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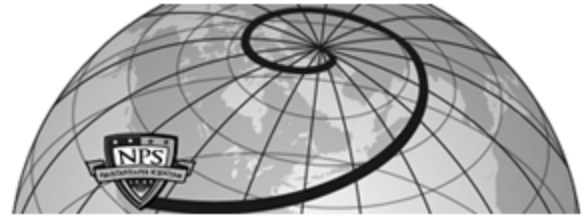
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AN INQUIRY INTO CONTRACTOR  
SUPPORT OF FLEET AIRCRAFT

PAUL M. ALLEN

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AN INQUIRY INTO CONTRACTOR SUPPORT

OF FLEET AIRCRAFT

By

Paul A. Allen  
Commander, Supply Corps, United States Navy

The complexity, intricacy, cost and rapid obsolescence of modern military weapons has produced unprecedented problems in logistic support. These problems have been attacked in the Navy from two directions. The first, by efforts to improve "in-house" logistic support procedures. The second, through increased reliance on Contractor support systems, particularly in the test and fleet introductory phases of a weapon's development. This latter course of action is examined insofar as applied to introductory support of the McDonnell F4H-1 aircraft at two Pacific Fleet operating sites.

A review and report of the initial impact of Contractor support of the F4H-1 is presented. Suggested improvements are made for extended use of Navy personnel in the Contractor support program.

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May 1962  
Master of Science in Management  
Navy Management School

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AN INQUIRY INTO CONTRACTOR SUPPORT  
OF FLEET AIRCRAFT

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A Research Paper  
Presented to  
the Faculty of the Navy Management School  
U. S. Naval Postgraduate School

\* \* \* \* \*

In Partial Fulfillment  
of the Requirements for the Degree  
Master of Science in Management

\* \* \* \* \*

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TABLE OF CONTENTS 1

CHAPTER	PAGE
I. SCOPE OF THE PROBLEM. . . . .	1
Past Logistic Support . . . . .	2
"In-House Effort to Improve Support . . . . .	4
Emphasis on the FIRM Plan . . . . .	5
Evolution of Contractor Support. . . . .	6
II. DEVELOPMENT OF CONTRACTOR SUPPORT PROCEDURES. . . . .	9
Planned Fleet Introduction of the Weapon. . . . .	9
Responsibilities of Major Participants in Contractor Support . . . . .	10
Contractor Support Sites. . . . .	16
Summary . . . . .	16
III. CONTRACTOR SUPPORT OF THE F4H-1 IN THE FLEET. . . . .	18
SAR-398 Actions at NAS Miramar, California. . . . .	19
Transition to Navy Support at Miramar . . . . .	24
SAR-398 Actions at Naval Missile Center, Point Mugu . . . . .	28
Other Facets of Contractor Support of the F4H-1 . . . . .	29
Summary . . . . .	31
IV. SUMMARY . . . . .	33
USAF Policies on Contractor Support . . . . .	33
Recommendation For Program Cost Analysis. . . . .	36
Summary, Conclusions, Suggested Improvements. . . . .	37

## CHAPTER I

### SCOPE OF THE PROBLEM

The inadequacies of logistic support of new aircraft and missiles introduced into Navy fleet units has traditionally been the subject of many scathing reports and much soul searching. In the early life, say the first year, of a weapons system (aircraft and missiles) our military supply and maintenance performance is at best marginal. And when, as was the case in 1956 and 1957, several new aircraft were introduced into the fleet within a short period of time, logistic support difficulties were chaotic. "Logistic support" in the sense under discussion, includes supply, maintenance, engineering, training and technical documentation.

At this point it is considered worthwhile to emphasize the recognized, but oft overlooked, mutual dependency of supply and maintenance in the field of aviation weapons support. Because of the critical function of reparable components of a weapons system, poor maintenance and repair practices, material failures, design changes, improper in-flight techniques, and inadequate "know how" and tooling, all will magnify supply support problems far out of proportion to their actual responsibility for difficulties encountered. Conversely an inadequate or untimely supply of materials can delay essential maintenance, thereby aggravating maintenance problems. Any of these situations of course, ultimately impinge on the ability

of a command to meet operational commitments and weaken our military readiness posture.

As in almost every field of endeavor, the technical complexity of modern fleet weapons is increasing at an increasing rate. Herein lies the crux of our problem. As weapons, particularly manned aircraft, are required to fly higher, faster, and further, and to operate alternately in tropical and frigid environments from sea level to fifty thousand feet or more, and to do so with the capability of accurately launching a myriad of complex bombs and rockets, the Navy finds itself supporting (or trying to support) a weapon system that hasn't quite been invented yet. We really can't afford to wait for a system to be completely "invented", or operationally perfected if you will, for if we did, by the time we "debugged" the majority of our equipments they would be obsolete. Such is the pace of today's military weapons race.

On the other hand, with the cost of military hardware becoming astronomical, the United States Navy continues to have ever increasing world-wide commitments that must be met with relatively small force levels and limited budgets. In 1956 the conservatively estimated fly-away cost of one F8U fighter aircraft was one million eight hundred thousand dollars! This is a capital investment of more than twenty five million dollars for just one fighter squadron! Today, only six years later the cost of a similar squadron of our most recently produced fighter, the F4H, is about thirty five per cent

greater. The Navy, then and now, cannot afford to have such expensive capital investments inoperative for very long periods.

Historically, the percentage of total Aircraft Out of Commission for Parts (AOCPP) by model has been the primary measure of the effectiveness and responsiveness of the aviation supply system. Although the AOCPP rate reflects in varying degrees certain factors previously mentioned which are beyond the control of the supply system, managers responsible for the support of aviation units still heavily rely on AOCPP statistics as a valuable control and reporting device.<sup>1</sup> Additional measures of logistic effectiveness which are being more diligently scrutinized by operations, maintenance and supply personnel are the percentage of time aircraft are down for maintenance as expressed in the squadron's ZULU reports,<sup>2</sup> and the number of Aircraft Not Fully Equipped (ANFE) as reported to the Aviation Supply Office (the Supply Demand Control Point for aviation material) by various activities supporting Naval aircraft. ANFE percentages indicate the degree to which aircraft, that may be flyable, are unable to perform their primary mission. For purposes of this discussion, data on AOCPP percentages were more readily obtainable and will be used with the

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<sup>1</sup>Commander W.L. Thorpe, Jr., SC, USN, "An appraisal of the Effectiveness of the Section "B" Allowance List in the Support of Modern Carrier Based Aircraft", 31 October 1958, (Unpublished Professional Paper on Supply Management).

<sup>2</sup>OPNAV Instruction P5442.2A, Aircraft Accounting System, May 1960.

qualifications indicated.

How much has been said about the general subject of inadequacies of logistic support of fleet aviation. Let's get more specific. Until 1956 the peacetime ACP rate for fleet aircraft fluctuated in the range of five to ten per cent. This rate, while not condoned, was perhaps justifiable in the light of the funds and effort needed to reduce the rate to any marked degree. However, in 1956 with the introduction of six new sophisticated jet aircraft, the ACP rates for some models soared at times to fifty per cent or more and on the average were in the twenty to thirty percent range.<sup>3</sup> While higher than normal ACP rates are to be expected in the initial phases of introductory fleet operations, the inordinately high rates continued on these aircraft well in 1958.

In light of the obvious inadequacies of logistics support rendered to fleet aviation, the "Arnold Board"<sup>4</sup> was created in 1957. This board conducted an extensive and searching study of the support policies and procedures for Naval Aviation from the Chief of Naval Operations down through logistic and operating commands to the level of fleet squadrons. This study resulted in many constructive recommendations and gave impetus to the development of more efficient ways of doing business. Two of the programs which received their impetus

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<sup>3</sup>Thorpe, Op. Cit., p. 5.

<sup>4</sup>"Report on the Board convened by the Assistant Secretary of the Navy (Material) to study and report upon the Adequacy of Naval Aviation Support", March 1958.

from the Arnold Board were the Screening for Aeronautical material (SAM)<sup>5</sup> program and the Revised Aeronautical Support Program (RASP)<sup>6</sup>. It is emphasized that the author does not consider that the Board created these programs, but rather, brought considerable pressure to bear on all levels of command to develop and experiment with imaginative support systems to meet the challenge of technological complexity. Fortunately, this emphasis and pressure did not diminish with the adjournment of the Board. The after effects are still evident today, as for example in the mushrooming aviation logistic support organization of the Bureau of Naval Weapons Fleet Readiness Representatives. To say the least, the Board discouraged the natural inclination of many to maintain the status quo in the performance of logistics support tasks.

As might be expected most recommendations received and acted upon during this period were toward improvement of Navy "in-house" logistic operations. Fast turn around of reparable, identification and more selective management control over the most important supply items of our inventory, reduction or at least tighter control over design changes, institution of more responsive mechanized aircraft

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<sup>5</sup>Commander Doyle W. Selden, SC, USN, "Inventory Management by Exception", 8 June 1960 (Professional paper on Supply Management).

<sup>6</sup>BUAER Instruction 4400.6, Joint BUAER/BUSANDA Program for a Refined Aeronautical Support Program (RASP), 16 February 1959.

configuration control records, etcetera, all were recommended and adopted in varying degrees.

In another sphere of aviation logistic support related to Arnold Board recommendations, the Bureau of Naval Weapons (then the Bureau of Aeronautics), under the direction of Chief of Naval Operations, was making a concerted effort in conjunction with the aircraft industry to reduce substantially the time required to bring a weapon from the drawing board to full fleet operating status. This is the Fleet Introduction Replacement Model (FIRM) Plan.<sup>7</sup> In a day of rapid technological advance and concomitant, rapid obsolescence of weapons, the advantages accruing from a reduction in the time required to design, test, develop, evaluate and introduce a weapon are obvious. Accordingly, all parts of the FIRM Plan were subjected to intense study with a view to shortening and combining phases where practicable. At the same time, efforts were directed toward the optimization of aircraft availability during Contractor-Navy test and evaluation phases and during the early stages of aircraft operation in the fleet environment, i.e. the Fleet Introduction Program (FIP) or Carrier Replacement Air Group (ACVG) training program. Other areas requiring improvement under the FIRM Plan were the training of fleet maintenance and operations personnel, engineering and maintenance standards, technical data and services and

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<sup>7</sup>OPNAV Instruction 05700.7, Policy for aircraft Produced as Fleet Introduction Replacement Model Aircraft.

material reliability. All of these areas seemed to promise improvement only if contractors were more intimately involved than they had ever been before in supporting weapons systems at military operating sites.

With the above in mind, and with primary regard to the logistic support aspects of the FIRM Plan, the Bureau of Naval Weapons and the aircraft industry developed the "Contractor Support Program"<sup>8</sup> in 1958. The program was promulgated as a "Contractor Material Support Document for United States Navy Contracts." Subsequently this document with minor conceptual revisions, was superseded and reissued as "Weapons Requirements," Number Two (WR-2).

The remainder of this paper will be devoted to a review of contractor support with emphasis on the supply aspects and with respect to observed results with the first Navy weapon to be supported under the Contractor Support Program. This weapon, the F4H-1, is an all weather fighter-bomber aircraft manufactured for the Navy by the McDonnell Aircraft Corporation. For purposes of this paper, the notation SAR 398 will be used to refer to the Contractor Support Program.

In summary, the intricate and complex weapons of today and tomorrow, more than ever, require effective and responsive logistic

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<sup>8</sup>Bureau of Aeronautics Department of the Navy, Special Aeronautical Requirements, SAR 398, 30 September 1958.

support systems. These systems may take the form of innovations or major changes in the Navy's "in-house" organizational structure, techniques and procedures. On the other hand, as is argued by industry, a great deal of logistics functions performed by Service organizations responsible for procurement and later stages of development are strictly management functions that many large industrial firms are uniquely equipped to perform well and that should be delegated to them as prime contractors.<sup>9</sup> Somewhere between complete Military support of a weapons system and complete contractor support there is probably an optimum support relationship. Some of the possible answers to this moot question will be explored with regard to the F4H-1 aircraft.

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<sup>9</sup>Charles J. Hitch and Roland M. McKean, The Economics of Defense in the Nuclear Age, The Rand Corporation, 1960., p. 229.

## CHAPTER II

### DEVELOPMENT OF CONTRACTOR SUPPORT PROCEDURES

SAR 398, the Contractor Support Program, as published and implemented in supporting the F4H-1, generally prescribed the procedures, terms and conditions governing the selection, funding, receipt, storage, issue, replenishment and disposition of material necessary to support a given weapon system during the test period and initial fleet introduction period.<sup>1</sup> In addition, SAR-398 specified the terms and conditions governing the furnishing of certain technical data and services which were to be provided under the contract for supplies. Services not included under SAR-398 were those incident to training of fleet personnel in maintenance and operation of the weapon and those for furnishing of contractor employees to man and operate the supply support and technical assistance programs. Though intimately related to the performance of the contractor under SAR-398 and within the term "Contractor Support", all these functions are handled under separate contractual arrangements and will only be touched on briefly.

#### I. PLANNED FLEET INTRODUCTION OF THE WEAPON

The contract for development of the F4H-1 was let some seven

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<sup>1</sup>Commander H. T. Barnett, SC, USN, "Navy/Contractor Support Program", a presentation at the 16th Annual Aviation Supply Conference, 26-30 October 1959.

and one half years ago with the McDonnell Aircraft Corporation. The first aircraft flight was in April of 1958. Initial planning called for introduction of the aircraft into the Carrier Replacement Air Group (RCVG) VF-121, at Miramar Naval Air Station, California in July of 1960. Because of various slippages and program changes, the first aircraft did not arrive at Miramar until 28 December 1960. Starting on this date the RCVG introduction program for both the Atlantic and Pacific Fleets was combined at Miramar for the first four months of fleet operations under CAN-398. In April of 1961, the Atlantic Fleet RCVG F4H training nucleus, VF-101 Detachment Alfa, split off from the Pacific RCVG and returned with five aircraft to its permanent duty station, the Naval Air Station, Oceana, Virginia. In accordance with its mission, this unit expanded to a full scale training operation for Atlantic Fleet F4H squadrons.

The first deployment of an F4H squadron overseas is scheduled to be in the Atlantic Fleet aboard the U.S.S. FORRESTAL in August 1962. This is some four years after the first flight and about twenty months after the first fleet deliveries.

## II. RESPONSIBILITIES OF MAJOR PARTICIPANTS IN CONTRACTOR SUPPORT

The Bureau of Aeronautics was assigned overall responsibility for coordinating and directing logistic support of FIRM Plan aircraft. More specific responsibilities with regard to contractor

support were:

1. The promulgation of planning data covering employment and deployment plans for the aircraft designated for contractor support.
2. The designation of those aircraft to be supported by the contractor during various phases of the FIRM Plan, e.g. Replacement Air Group Training, including specifying the length of contractor support period.
3. To insure that contracts contain the requirements of SAR-398 for contractor support.
4. To provide as required, coverage for contractor assistance in the field of training in all major elements of the weapon (other than SAR-398).
5. To specify and administer control over funds charged with contractor support program costs.
6. Providing certain equipments and materials for contractor use, e.g. aircraft engines.
7. Promulgate maintenance, repair and overhaul policy for aircraft and major components during contractor and Navy support periods.
8. To arrange for Material Support Planning Conferences with the objective of establishing target dates for all specific aeronautical material support actions, assign primary responsibility for such actions, and resolve any support problems.<sup>2</sup>

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<sup>2</sup>BUAER Instruction NAVAER 00.73B, Logistic Material support of Aircraft Produced as Fleet Introduction Replacement Model Aircraft, 23 March 1959.

The Aviation Supply Office, Philadelphia, is the Navy Supply Demand Control Point for Aeronautical Material. This office is responsible for providing an adequate range and quantity of spare assemblies, spare parts, special support equipment, and adequate stocks of general aeronautical materials to support all FIRM Plan aircraft with the exception of those aircraft and equipments designated for direct contractor support. This does not mean that the Aviation Supply Office (ASO) is not involved in SAR-398. To the contrary, it is involved from the earliest planning until the aircraft is phased out of the Navy. ASO participation and direction at all stages is extensive for several reasons. Complexity, cost and administrative considerations, require that there be more than one prime contractor involved in developing and supplying major equipments which become an integral part of the aircraft. Consequently, as in the case of the F4H-1, though McDonnell coordinated supply support through most phases of the FIRM Plan, the source of some forty two per cent<sup>3</sup> of the line items of material initially procured for "contractor" support at fleet training sites, and a similar percentage at test and evaluation sites, was procured by ASO from other prime contractors such as the General Electric

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<sup>3</sup>Minutes of F4H-1/IF SAR 400 Delivery Status Meeting, 1 - 2 November 1961, Aviation Supply Officer letter MSS1-A, 5050 of 17 November 1961 with enclosure.

Corporation and provided to McDonnell for their use. Technically speaking, the two material source categories are called Contractor Furnished Equipment (CFE), mainly the airframe, special support equipment therefor and some internal components, and Government Furnished Aeronautical Equipment (GFAE) such as the propulsion unit (the J-79 engine), and the fire control radar system.

ASO in order to appropriately emphasize the integrated nature of support actions needed for modern weapons has established an internal organization, the Weapons Systems Division.<sup>4</sup> This division manages weapons systems assigned to the ASO in order to assure timely and complete logistic support for all Navy and Marine aircraft and their related systems. Specific duties are: the coordination of ASO logistic actions in support of specific weapons, analyzing and reporting status of weapons systems, providing a central point of contact for weapon systems information on supply items, providing planning data for inventory management purposes, and keeping top management advised of weapon supply support status/problems. Each weapon, for example, the F4H-1, is assigned to a manager team of one officer and one civilian, both of whom will stay with a weapon for a minimum period of three years. This team coordinates responsibilities with regard to contractor support and transition to Navy support that have been assigned to ASO by the Bureau of Aeronautics as follows:

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<sup>4</sup>Aviation Supply Office, Weapons Managers Handbook, ASO Internal Publication of 1 March 1962

1. Chair Support Material List conferences and review Support Material Lists as submitted by the contractor, making arrangements as necessary to provide spares to contractor support sites on contractor warehouses for Government Furnished Aeronautical Material.

2. Emphasize and monitor early accumulation, evaluation and analysis of accurate and complete usage data from contractor and Navy supported operations. This data to be used in assisting in adjusting procurement actions.

3. Issue appropriate detailed supplemental instructions and guidelines to all concerned regarding allocation, distribution, handling, accounting, etc., of material procured under the contractor support concept.

4. Schedule provisioning and delivery of spares to facilitate transition from contractor support to Navy support.

5. Conduct frequent liaison with all activities involved in supporting a program.

The contractor was given a great amount of latitude under SAR-398 in the establishment of internal procedures for supporting the the weapon during the test and evaluation phases. However, the following were his specific responsibilities:<sup>5</sup>

1. Determination of range and quantity of Contractor-Furnished

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<sup>5</sup>Special Aeronautical Requirements, SAR 398, Op. Cit.

Equipment, Government-Furnished Aeronautical Equipment, special support equipment, and general and standard support equipment required at various support sites. This is the basis for the Support Material Lists mentioned above.

2. Operation of central storage facilities at each operating site, including replenishment and distribution of material.

3. Design of special support equipment as required.

4. Arrangement for rework of Contractor Furnished Equipment and spares.

5. Provide technical data and publications as required under the program.

6. Submission for Navy approval of design changes to end articles and modification of materials in store, in use and in manufacture as approved.

7. Establishment of a Maintenance Support Plan in consonance with Material Support and Deployment Plans.

8. Training of government personnel as provided for in call contracts.

Other activities involved in the program are numerous and their responsibilities need not be set forth here. Commander Naval Air Force, Atlantic and Pacific Fleets, fleet operating and test sites, overhaul activities, the prime equipment contractors, many subcontractors, Navy technical staffs, etc., all were involved in varying degrees and at varying time periods in the FIRM Plan. The variations

in themselves are not significant to this study. However, it is quite apparent that coordination of all possible actions was a very difficult and time consuming task.

### III. CONTRACTOR SUPPORT SITES

Under the test, evaluation and fleet training phases of the FIRM Plan, aircraft were deployed to seven different sites from Massachusetts, Maryland and Virginia on the east coast, to New Mexico and three activities in California. All seven of these sites were supported for varying lengths of time by the contractor under SAR-398. The focal point of supply action was the McDonnell warehouse and plant at St. Louis. At each aircraft operating site the contractor had established civilian maintenance and supply support teams. Aircraft are still operating at six of these locations. McDonnell is contractually committed for an indefinite period to full support at four of these activities where aircraft are still undergoing test and evaluation. The remaining two sites, the Naval Air Stations, Miramar and Oceana, are now primarily supported by the Navy supply system, though the contractor is providing assistance on a limited scale in expediting material requirements.

### IV. SUMMARY

As might be expected on the first contract under SAR-398, there were many operating plans and logistic support plans and responsibilities that required definition. Where possible these plans and re-

sponsibilities were spelled out but it was also obvious that there were many grey areas that could not be cleared up until such time as experience was gained in day-to-day support. The Bureau of Aeronautics, Aviation Supply Office, McDonnell Aircraft Corporation, Fleet Air Commands, and many other military and civilian activities involved in supporting the F4U-1 needed to be integrated as a team. This had been done before and would be done again. The difference in the scheme of things this time was the emphasis on contractor support and responsibility, where in the past, the Navy had assumed the support responsibility almost immediately on delivery of the first aircraft.

## CHAPTER III

### CONTRACTOR SUPPORT OF THE F4H-1 IN THE FLEET

We have reviewed the contractor support program in light of general plans and responsibilities. It is now considered appropriate to review the program in action at one fleet test site and to evaluate, after the fact, the results of the program at another fleet operating site which was under SAR-398 but now is under Navy support concepts.

Unfortunately, it appears that no thorough documentation of the effectiveness of contractor support has been made at any location. The author has visited a fleet test and evaluation site of the F4H-1, the Naval Missile Center, Point Mugu, California, and a fleet training and introduction site for the weapon, the Replacement Carrier Air Group, VF-121, at the Naval Air Station, Miramar, California. At neither location did contractor or Navy personnel have a distinctive measure of effectiveness with regard to contractor support. Nor does there appear to be an official program of reporting and analysis of the worth of the contractor support program.

For the above reasons, this paper must be limited in scope to a narrative dissertation on the methods known to be practiced and the effects as observed by participants and as substantiated to the author. This parochial view may serve to dampen the validity of the study. On the other hand, the views expressed are considered to be

founded, in fact, and where practicable and considered necessary, are documented though perhaps inferentially.

#### SAR - 398 ACTIONS AT NAS MIRAMAR, CALIFORNIA

The early planning for Replacement Carrier Air Group training called for a four ten month time span of contractor support commencing at Miramar in August 1960 and terminating on 1 October 1961.<sup>1</sup> McDonnell personnel arrived at Miramar in August as scheduled and set up a base in the RCVG hangar. Provision was made by the station for storage of material and office space for maintenance, supply and general administration. However, as indicated previously, the first aircraft did not arrive until the end of December 1960. By this time McDonnell's total force had built up to about sixty engineering, supply, maintenance and administrative personnel. Of this total, thirteen were employed in the supply support function.

During the contractor support period the Supply Department of the Naval Air Station was not directly involved in the support of the F4H-1. However, the Department did act as a receiving and shipping agent for contractor representatives in the RCVG.

All material identification records maintained by the contractor used the manufacturer's part numbers. This in itself is a very

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<sup>1</sup>Minutes of F4H-1/1F SAR 400 Delivery Status Meeting, Op. Cit., enclosure (2), Page (4).

important advantage accruing under the contractor support program. The use of Federal Stock Numbers under a Navy support concept requires extensive cross reference publications over and above manufacturer's documentation and a concomitant high level of research effort just to identify material requirements. This difficulty in achieving a common language between the consumer and producer is high-lighted during the early life of a weapon when design changes and part number modifications are rampant. Federal Stock Numbers, to say the least, are unwieldy and are often insignificant so far as maintenance personnel (consumers) and contractors (producers) are concerned. In any logistic system good communications and a common language are very important in expediting action and simplifying procedures. Therefore, the advantage gained by the contractor in using part numbers cannot be overlooked.

The guide for stocking of aeronautical material was the Support Material List mentioned earlier. This list reflected Navy approved contractor estimates of requirements and was modified by usage experience during the support period. It was a key document for it resulted in the allocation of scarce aircraft spare parts procurement funds to SAR-398, which in turn, reduced the amount of funds available for the "initial buy" of Navy stocks of the same material. Accordingly, the items included in the Support Material List were carefully scrutinized by the Navy (Material Inspection Service, Bureau of Aeronautics, Aviation Supply Office) to assure

optimum range and depth. Particular attention was given to "hi-cost" items of both Contractor and Government Furnished Equipment. Further the Bureau of Naval Weapons and its West Coast Fleet Readiness Representatives performed a physical audit of items on the List.

The contractor representatives in replenishing material or in obtaining technical data or in satisfying requests for material not stocked, used teletype and telephone communications to the McDonnell plant in St. Louis. Air transportation and close control over material in transit was the rule. Through individual attention to all line item requirements, contractor representatives estimated that ninety seven per cent of the material requisitioned from St. Louis for immediate use was delivered to Miramar within thirty six hours after the request was submitted through contractor channels. On the receiving end of the requests, the McDonnell material support organization used every practicable means to provide requirements, including, in some cases, the removal of parts from aircraft in production. The major difficulty experienced in obtaining materials at the support site was apparently for Government Furnished Aeronautical Material. The duality of material support sources precluded the contractor from exercising complete control over the replenishment of backup stocks at his central warehouse in St. Louis.

One of the prime considerations in maintaining an optimum sized Support Material List is the expeditious repair and return to stock of reparable items found to be defective and the expeditious turn-

around of items requiring modification because of design changes. On the maintenance side of the picture, it is desirable to develop, at an early date, a local fleet and shore facility repair and overhaul capability, particularly for hi-cost reparable. The existence of these capabilities minimizes the time required to repair defective items, reduces stock level requirements, and in the case of fleet units, develops maintenance experience necessary to obtain self sufficiency when deployed. Contractor and fleet support experience at Miramar indicated that, except for electronics component repair, it is difficult, if not impractical, to optimize training in fleet repair capability, and at the same time maintain high aircraft availability with a relatively small stock level of parts. The requirements of the latter program emphasize rapid repair and turn around of reparable, whereas, the repair and overhaul training program, place emphasis on tooling and time consuming learning processes which cannot be accommodated in the heat of maintaining the aircraft in an "up" status. In this same vein, usage data generated under contractor support methods appeared to be suspect because of the inclination and emphasis "to keep 'em flying" through replacement of defective components. Therefore, the usage being generated was reflecting defective components vice defective parts of these components. It is worthy of note that contractor local issues at Miramar reached a peak of approximately two thousand line items in the month of September 1961, the last month of operation under SAR-

398. Before leaving the subject of local repair it is necessary to point out that both the contractor and fleet representatives considered that the "D" level fleet electronics repair capability at Miramar was eminently successful. "D" level maintenance for electronics is shop and component repair including servicing, test or operational check, trouble shooting and adjustment, replacement of defective parts such as resistors and capacitors, et al. The fact that much of this work was done for F4H at the station was highly significant because most of the complexity in this weapon is attributable to electronic sub-systems.

In May of 1961, in consonance with the Maintenance Support Plan, McDonnell began to rapidly phase out contractor maintenance personnel and the Navy assumed a concurrent increase in support responsibility. However, fleet maintenance personnel had been integrated with contractor personnel since the start of the RCVC program. The contractor actually reduced the total personnel on board from sixty to twenty over a period of two months. As might be expected, overall maintenance performance deteriorated during this period but subsequently recovered. Experience, or lack of it, and contractor versus Navy maintenance techniques, undoubtedly contributed the most to maintenance transition difficulties. However, there were some discussions as to the disparity between maintenance techniques as promulgated for Navy use in McDonnell prepared maintenance handbooks and actual maintenance techniques practiced by contractor represen-

tatives under SAR-398. Here again, there is circumstantial evidence pointing toward the use of exigent procedures in order to maintain flight schedules.

#### TRANSITION TO NAVY SUPPORT AT MIRAMAR

As mentioned previously, the Navy Supply Department at Miramar did not assume responsibility for support of the weapon until 1 October 1961. However, Navy-wide plans for transition to Navy support had been jelling for over two years and Miramar support was very much a part of these plans.

One significant innovation that should be mentioned at this time, was the establishment of a locally constituted F4H Support team. This Team was created by Commander Naval Air Force, Pacific Fleet, primarily to provide emphasis on local procedures with regard to overhaul, repair, maintenance and supply support of the weapon. The Team was not a duplicate of any team established under Bureau of Naval Weapons documentation but was developed solely to coordinate West Coast support actions. Some members of the local team were members of Navy wide teams. From a limited analysis of the concept, it appeared to be a successful organizational move which greatly facilitated and improved communications between local fleet and contractor representatives and their respective supporting groups outside the local area.

A "Supply Item Provisioning Document, Special Aeronautical

Requirements, Number 400 (SAR - 400)", of April 1958, prescribed the terms and conditions governing the furnishing and selection of materials and services covering the normal "buy" of Navy Supply and maintenance requirements. This was the Navy support counterpart to SAR-398. The Procedural transition from support under one document to support under the other was not too definitive for the F4H-1 even though the channels for obtaining and providing parts and equipment were spelled out in detail. Improvements in this area are being effected for subsequent aircraft models being introduced into the fleet.<sup>2</sup> The distinct impression was gained that transition supply-wise from Contractor to Navy support was not very smooth at the local level. Rather, it seemed to consist of the closing of the contractor "store" one day and an opening under "new management" the next day with practically no indoctrination. This is considered to be a basic defect and was in marked contrast to the integration of fleet maintenance personnel into the contractor support program from the date of arrival of aircraft at the fleet operating site. The main "reason" for not utilizing fleet supply personnel in the contractor support program appears to hinge on the belief that the local Navy supply system is unable to effectively sub-optimize support of a single weapon. Accordingly, the Navy pays

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<sup>2</sup>Aviation Supply Office Instruction 4000.4, Contractor to Navy Support Transition Conferences; procedures for, 2 October 1961

a premium to private industry to exert this special emphasis. While it is difficult to document the reasoning behind this philosophy, practically speaking, it is based on the premises that the sheer size of the Navy logistic operation, its multiplicity of tasks which result in a mediocre common denominator of performance, and its attendant bureaucratic red tape, precludes special emphasis on support of a single weapon at an operating site. This philosophy is considered to be mostly conjecture since the Navy never has tried to provide a complete in-service weapon support concept for an aircraft down to the operating level. In this regard, it is believed that supply personnel at the operating site should be as thoroughly integrated into the support of the weapon from its arrival on board as are fleet maintenance personnel. To have done so with the F4H-1 would have obviated some of the difficulties of transition, would have provided valuable experience with regard to peculiarities of the contractor material support problems and would have established guidelines for local stocking and replenishment policies for repair parts. Any such integration of Navy personnel would of course require the continued use of informal techniques used by the contractor including those used for replenishing and expediting material requirements.

At transition time, difficulties encountered by the Navy supply system were centered around two areas. First, there were many problems in identifying and cross referencing SAR-398 and SAR-400 stocks

of material to Federal Stock Numbers, i.e. publications and stock number changes were not current. Secondly, there was slippage in the delivery of SAR-400 material to Navy sites with the result that ninety five per cent<sup>3</sup> of the spares, though shipped by the end of October, arrived at the station in a very short period of time. Consequently, support emphasis suffered while efforts were concentrated on assimilation, receipt, identification, storage and recording of assets. Fortunately contractor technical and service representatives were available on the scene to render assistance.

In retrospect, the contractor representatives in a nine month period had supported, in a very specialized and commendable manner, an average of about twelve aircraft at Miramar. The local Navy support system assumed responsibility for twenty three F4H-1 aircraft on 1 October in addition to normal support responsibilities of more than two hundred fifty other aircraft representing ten different models. Further, in a period of five months subsequent to the Navy support date, the number of F4H-1 aircraft at Miramar has increased to more than forty. During this period the AOCIP rate for this aircraft has ranged from seven to fourteen per cent with the average a respectable eight per cent. It is also understood that the AOCIP rate for the F4H-1 at the Naval Air Station, Oceana, the other fleet

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<sup>3</sup>Minutes of F4H-1/1F SAR 400 Delivery Status Meeting, Op., Cit., Enclosure (5), Page (1).

site, has under Navy support, been comparable to the rates of other more stabilized first line aircraft.

### SAR-398 OPERATIONS AT THE NAVAL MISSILE CENTER, POINT MUGU

The Naval Missile Center, Point Mugu, California has been testing and evaluating the F4H since July of 1960. In April 1962 a total of six aircraft were actually on board in the custody of three activities; Air Development Squadron (VA-4), Guided Missile Unit Seven (GMU-7), and one aircraft on bailment to the Raytheon Company. All of these aircraft are early production models, some of the first twenty six produced, are not configured or soon to be configured for fleet operation, and are often characterized as "hand tailored" aircraft.

Maintenance for these aircraft through "C" level (Component repair) capability is performed by a group of twenty nine enlisted men under the direction of the Officer in Charge of GMU-7. Technical assistance is provided by McDonnell representatives and other vendor representatives involved in various sub-systems such as the engine and missile systems.

The supply support techniques employed at Point Mugu are the same as those that were employed under SAR-398 at Miramar. A total of nine McDonnell employees are involved in the supply management function for the F4H-1. The major difference between the concepts at the two locations is that the aircraft at Point Mugu (as well as

at three other test sites) will remain under SAR-393 indefinitely. There is a separate Support Material List for Point Mugu, and some sixteen thousand line items administered by McDonnell are stored in spaces made available by the Missile Center. The supply department of the Naval Air Station only handles aircraft engines, some Government Furnished Aeronautical Equipment and service changes for the weapon.

The major deficiency in material support occurred early in the program when Government-Furnished support equipment arrived several months after the aircraft. Otherwise the Contractor support program is functioning very successfully and material problems are minimal. All concerned consider the contractor support program as a necessary way of life in order to keep these "peculiarly configured" aircraft in top condition. The number of planes AOCIP because of supply support deficiencies has been negligible.

#### OTHER ASPECTS OF CONTRACTOR SUPPORT OF THE F4H-1

Though Type Commanders have retained responsibility for overall control and coordination of supply support of deploying squadrons and carriers, the Contractor support concept has brought with it another "first" with regard to the outfitting of carriers scheduled to support the F4H. In the past, all repair parts were provided to aircraft carriers from stocks at Navy supply activities on either

coast. Further, the range and depth had been specified on the basis of Bureau of Aeronautics Allowance Lists prepared by the Aviation Supply Office. These Allowance Lists were still prepared and used for the F4H but not in the same manner. Because of the "compressed" nature of the FIR Plan as related to spares provisioning and deliveries, as well as contractor experience during the test, development and RCVG training, it was decided that the contractor would provide a hundred eighty day stock level of Contractor-Furnished material direct to three aircraft carriers. This action was essentially completed in April of 1962 about four months before the first deployment. The Navy supply system is providing the balance of the common and peculiar materials also predicated on Contractor-Navy experience and on a one hundred eighty day stock level. This outfitting technique will be an interesting subject for further evaluation in light of innumerable studies made in the past on outfittings and development of allowance lists.

A much broader and comprehensive concept of "Contractor Support" which was touched on earlier must be mentioned at this time. This is the assignment of responsibility to the contractor for preparation and updating of documentation prescribing procedures for maintenance engineering analyses and identifying program life periodic maintenance requirements for the weapon<sup>4</sup>. Because the F4H was

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<sup>4</sup>Department of the Navy, Bureau of Naval Weapons, Military Specification Weapon System Periodic Maintenance Requirements; Aircraft, XFuPP-148, Revised 3 June 1961.

the first weapon under Contractor support, this facet of the program was not fully implemented and in many areas this program is still developing. The present Navy philosophy in this area is that:

Under the current state of compressed aircraft design development, it is imperative that vigorous maintenance engineering be pursued during the design development and production phases to a degree not heretofore experienced in the procurement of aircraft. Well defined, justifiable, preplanned requirements for both scheduled and anticipated unscheduled maintenance consistent with the state of design must be identified and provided to the aircraft operator in a simple form, capable of ready adjustment to accommodate changes to the aircraft design or improvements in maintenance practices.<sup>5</sup>

The above encompasses the requirement that, where specified in the contract, the Contractor will: identify and define items having maintenance significance, determine at what level of maintenance repairs can be performed, promulgate maintenance manuals and squadron maintenance requirements cards, develop and specify component replacement factors, etc.

From this brief resume it is obvious that if implemented in breadth, logistic support responsibilities of contractors may be tied to the weapon system as long as it remains in the fleet and conversely the Navy may be tied to many contractors for weapons system support procedures from the birth to the death of a weapon.

#### SUMMARY

The Contractor support program, both in the Replacement Carrier

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<sup>5</sup>Ibid., para. 1.1

Air Group and at a Fleet operational test and evaluation site, was implemented with very few difficulties. The minor problems that did occur appeared to be caused by the dichotomy of supply sources with Government-Furnished Aeronautical material periodically not available to the Contractor in sufficient quantity. This pin pointing of responsibility is understandable in light of the Contractor's ability to obtain items from aircraft production lines. A basic defect in the program appeared to be a lack of definitive measures of effectiveness. Other problems were the questionable validity of usage data and minimal development of fleet repair capability under SAR-398. Additional deficiencies were noted in the rather discontinuous transition to Navy Supply support.

All of the above deficiencies are considered to be minor. In consideration of weapon complexity, the achieved low AOCF rate for the F4H, and previous experience in the introduction of fleet aircraft, SAR-398 appeared to provide excellent results. One of the most beneficial effects of the program was the emphasis derived for a concentrated team effort by Navy and Contractor personnel in order to optimize aircraft availability in the early stages of fleet operation.

Further ramifications of Contractor support beyond the scope of this paper remain to be evaluated with regard to carrier outfittings and related allowance lists and documentation concerning development of maintenance engineering analyses.

## CHAPTER IV

### SUMMARY AND CONCLUSIONS

The United States Air Force in the past has considered and rejected buying "management" of a weapons system. This rejection was attributed to the costs inherent in such a program.<sup>1</sup> However, present Air Force policy on the use of "Contractor support" in a narrower management sense is quite extensive, particularly, for support functions classified by that Service as not being combat or direct combat functions.<sup>2</sup> Though the USAF concept provides for extensive commercial aircraft overhaul and major rework capability, it does not provide for the release to contractors of logistic functions such as organic (fleet level) maintenance, engineering analyses and supply for "vital" weapon systems such as the F-110<sup>3</sup> (the Air Force designation for the McDonnell F4H-1). In other words, the Air Force will not use SAR-398 or attendant contractor support concepts. To the contrary, the Air Force logistics requirements are to be provided in accordance with the following basic principles:

The USAF must be organically capable of managing the entire logistic support program. To develop and maintain this capability, the Air Force must be able to approve, direct and control

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<sup>1</sup>Space Aeronautics Magazine, (March 1960), p. 26.

<sup>2</sup>United States Air Force Regulation Number 25-6, Use of Contract Services, 5 October 1960.

<sup>3</sup>United States Air Force Material Program Guidance P-64, Volume 1, Section 1, Chapter 1.

the entire depot logistic program and must keep abreast of management and technological advances so that it can effectively, and organically, manage new systems as they enter the inventory. In addition, this capability must be established early in the research and development stage of a new system to insure that the Air Force is managerially capable of providing the logistic support needed to fulfill the operational objectives of the weapons system.<sup>4</sup>

The fact that the above policy exists for the Air Forces does not imply that it is the only right policy for the Military Services. Nevertheless, because of cost and other military management considerations, it does indicate that the Air Force is not willing to relinquish control over logistic support to the extent of the Navy's action on the F4H-1 and subsequent aircraft under SAR-398. This is paradoxical in part, for we in the Navy have always encouraged and maintained an "in-service" capability for overhaul and major repairs of weapons, a function the Air Force has delegated to industry. In any event, our pursuit of contractor support has a precedent within the Air Force which should be looked into before proceeding too far down the road to increasing dependence on industry.

On the other hand, the Navy's willingness to experiment by giving contractors a greater role in the introduction of new weapons does have obvious advantages as already discussed. Further, the Navy does not appear to be relinquishing too much control over logistic support functions, although there remain some unanswered

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<sup>4</sup>Ibid. Page 1.

questions with regard to the development and promulgation of maintenance engineering standards and related documentation. For instance, there are undoubtedly strong similarities between certain maintenance functions of every weapon. If the contractor actions are not carefully coordinated and controlled we will develop a Douglas way, a Grumman way, a McDonnell way, etc., to do the same function.

The cost of the SAR-398 program with all its ramifications, is unknown to the writer and perhaps not to anyone else. It is known that costs have varied with the weapon and contractor and there apparently is no distinct pattern on which to base future cost trends. At this writing the provisions of contractor support have been incorporated in contracts with four different contractors for six different weapons. Since SAR-398 material at fleet sites reverts to the Navy supply system on transition to SAR-400, very little of this material is considered to be in the nature of an "excess" cost to the Navy. Material at test and evaluation sites does provide some what of a different situation because it is not available as a current asset for support of all fleet aircraft. Rather, it is kept for the most part, in a separate contractor supply system primarily for his use. However, even here, selected items from these exclusive inventories could be made available for fleet use in an emergency. There have been many discussions with regard to the high "cost" of SAR-398 and attendant call contracts.

It is believed that if costs incurred under contractor support are higher than the previous introductory programs, said costs are only being viewed in light of their effect on this year's budget. This is indeed a short range view of costing, though admittedly, one we have had to live with under past budgetary constraints. From a more pragmatic point of view, and in light of current emphasis by the Department of Defense on the mission oriented Program Package concept for funding weapons, it seems to be essential that a detailed economic analysis of contractor versus Navy support be conducted. It is so recommended.

The contractor support concept was developed in an effort to obviate logistic support deficiencies experienced heretofore in connection with the introduction of highly complex weapons into the fleet. It has been tailored to conform with the "weapon system support concept" by melding contractor and government personnel into a strong logistic team. It is a very complex support system involving coordination of countless personnel at all levels of government and industry. Concrete measures of effectiveness are not available to determine the efficacy of the system in relation to dollar and time constraints. The program has been very successful to date on the F4H-1, both in the Fleet Introduction in the RCVG and in the fleet test and evaluation phases of the FIRM Plan. By successful, it is meant that the ACCP rate has been low and aircraft availability has been high. Unfortunately, measuring this low ACCP

rate and high aircraft availability against any previous weapon introductory program cannot be done with much validity. The F4U-1 program was in a class by itself and subjected to individual emphasis by all concerned. Further, this aircraft benefited in many areas other than contractor support from experience gained when the Navy introduced its last new family of weapons in 1956 and 1957.

SAR-398 obviously is not a panacea for aviation logistic ills, but as stated before, it certainly has resulted in optimizing the efforts of all concerned in coordinating support of a weapon. In total, it appears that support of the F4U-1 under SAR-398 cannot be criticized other than constructively. And even then, not in depth. In this vein, if cost considerations allow the program to continue, it is suggested that only one major improvement be undertaken in the program. This is in the area of greater integration of Navy supply personnel in the initial phases of weapon support. More specifically, in lieu of assigning supply support functions for the new weapon strictly to contractor personnel, assign these duties from the beginning of the SAR-398 program to a specially created supply task force of Navy personnel. The task force to be headed by a junior Supply Corps officer or an E-9, Chief Aviation Storekeeper. The task force would be assisted by one contractor parts representative, it would follow procedures specified by contractor supply organization and during the tenure of contractor support would report to a designated weapon project officer either in the

RCVG or in the Air Development Squadron. At such time as support is transitioned to the Navy under SAR-400 the task force would report to the station Supply Officer. Aside from local inventory management functions this task force leader could represent, and be fully cognizant of, Bureau of Naval Weapons/Aviation Supply Office interests of SAR-398/400 policies and procedures.

In the area of minor suggestions, it is believed that there is a need for a general increase in Navy efforts to repair components locally. Local Navy efforts could also be effectively used in scrutinizing the generation and reporting of usage data.

From the above it can be seen that there are few, if any, basic differences of opinion with respect to the present concepts of operation under SAR-398. Rather, it is believed that a tightening up of Navy/Contractor integration with more emphasis on Navy supply control and participation in the early stages is all that is necessary. Through the above actions, coupled with more stringent guidance over Navy Personnel, it is believed that greater emphasis on Navy maintenance and repair of components can be derived in the field. Further it is considered that the use of Navy personnel in the control of supply functions, with privileges of material access now enjoyed by contractor supply representatives could possibly save funds, provide more Navy experience early in the program, facilitate transition to Navy support, and provide a more realistic appraisal of usage data generated.

As a final recommendation it is considered necessary that future studies be conducted with regard to the efficacy of outfitting procedures of aircraft carriers described in Chapter 3 and also of the value of maintenance documentation provided by the contractor.

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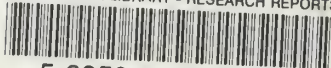
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