something that only he and his small personal staff possessed and had competence to do, McNamara declared insufficient, or invalid, or both, the customary criteria for making decisions and the traditional grounds for making them.²⁵

Program Results. It behooves us to learn as much as we can from this affair. It is irrelevant simply to ask the question: Is the present operating version of the TFX/F-111 a good military aircraft? The issue in this case is whether or not the aircraft met the objectives of the TFX program as stated by Secretary McNamara in 1963:

- To provide advanced fighter for Air Force and Navy to be introduced in the late sixties,

- To maximize dependability of the new aircraft,

- To minimize its costs (implement commonality).

As of January 1971, the results of the TFX program are:

- The development of suitable planes for Navy and Air Force was delayed at least 5 years,

- Large sums of money, talent, and energy were wasted,

- Self-deception, official equivocation, and misrepresentation were encouraged,

- Confidence in the high command was diminished,

- Relations between Congress and the Executive were unnecessarily strained,

- Both our military posture and our defense system were damaged. The integrity of the procurement system was undermined,

- The British and Australian defense plans were disrupted, and our relations with these allies were harmed,

- Managerial talent and executive energy of very senior members of the executive branch were diverted to an

unproductive project when they were badly needed elsewhere, i.e., Vietnam,

- Finally, one of the worst features of the TFX/F-111 affair has been that in the recent controversy over the military industrial complex the military have been blamed for the excess cost of the procurement programs. Those who demand more civilian control seem to forget that, as Robert Art writes, civilians dominated the entire concept and program.

The failure of the program was caused by a disastrous combination of intellectual faults, to wit:

- Pushing state of art in a dual-purpose aircraft simultaneously in:

- Aerodynamics
- Metallurgy and fabrication
- Propulsion
- Electronics and Weaponry

- False assumptions as to:

- Cost and time of development
- Cost of production
- Nature of commonality
- Cost of commonality—both in degraded performance and in side effects, such as carrier modification.

- Failure of the Secretary of Defense to appreciate the regenerative or snowball effect of excess weight in both performance and cost. This weight reduced performance in acceleration, climbing, maneuvering, and landing. This had to be "fixed" by additional engine power, which in turn raised the cost for the additional power itself required more time, money, fuel, and weight. Furthermore, there was a reduction in flexibility for the excessive weight left no room for future improvement.

As these regenerative cumulative faults appeared, they were compounded by a further very common and plausible fault. The integrity and continuation of an approved program became the main objective rather than the accomplish-

ment of the objective for which the program was instituted.*

Conclusions and Observations. Mr. McNamara as Secretary of Defense had some notable accomplishments on his record. He had forced the services to make an improved and more rigorous relation of logistical programs to national strategy and to force structure. This involved more extensive and better quantification than that previously used. He had assumed personal responsibility for closing unneeded military installations and had been unusually successful. He had shown courage in cutting back programs which had strong popular support but uncertain military justification. He strengthened other useful programs that had been starved.

The claims for dollar savings in his administration are difficult to measure: first, because many of these claims cannot be verified without a better knowledge of the need for reserve stocks; second, many successful measures were instituted in previous administrations and came to fulfillment in his; third, some of his advertised cost savings, as for example, great reduction in cost of packaging for overseas shipment of Navy material, caused unnecessary waste in Vietnam.

The very vigor of his administration attracted strong support and strong dissent with protagonists of both sides quick to emphasize or perhaps exaggerate the evidence in favor of the particular position taken.

On the basis of the public record, the TFX case is a clash of two intuitive judgments—one by Navy professional planners represented by Admiral Anderson, Rear Admiral Ashworth, and Mr. Spangenberg, the senior Navy civilian on the Source Selection Board, all of whom

had had years of practical experience and responsibility in the operational field of knowledge involved; the other that of Robert McNamara who had had no experience or active responsibility in that operational field of knowledge.

No real *new* lessons have been derived from the TFX study. Fundamental principles cannot be violated with impunity, and the result of the program was predictable and was predicted. The whole affair illustrates that there is simply no substitute for professional competence, and that the cost for persistence in a hopeless venture can be enormous and incalculable.

But we must not forget that other factors contributed to the desire to impose greater civilian control on military affairs. For example:

- The basic size and complexity of the issues of strategy, weapons procurement, and budget allocation became frustrating which in turn caused an exaggerated reaction toward centralization.

- The military themselves had indulged in dishonest justification for

BIOGRAPHIC SUMMARY



Rear Adm. Henry E. Eccles, U.S. Navy (Ret.), graduated from the U.S. Naval Academy, Class of 1922. He holds a master of science degree from Columbia University, is a graduate of the Naval War College, and is currently serving as a consultant for logistics at the War College.

He has had a variety of duty in submarines, destroyers, cruisers, battleships, and in 1946-47 commanded the U.S.S. *Washington*. Prior to his retirement in 1952, he was Assistant Chief of Staff for Logistics, Commander Allied Forces, Southern Europe. His publications include: *Military Concepts and Philosophy*; *Basic Logistics*; *Command and Control*; *Command Logistics*; *Cuba—October 1962*; and numerous articles for professional journals.

*A case in point is the Battle of Flanders, from July to November 1917, when 300,000 British troops were killed for no significant gain.

expensive projects. Slanted staff studies were frequent and were expected.

- Senior military men knowingly and deliberately refused to undertake adequate logistic research in 1952-1961.

- Logistic duties were known as "the kiss of death." Logistic education was inadequate.

- When Mr. McNamara took office, most so-called "strategic" and "contingency" plans were worthless because they were not logistically supportable, thus destroying the credibility of our senior officers who had responsibility for formulating such plans.

Therefore, the military professional should not feel in any way complacent because in this affair the professional turned out to be right and the civilian secretariat wrong, for the intangible "integrity of command" had been violated repeatedly and flagrantly by military professionals. The slang expressions such as "Don't let it happen on my watch," "Don't make waves,"

and "Your job is to make your boss look good" are just as bad as the overt misrepresentation and ruthless repression of dissent shown in the TFX investigation.

While the TFX case has not produced any revolutionary concepts or insights in management, it does shed some light on the whole philosophy of bureaucratic organization and decisionmaking.

In the late 25 years political, economic, social, and military concepts have changed throughout the world to a degree which approaches a massive cultural transformation. Among others there has been a major change in the structure and concepts of high military command as shown in figure 3.

Much of this change in the meaning and organization of command has been inevitable. Some of it has been wise, some has been unwise. In particular, the manner in which civilian control has been exercised through highly cen-

EVOLUTION OF MODERN HIGH COMMAND

1

INDUSTRIAL REVOLUTION INVOLVED WHOLE NATION IN ANY WAR.

2

TECHNOLOGICAL REVOLUTION PRODUCED :

A. THERMO NUCLEAR MISSILES WHICH THREATEN WORLD DISASTER ,
WITH CONSEQUENT DEMAND FOR .

RAPID INTELLIGENCE .
QUICK DECISION & ACTION .
STRICT POLITICAL CONTROL .

B. DATA PROCESSING .
ADVANCED RECONNAISSANCE .
FAST COMMUNICATIONS .
FAST TRANSPORTATION .

PROVIDED NEW CAPABILITIES .

3

NEW CONCEPT IN NATURE AND EXERCISE OF COMMAND.

4

INSTITUTIONALIZATION .
CENTRALIZATION .
CIVILIANIZATION .

AND

ELABORATE ELECTRONIC
COMMAND CONTROL
SYSTEMS .

Figure 3

tralized operational decisions has been unsatisfactory, frequently frustrating, and sometimes counterproductive.

The true malignancy of bureaucracy is caused by a well-known fact: when you take the power of decision away from a man, you simultaneously start to reduce both his inclination and his ability to make decisions.

The same principle applies to institutions. When you frustrate the responsible action of a high-level institution, its best members leave it and organizational degeneration is inevitable. Also, when men are deprived of authority, they tend to become adept in shirking or avoiding responsibility and in covering up mistakes.

This, in turn, produces a variety of harmful effects:

- Men become afraid to act decisively in times of emergency.

- They lose their ability for clear analytical thought.

- The image of the service or of the man becomes the goal rather than the substantive realities of combat effectiveness and efficiency.

- They lose their credibility in the eyes of their subordinates.

- Actual responsibility becomes overly diffused throughout the necessarily large personal staff of the top command structure with consequent loss of *effective command control*.

The cumulative effect becomes a form of moral and intellectual corruption, a continuing degeneration in the integrity of command and a consequent loss of morale and combat effectiveness. Evidences of this degeneration are best seen in the Vietnam war and the incidents involving the *Pueblo* and the Coast Guard cutter *Vigilant*.

FOOTNOTES

1. U.S. Congress, Senate, Committee on Government Operations, *TFX Contract Investigation*, Report (Washington: U.S. Govt. Print. Off., 1970).

2. U.S. Congress, Senate, Subcommittee on Investigations, *TFX Contract Investigation* (Washington: U.S. Govt. Print. Off., 1963), pts 1-5.

3. U.S. Congress, House, Committee on Armed Services, *Appropriations for FY 1968*, Hearings (Washington: U.S. Govt. Print. Off., 1967); U.S. Congress, Senate, Committee on Armed Services, *Appropriations for FY 1969*, Hearings (Washington: U.S. Govt. Print. Off., 1968); U.S. Congress, Senate, Committee on Appropriations, *Appropriations for FY 1969*, Hearings (Washington: U.S. Govt. Print. Off., 1968).

4. Robert Art, *The TFX Decision—McNamara and the Military* (Boston: Little, Brown, 1968).

5. "Incredible Contract," *Barron's*, 11 May 1970, p. 1, 8, 10; "Profits and Losses," *Barron's*, 30 September 1968, p. 1, 12; "Flying Edsel?" *Barron's*, 12 July 1968, p. 1, 3, 8, 20; "Too Much, Too Late," *Barron's*, 16 August 1965, p. 1, 3, 8, 10, 12, 14; "Wing and a Prayer," *Barron's*, 30 August 1965, p. 3, 8, 10, 13, 15; "Point of No Return," *Barron's*, 15 August 1966, p. 1, 3, 8, 10, 12.

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8. *The New York Times*, Editorial, 2 January 1971.

9. Jerome Bruner, *The Process of Education* (Cambridge: Harvard University Press, 1960), p. 58, et seq.

10. Senate, Subcommittee on Investigations, p. 1251-1290.

11. *Ibid.*, p. 429.

12. Alexander.

13. House Committee on Armed Services; Senate Committee on Armed Services; Senate Appropriations Committee.

14. Senate, Subcommittee on Investigations, p. 377, 388.

15. *Ibid.*, p. 494.

16. *Ibid.*

17. *Ibid.*

18. *Ibid.*, p. 429.

19. "Defense Highlights," *Ordnance*, November 1967, p. 220.

20. Alexander.

21. *Ibid.*

22. "Defense Highlights," p. 250-251.

23. Senate Committee on Armed Services.

24. Art.

25. *Ibid.*, p. 161.

APPENDIX I—TFX CONTRACT INVESTIGATION

REPORT

91st Cong., 2d sess., Senate #91-1496

SUMMARY AND CONCLUSIONS

SUMMARY

The history of the TFX program is one of a series of management blunders, a series of poor decisions at the highest levels of the Department of Defense, which compounded error upon error as the TFX program stumbled along year after year. This report on the history of the program shows that at least five major management errors were made during the course of the program, as follows:

First, the original decision by Defense Secretary McNamara to start the TFX program, made on September 1, 1961, was wrong

This decision to proceed with a multimission TFX overruled the recommendations of the Air Force and Navy that separate TFX aircraft developments should be undertaken. The service recommendations were based on careful studies which showed the multimission airplane project to be technically infeasible if the separate mission requirements were to be attempted with one airplane. However, the project was ordered started by Defense Secretary McNamara without any attempt to resolve the fundamental incompatibility in design requirements between a carrier-based air superiority fighter and a land-based supersonic ground attack fighter-bomber. The program was doomed to failure right from the beginning.

Second, the decision in November of 1962 to choose the second best TFX proposal at the higher price was wrong

The decision of the civilian Secretaries in overruling the recommendations of an objective source selection process, without consultation or advice on the merits of their action, constituted inexcusable procedure by high ranking Government officials. This assumes, of course, that the contract was awarded to General Dynamics Corp. for the reasons stated in the official memorandum for the record outlining the Secretaries' rationale for their decision. In addition, the tenacious defense of the contract award when the decision was questioned and the insistence upon the worth of their unprofessional stated judgments on such technical issues as commonality, titanium, thrust reversers, et cetera, had the effect of locking the Secretaries into an inflexible policy on design changes during research and development. The effect of their arbitrary stand was to prevent desirable technical changes from being made in the selected design because these factors had been stated as reasons for rejecting the top-rated proposal.

Third, the failure to heed warnings in February, July, and October of 1964, of technical difficulties and to allow redesign of the F-111B was wrong

If the advice to redesign the Navy plane had been heeded at this very early state of the research and development program, then a useful F-111B most probably could have been produced. This step would

have required the admission of the error of the multimission decision of September 1961 and the failure of the commonality concept which was emphasized in the contract award of 1962, but it would have saved hundreds of millions of dollars which ultimately were wasted and would have enhanced the Nation's defense posture by providing a combat-worthy airplane at an early date.

Fourth, the order to start Project Icarus in August of 1966, and to place personal management of the TFX in the Secretary of Defense's office, was a poor management decision. Obviously it was made in desperation

The imposition of Project Icarus upon the program reflected a lack of perception of the true import of the research and development results at that time, which had shown conclusively the lack of potential in the F-111 airplanes ever to fulfill their operational requirements. Project Icarus also resulted in interference with the services' management of the program without resulting in any substantive improvements to the designs of the F-111's.

Fifth, the decision to continue the production line on the F-111A in April-May 1967 was wrong

Production should have been stopped at that time until the many technical design problems were solved and the fixes were tested. The problems all had been reported to the Project Icarus meetings and discussed therein. The result of the decision to continue with production was the building of hundreds of inferior and substandard tactical F-111's. Because of this, the available funds for the F-111 program largely were used up on inferior versions of the airplane, and the Air Force could no longer afford to buy the adequate aircraft, the F-111F, which finally emerged.

These major management errors in the TFX/F-111 program all occurred at critical points in the history of the program, points where sound judgment in accepting the advice and counsel of the professionals and experts whose job it was to procure aircraft for the Department of Defense would have resulted in vastly different results for the TFX program.

Certainly the evidence is unimpeachable that the multimission program never should have been started. But once that error was made, selecting the airplane design rated as the second-best attempt to fulfill the impossible requirement was compounding error with error. Whether this selection error was made for the reasons stated, such as "commonality," or for other unacknowledged reasons, it certainly represented a second-best attempt to rectify a previous blunder.

The refusal in 1964 to recognize that the previous actions had resulted in failure, and the insistence then that the commonality principle be maintained at that critical point in the program obviated the last chance to salvage the TFX and to produce superior (but separate) aircraft for the Air Force and Navy. At this early stage of research and development it would have been possible to reorient the TFX's into two separate airplane designs unencumbered by the commonality requirement, with very little waste of money or slippage in schedule. The refusal to admit to failure at this point in the TFX's history was the most inexcusable error because it was made when the evidence of failure was overwhelming and irrefutable.

The decisions which followed—the personal attempt by the Secretary of Defense to manage the program through Project Icarus and the decision to continue production without completing research and development—simply continued to compound the effects of the previous errors. These decisions to continue the program were made in the face of conclusive evidence from the flight tests of the planes that they were deficient—for instance, they were grossly underpowered—in their tested configurations. A principal result of these decisions to press on with the production program was, as stated before, to use up funds available for tactical F-111's largely in the purchase of hundreds of inferior F-111's.

CONCLUSIONS

The TFX program has been a failure. The Federal Government will spend more than \$7.8 billion to procure about 500 aircraft, although the original production schedule called for more than 1,700 aircraft to be purchased for less money. Of the 500 planes we will have, less than 100 (the F-111F's) come reasonably close to meeting the original standards. Spending so great a sum for so few aircraft represents a fiscal blunder of the greatest magnitude. It is clear that vital financial resources were squandered in the attempt to make the TFX program produce satisfactory results.

The billion dollar savings in the TFX program, so grandiloquently promised by Secretary of Defense McNamara, became instead a directly accountable waste of more than one-half billion dollars spent on the F-111B, the F-111K and the RF-111 versions of the plane, all of which were unacceptable and had to be cancelled and abandoned before production. The total failure of the attempt to produce a satisfactory F-111B has caused a long and unnecessary delay in filling the Navy's requirement for a new carrier-based fighter. The lack of fighter maneuverability in the Air Force versions of the F-111 plane made it necessary to undertake the development of another fighter—the F-15—to fill this role for the Air Force in the 1970's. The excessive costs of the Air Force versions forced drastic cutbacks in the numbers of aircraft which can be procured to fill the tactical and strategic inventory. The long delays in getting the F-111's into operational use certainly have had an adverse impact on our defense posture.

Aside from the serious impact which the TFX program has had upon our national security and aside from the obvious waste of scarce resources, the TFX case also has affected public confidence in our defense establishment. As this report makes clear, the primary cause of the TFX fiasco was mismanagement. A series of management blunders, made for various reasons, compounded errors with more errors and caused the failure of the program. The management blunders were made at the highest echelons of the Government. Top Presidential appointees in the Department of Defense during the McNamara era overrode expert advice to impose personal judgments on complex matters beyond their expertise. These same officials then made extraordinary efforts to conceal the results of their errors in the TFX case. These efforts included deliberate attempts to deceive the Congress, the press, and the American people. Understandably, this sorry record has done nothing to enhance public confidence in the integrity and competence of the people who are charged with preserving the national security. Nor has it improved the public image of the Department of Defense.

What should be done to correct these conditions? Announcements have already been made of greater decentralization of the management system within the Pentagon so that technical aspects of weapons development programs would be managed where they should be—by the individual services which eventually will be responsible for using in combat the weapons that they develop. There is stated to be increased awareness of the need for current and valid assessments of program status and progress. There also is stated to be concern with the problems of conducting research and development concurrent with early production. The subcommittee believes that these trends in management policies, if diligently followed, could lead to improvements in the weapons acquisition process and in management effectiveness within the Pentagon.

The subcommittee is hopeful that the civilians who now run the Department of Defense, as well as those who will follow, will be committed to a policy of candor and truthfulness in their relations with the press, the public, and the Congress. Such a policy, if observed, should do much to improve public confidence in the credibility of the Pentagon.

It would be foolhardy, however, to assume that such errors as are exemplified in the TFX program could not be repeated. A major lesson of the TFX case is that the Congress must not hesitate, in the exercise of its oversight function, to examine major procurement procedures, decisions, and programs, particularly whenever there is obvious deviation from established practices. The Congress must be ever watchful, because there could be recurrences of the serious and damaging mismanagement that attended the TFX program from its inception, as reflected in the subcommittee's hearings and as summarized in this report.

The following members of the Senate Permanent Subcommittee on Investigations have approved this report:

JOHN L. McCLELLAN.
HENRY M. JACKSON.
SAM J. ERVIN.
ABRAHAM RIBICOFF.
LEE METCALF.

KARL E. MUNDT.
CHARLES H. PERCY.
EDWARD J. GURNEY.

The members of the Committee on Government Operations, except those who were members of the Senate Permanent Subcommittee on Investigations, did not sit in on the hearings and executive sessions on which the above report was prepared. Under these circumstances, they have taken no part in the preparation and submission of the report, except to authorize its filing as a report made by the subcommittee.

APPENDIX II—TFX/F-111 CHRONOLOGY

- 1958-59 Boeing and General Dynamics started small-scale wind tunnel tests of TFX concept on assumption Air Force would need advanced tactical fighter.
- Early 1960 Navy proposed F-6D Missileer to succeed F-4H tactical fighter for fleet air defense.
- March 1960 NASA tested swing-wing design—declared technically sound.
- April 1960 Air Force R&D and TAC and NASA agreed on swing-wing tactical fighter.
Proposed 16 test aircraft first flight test for May 1963.
OPS AVAILABILITY Oct 1965.
- June 1960 SOR 183 issued by AF HQ.
- November 1960 Secretary Gates halted work on both TFX and F-6D to avoid committing Kennedy administration.
- February 1961 McNamara says TFX should be made to fulfill requirements of Air Force, Navy, and Army.
- 9 March 1961 Assistant Secretary Navy R&D Wakelin stated to Dr. York, DOD Director of R&D, that TFX (SOR 183) not suitable for Navy and warned against overemphasis on “commonality.”
- 7 June 1961 McNamara concludes TFX should fulfill requirements of only Air Force and Navy.
- 22 August 1961 Air Force and Navy report to McNamara they are unable to reach agreement over joint requirements for TFX.
- 1 September 1961 Secretary McNamara authorized joint development program (estimated savings of \$1 billion over separate programs).
- 1 September 1961 DOD announces new tactical fighter program for U.S. Air Force and U.S. Navy, naming U.S. Air Force as executive agent for the program.
- 1 September 1961 McNamara unilaterally sets requirements for Air Force and Navy for TFX.
- 1 October 1961 Air Force issues request for proposal and work statement to airframe industry.
- 6 December 1961 Six leading aircraft manufacturers submit first proposals regarding tactical fighter to DOD. Source Selection Board.
- 19 January 1962 Source Selection Board votes unanimously to recommend Boeing as winner of TFX contract.
- 24 January 1962 Air Force Council rejects Source Selection Board’s decision and recommends 8-week extended competition between Boeing and General Dynamics-Grumman.
- 1 April 1962 Boeing and General Dynamics-Grumman submit second proposals to Source Selection Board.
- May 1962 Source Selection Board (14 May) and Air Force Council (24 May) recommend award of contract to Boeing, but Navy refuses to go along.
- Late May 1962 Korth and Zuekert reject decision and order a third 3-week competition between Boeing and General Dynamics-Grumman. Boeing and General Dynamics-Grumman submit third proposals to Source Selection Board.
- 20-21 June 1962 Source Selection Board and Air Force Council again recommend award of TFX contract to Boeing, but Navy refuses to go along.
- 1 July 1962 McNamara orders final runoff between Boeing and General Dynamics-Grumman on basis of open “payoff points.”

- 11 September 1962** Boeing and General Dynamics-Grumman submit their fourth and last proposals to Source Selection Board.
- Mid October 1962** Evaluation by Source Selection Board.
- 14-28 October 1962** CUBAN MISSILE CRISIS.
- 15 October 1962** Navy decided on Boeing.
- 24 October 1962** *Forth Worth Press* announced selection General Dynamics (Kantor story).
- 2 November 1962** Source Selection Board unanimously selected Boeing.
- 7-8 November 1962** Generals Sweeney, Bradley, Schriever and Admiral Masterson concurred.
- 8 November 1962** General LeMay, Admiral Anderson concurred.
- 9 November 1962** Secretaries Korth and Zuekert briefed in latter's office.
- 9-24 November 1962** Secretaries considered.
- 18 November 1962** Secretary Zuekert made up his mind as to award.
- 21 November 1962** Secretary Zuekert wrote memo also signed by Secretary Korth and concurred in by Secretary McNamara; RECOMMENDED GENERAL DYNAMICS.
- 23 November 1962** Secretary Zuekert informed General LeMay that General Dynamics had been selected.
- 24 November 1962** DOD names General Dynamics prime contractor for development of 23 tactical fighters, now called F-111, with Grumman as principal and associate subcontractor. (18 for U.S. Air Force, 5 for U.S. Navy)
- 1 August 1963** Air Force Secretary Zuekert testified at length as to impossibility of making accurate cost forecasts of complex new weapons systems. (p. 2100-2126 of Senate TFX Investigation).
- 24 October 1963** DOD announces Australian Government agreement to purchase 24 F-111's for the Royal Australian Air Force. Est. cost \$125 million.
- January 1964** Superweight improvement program instituted (SWIP).
- April 1964** Production contract to General Dynamics for 431 F-111's through 1969. Eventual procurement forecast as 1,600.
- 21 December 1964** First F-111A flight completed at Forth Worth, Tex.
- 6 January 1965** Variable wing tested for first time at Forth Worth, Tex.
- 5 March 1965** F-111 completes its first supersonic flight.
- 6 April 1965** Secretary of Defense Robert S. McNamara confirmed the U.S. Government had made an arrangement with the British Government enabling Great Britain to obtain F-111 aircraft for the Royal Air Force.
- 12 April 1965** DOD announced letter contract for 431 production F-111 aircraft.
- 10 May 1965** Lt. Col. James W. Wood becomes the first Air Force pilot to fly the F-111A.
- 2 July 1965** Grumman completes first supersonic flight with F-111B version.
- 27 July 1965** Capt. D.C. Davis, USN, becomes the first Navy pilot to fly the F-111.
- 8 October 1965** Group Capt. C.H. Spurgeon, Royal Australian Air Force, flew the F-111 at the Air Force Flight Test Center to become the first foreign pilot to fly the Air Force's latest fighter.
- 3 December 1965** Secretary of Defense announces decision to develop RF-111A tactical reconnaissance version of the F-111.

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- 10 December 1965** Plan announced to develop the F-111 strategic bomber version of the F-111.
- 16 December 1965** RAF Wing Comdr. G.R.K. Fletcher becomes the first British pilot to fly the F-111.
- 7 January 1966** U.S. Naval Air Test Center made final report on Phase 1 preliminary evaluation of F-111B airplane FT 030R-65 (CONF) stating the F-111B airplane unsatisfactory for service use.
- 22 February 1966** British announce intention to purchase F-111 aircraft for the Royal Air Force.
- 27 May 1966** The first production prototype F-111, aircraft number 12 in the test series, made its initial flight at Forth Worth, Tex. This aircraft incorporated all the significant changes based on the flight test program.
- August 1966** Secretary McNamara took personal charge of Program. He became the project Manager of "Project Icarus."
- October 1967** Navy initiated VFX study and received proposals from Grumman and later from three other companies for plane to do fleet air defense at less weight than F-111B.
- January 1968** British canceled order for F-111.
- February 1968** Secretary of Defense estimated cost of 235 F-111A through FY 1969 as \$6.76 million each.
- 2 February 1968** Secretary McNamara stated Navy VFAX would be possible alternative if F-111B did not perform satisfactorily but that this seemed unlikely.
- 2 February 1968** Secretary McNamara testified to Senate Armed Forces Committee that all present analyses indicated F-111B would function satisfactorily on and off the carrier.
- 15 February 1968** Page 501. In questioning Dr. Foster, Senator Symington stated in Senate Hearing "it is hard to follow reasons why it is better for us to keep on fighting to get the F-111B the right airplane for the Navy, when nobody in the Navy wants it."
- 1 March 1968** Clark Clifford succeeded Robert McNamara as Secretary of Defense.
- 4 March 1968** Senator Symington stated at hearing that nearly all DOD statements about cost and performance had been wrong and that he had found service disagreement to point of contempt for efforts to promote TFX/F-111B.
- 4 March 1968** Senator Symington at F-111B hearing mentioned that the determination of DOD to make "an honest woman" out of the TFX had prevented development and production of adequate missile system.
- 4 March 1968** Secretary of the Navy Ignatius stated fly away cost F-111B as around \$8 million.
- 4 March 1968** Secretary of the Navy Ignatius testified to Senate Armed Forces Committee that he anticipated that "production-configured F-111B--will satisfactorily meet urgent requirement for supersonic platform for highly promising PHOENIX missile system." And that Navy requested funds for 30 production F-111B aircraft to begin fleet introduction.
- 4 March 1968** Secretary of the Navy Ignatius and Asst. Secretary of the Navy Frosch, Admiral Moorer, and Vice Admiral Connolly discussed at length with Senate Armed Forces Committee the pros and cons of canceling F-111B; at conclusion Senator Stennis stated that he couldn't go on buying F-111B's "with the unfortunate limitations it has."

- 2 May 1968 Representative Hardy of House Armed Services Committee stated "we have been milked by the F-111 up to now. I hate to see us pouring more money trying to make something work which was a brainstorm that ought not to have been started."
- 6 June 1968 Secretary of the Navy Ignatius reported to House that as a result of Navy Fighter Study Group work, Navy reduced requirement from 30 to 8 in FY 1969 budget. (The hedged approach.)
- 20 June 1968 Dr. Frosch stated that Senate Armed Forces Committee had authorized no funds for F-111B.
- 24 June 1968 Secretary of Air Force Harold Brown stated that F-111A was proving to be an outstanding aircraft in actual combat operations in SE Asia.
- 25 June 1968 At House Armed Services Committee, Secretary Brown and General McConnell, USAF, expressed vital need for an all-weather fan jet variable sweep-wing plane with good avionics and that F-111 would provide this vital capability better than any available aircraft. They did not answer Mr. Bates' question "If you could turn the clock back would you go down the same road?"
- 4 September 1968 Australia took delivery of its first F-111C at Forth Worth and later announced it would take no more until defects were corrected.
- 7 October 1968 Senator Symington suggested terminating the F-111 program.
- October 1968 Estimated cost for Australian order \$294 million.
- 8 October 1968 Australia's 24 F-111's ordered in 1963 now 18 months behind schedule.



The Armed Forces will never show a dollar-and cents profit.

*Observation by unidentified officer, c. 1950,
quoted in the Professional Soldier, Janowitz.*