UNITED STATES GENERAL ACCOUNTING OFFICE
WASHINGTON, D.C. 20548

B-208653

JANUARY 14, 1983

The Honorable Caspar W. Weinberger
The Secretary of Defense

   Attention: Director, GAO Affairs

Dear Mr. Secretary:

   Subject: Greater Benefits to Be Gained From DOD Flight
             Simulators (GAO/FPCD-83-4)

   The Department of Defense has adopted the policy of using
simulators whenever possible to reduce training costs and to
improve training effectiveness. Simulators offer opportuni-
ties to improve training capability; extend a weapon system's
life; reduce accidents; and reduce range, fuel, ammunition,
and missile requirements. Defense has invested over a billion
dollars in flight simulators and plans to spend an estimated
$3.2 billion over the next 5 years for new flight simulators,
modifications to and additional copies of existing simulators,
and spare parts.

   Whether this large investment will reduce training costs
and will meet the services' future training needs depends on
how well the services

   --analyze their training needs,

   --design simulators specifically to meet their needs, and

   --develop training plans incorporating simulators into
     their training programs.

   We found that the services are not always analyzing their
training needs and thus do not know what tasks can best be
taught on simulators. In addition, the services are not
always incorporating simulators into their training programs.
As a result, the simulators are not being used as effectively
as they could be. These problems can adversely affect the
potential benefits from the services' planned investment in
flight simulators.

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OBJECTIVES, SCOPE, AND METHODOLOGY

Our objectives were to determine whether

--the services are sufficiently analyzing their training needs and identifying those tasks that can best be taught on flight simulators, and *whether*

--simulators are training pilots to do the tasks intended.

To meet our objectives, we selected seven flight simulators that

--were among the services' highest 20 percent in terms of total dollars invested;

--were used to train personnel for critical jobs (tasks that contribute substantially to readiness); and

--had been fully operational for at least 2 years.

The locations we visited were in geographical areas with large concentrations of simulators. At each location, we examined course syllabi to determine how the simulators were to be used. We also determined how the simulators were being used, benefits derived, and problems with the simulators.

The following table lists, by service, the simulators chosen for review, their costs, and the training centers and operating units which we visited.

Service	Simulator	Total number	Total cost (millions)	Locations
Navy	Air combat manuevering simulator-2E6 (F-4, F-14)	1	$ 17.5	Oceana Naval Air Station Virginia Beach, Va.
	Operational flight trainer-2F95 (F-14)	4	26.7	Miramar Naval Air Station San Diego, Calif.
Air Force	Operational flight trainer, F-15	[a]/11	[a]/81.1	Langley Air Force Base, Hampton, Va; Luke Air Force Base, Phoenix, Ariz.
	Operational flight trainer, F-4E	12	[a]/30.0	Seymour Johnson Air Force Base, Goldsboro, N.C.; Luke Air Force Base, Phoenix, Ariz.
Marine Corps	Weapon system trainer-2F88 (F-4)	3	18.3	Yuma Marine Corps Air Station, Yuma, Ariz.
	Operational flight trainer 2F117 (CH-46)	1	10.3	Marine Corps Air Station, New River, N.C.
Army	Trainer synthetic flight system UH-1	22	57.0	Fort Rucker, Ala; Fort Sill, Lawton, Okla.

[a]/ Additional information provided in Defense's comments, which was not validated by GAO.

We conducted a literature search and contacted defense agency audit groups to examine previous studies on simulators. We also contacted the following organizations to find out how each service manages simulators and how much the services plan to spend on simulators over the next 5 years.

Army

Deputy Chief of Staff for Operations and Plans
Training and Doctrine Command
Training and Doctrine Command's Systems Support Analysis
  Activity
Army Training Support Center
Office of Project Manager for Training Devices
Army Inspector General

Navy

Deputy Chief of Naval Operations, Chief of Naval
  Personnel
Deputy Chief of Naval Operations, Aviation Manpower and
  Training
Naval Air System Command, Headquarters
Naval Training Equipment Center
Fleet Aviation Specialized Operational Training Group,
  Atlantic
Naval Audit Service

Marine Corps

Deputy Chief of Staff for Training, Policy Control Branch
Deputy Chief of Staff for Aviation, Aviation Weapons
  Systems Requirement Branch

Air Force

Deputy Chief of Staff for Operations, Plans and
  Readiness, Rated Management Division
Deputy Chief of Staff, Research, Development and Acquisition
Air Force Joint Cruise Missiles Project Office
Tactical Air Warfare Center
4444 Operational Squadron, Tactical Air Command

We made these visits between November 1981 and June 1982, in accordance with generally accepted Government audit standards.

TRAINING NEEDS ARE NOT ANALYZED

Before deciding on what type of simulator to use for training, the services must first analyze their training needs. Such an analysis involves (1) identifying tasks that need to be taught and (2) choosing the best option to teach these tasks.

We found that the services did not analyze their training needs for the simulators selected for review. Instead, they focused on duplicating the actual weapon systems and their surroundings. In reviewing documents justifying the purchase of flight simulators, we found descriptions only of what the simulators should do--which was primarily to replicate the actual equipment--with little reference to how the devices could meet training needs.

This emphasis on equipment capability, rather than the training needs that can best be met by simulators, has been recognized in defense agency audit reports. The Naval Audit Service, in a January 1980 report, [1]/ questioned whether the Navy had adequately assessed its training needs before buying simulators, citing the 2E6 air combat maneuvering simulator as an example. Also, the Army Audit Agency, in a March 1982 report, [2]/ pointed out that the Army had not used training needs as a basis for designing its UH-1 synthetic flight simulator. Instead, the Army attempted to design a simulator that would replicate all possible flight characteristics.

SIMULATORS ARE NOT ALWAYS
INCORPORATED INTO TRAINING PROGRAMS

To insure that simulators are used as intended, the services should incorporate them into training plans. Although training units we visited for new pilots [3]/ had included simulators in specific training syllabi, operating

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[1]/"Servicewide Audit of the Aircraft Flight Simulator Program," Audit Report 140058, Naval Audit Service Southeast Region, Virginia Beach, Va.

[2]/"Synthetic Flight Training System," Audit Report S082-6, U.S. Army Audit Agency, Washington, D.C.

[3]/New pilots include those (1) coming out of basic training, (2) making a transition to other aircraft, and (3) returning to an aircraft after having not flown.

units had no such syllabi for training experienced pilots.
For example, the Navy's F-14 and the Air Force's F-15
operational flight trainers had been incorporated into the
training course syllabi for new pilots, but the operating
units reviewed had established only minimum hour requirements
for simulator use, leaving the training content up to the
individual in training. The Air Force tactical squadrons
visited required each experienced F-15 pilot to use the
trainer only 12 hours a year; the Navy fleet squadrons visited
had no minimum hour requirement for F-14 pilots. Operating
units of both services used their trainers primarily for
periodic proficiency qualifications preparation and testing.

INADEQUATE NEEDS ASSESSMENT AND
TRAINING PLANS MAY ADVERSELY
AFFECT SIMULATOR TRAINING

Because the services do not always analyze their training
needs nor incorporate simulators into training programs, they
are left with systems that may not meet their needs and that
may not be used as effectively as they could be. Two examples.
are the Navy's 2E6 air combat maneuvering simulator and 2F95
operational flight trainer.

The 2E6, which costs about $18 million, is an aerial
combat maneuvering trainer for both the F-4J and F-14A
aircraft. It can simulate 1-on-1 or 2-on-1 aerial combat
environments, while providing pilots 340-degree visual
capability. The 2E6 can also simulate battles with various
adversary aircraft. Yet, the Navy's Atlantic Air Command uses
the 2E6 primarily to provide new pilots basic air-to-air
tactics training. Utilization averaged only about 4 hours a
day for each of the simulator's two cockpits for calendar year
1981. The Navy, about 3 years after fielding the 2E6, is
being assisted by a contractor to identify what tasks can best
be taught on the 2E6 and to develop a training syllabus.

The Navy's Pacific Air Command has questioned the need
for the 2E6. Although the 2E6 was orginally scheduled to be
placed at both Atlantic and Pacific facilities, the Pacific
Air Command expressed doubt as to the training effectiveness
of the 2E6 and believed equivalent training could be obtained
from other simulators. For these reasons, according to a
Pacific Air Command official, the command did not receive and
has not requested, a 2E6.

The 2F95, at Miramar Naval Air Station in San Diego, costs $6.7 million and is an operational flight trainer for the F-14 aircraft. It simulates both motion and visual characteristics, similar to the actual aircraft, and familiarizes pilots with operational procedures, navigation, communications, and mission operations, as well as flight system malfunctions. The 2F95 can be linked with an F-14 rear seat trainer to provide complete aircrew training, including certain tactics. Yet, reportedly, the F-14 training squadron uses the 2F95 primarily for basic instrumentation and procedures training. The fleet F-14 squadrons also make limited use of the 2F95, mostly for pilots' practice before flight qualifications tests in the actual aircraft. An official from one of the fleet squadrons we visited said required use of the 2F95 had not been made a part of the squadron's training program because the trainer did not specifically meet fleet squadron training needs. As a result, the 2F95 has been used less than 50 percent of the available training time.

NOTED PROBLEMS MAY HAVE IMPACT
UPON FUTURE SIMULATORS

The services reportedly are continuing to experience problems with determining simulator requirements and using simulators. Therefore, the problems we noted with simulators currently in use will likely be found in the development and use of new simulators.

Service regulations require an analysis of training needs to justify buying simulators. Nevertheless, we found that training needs are not always adequately analyzed to form the criteria for developing new simulators. For example, a Naval Training Equipment Center official said that two simulators being planned, the TH-57 helicopter trainers (flight instrument and cockpit procedures trainers) and the EA-6B cockpit procedure trainers, have had hardware decisions made without training needs being analyzed. Officials from other services also expressed concern over the lack of timely and adequate analysis of training needs for designing and developing new simulators.

In addition to purchasing new simulators, the services are planning to buy additional copies of existing simulators. The Navy's plan to buy another 2E6, estimated to cost $23.3 million, is of particular concern because training needs were not analyzed for the first 2E6 nor has the simulator been fully incorporated into operating units' training programs.

Additionally, according to Navy officials, a user activity for
the planned 2E6 has not been identified.

CONCLUSIONS

Simulators are becoming an increasingly important element
of military training but, similar to the systems they are
simulating, they are becoming more costly. To insure greater
benefits from their large investment in simulators, the ser-
vices should develop simulators to meet proven training needs
and incorporate them into specific training programs. Our
review indicates that the services are not always doing this,
as specifically demonstrated by the Navy's 2E6 air combat
maneuvering simulator.

RECOMMENDATIONS

We recommend that the Secretary of Defense:

--Approve budget requests for flight simulators only
after the services have analyzed their training needs
and proven that the needs cannot be met with existing
simulators. (Specific review should be made of the
pending purchase of an additional 2E6.)

--Require the services to incorporate simulators into
their training programs.

AGENCY COMMENTS AND OUR EVALUATION

In commenting on our draft report, Defense agreed in
principle with our conclusions and recommendations but dis-
agreed with most of the data in the report. Basically,
Defense asserted that the services did analyze specific train-
ing needs for the selected simulators and did include the
devices in training plans for operational units. However, in
following up on the material presented by Defense, we did not
find support for its contentions. The enclosure contains
Defense's comments and our detailed evaluation of those
comments.

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As you know, section 236 of the Legislative Reorgani-
zation Act of 1970 requires the head of a Federal agency to
submit a written statement on actions taken on our recommenda-
tions. This written statement must be submitted to the House
Committee on Government Operations and the Senate Committee on
Governmental Affairs not later than 60 days after

the date of this report. A written statement must also be submitted to the House and Senate Committees on Appropriations with the agency's first request for appropriations made more than 60 days after the date of the report.

We are sending copies of this report to the Chairmen, Senate and House Committees on Appropriations, Senate Committee on Governmental Affairs, and House Committee on Government Operations; and to the Secretaries of the Navy, Air Force, and Army.

Sincerely yours,

Clifford I. Gould
Director

Enclosure

ASSISTANT SECRETARY OF DEFENSE

WASHINGTON, D.C. 20301

MANPOWER,
RESERVE AFFAIRS
AND LOGISTICS

5 NOV 1982

Mr. Clifford I. Gould
Director, Federal Personnel and
  Compensation Division
U.S. General Accounting Office
Washington, D.C. 20548

Dear Mr. Gould:

Thank you for your letter to the Secretary of Defense, dated
October 1, 1982, concerning your draft report, "Greater Benefits
to be Gained From DoD Flight Simulators," OSD Case #6106, GAO
Code 967025.

The Department concurs in principle with the conclusions and
recommendations stated in the draft report. Analysis of the need
for additional flight simulators is done as a part of the program
and budget review process conducted within the Department of
Defense. Justification for simulator procurement is based on
training needs identified by each Service. In the specific case
of the Navy's 2E6 trainer, the Navy will review and update their
plans and justification for the 2E6 during the next two annual
program reviews. Future budget decisions regarding the 2E6 will
be made subsequent to the completion of the program review
process.

The Department believes that analysis of training needs and
documentation of those needs for flight simulators are continuing
to improve through refinements of the Instructional Systems
Development (ISD) process. Incorporation of simulators into the
training plan for pilots is an integral part of the ISD process.
Further, the Services have identified specific simulator training
that is required for pilots. As a result, pilot training
programs have become better and the readiness of our forces has
increased. A detailed response to the findings, conclusions and
recommendations is enclosed.

Thank you for your interest in this matter.

                                  Sincerely,

                                  James N. Juliana
                                  Principal Deputy Assistant Secretary of Defense
Enclosure   (Manpower, Reserve Affairs & Logistics)

   GAO notes: Page references have been changed to correspond with
                those in the report.

                GAO's comments follow each of Defense's summary of
                findings and responses on pages 10 through 19.

GAO DRAFT REPORT FPCD-83-4

OSD Case No. 6106

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

FINDINGS:

1. Defense has invested over a billion dollars in flight simulators and plans to spend an estimated $3.2 billion over the next five years for new flight simulators, modifications to and additional copies of existing simulators, and spare parts. (pg. 1)

DoD Position: Concur.

2. GAO found that the Services did not analyze their training needs for the simulators but instead focused on duplicating the actual weapon system and their surroundings. (pg. 4)

DoD Position: Nonconcur. The Services have analyzed the specific training needs for the instruction of military pilots. These training needs have been the basis for identifying the specific capabilities required in a simulator to ensure effective training. In several cases, the Services have procured part task trainers for those training tasks that can be isolated. Since the late 1970's, the Services have further improved training analysis and documentation of training needs under the Instructional Systems Development (ISD) process.

In order for the simulator to be effective for many pilot training tasks, it must properly represent the aircraft and its equipment. The amount of fidelity required in a simulator to have effective training is a complex question that has not been answered by the research community. The extent to which the Services duplicate hardware for effective training is consistent with the policies of experts in civil and commercial aviation. While research continues on this issue, the Services will continue to analyze and identify training tasks that are best taught in a simulator and those that can be taught through other modes of instruction.

The current Navy directives which provide policy and procedures for establishing requirements and establishing qualitative and quantitative inputs are:

OPNAVINST 1500.8J - Subj: "Navy Training Planning Process in Support of New Development"

OPNAVINST 1551.7B - Subj: "Fleet Participation in Development Acquisition, and Acceptance of Major Training Devices"

OPNAVINST 1500.11G - Subj: "Naval Aviation Training Program Policies, Responsibilities, and Procedures"

GAO Comment

Defense' comments that the services have analyzed the specific training needs for the instruction of military pilots misleads the reader. Whereas the current procedures for approving the purchase of flight simulators require analysis of training needs as part of the ISD process, such assessments were not required when the systems we reviewed were approved for purchase. Further, the adequacy of the current procedures for determining training needs, as well as the adequacy of the analysis resulting from their application, has not been demonstrated. These questions are being addressed in a current GAO review.

Regarding the amount of fidelity (properly representing the aircraft and its equipment) required, we recognize that more research needs to be done, and that high fidelity for many attributes is very expensive. Thus, we encourage the services to analyze the tasks that need to be taught and include only those features the services know are necessary.

Using the hardware fidelity requirements of civil and commercial aviation as support for the services' action is inappropriate for several reasons. For instance, fidelity in hardware is not the only nor the most expensive item being duplicated. The behavior of the aircraft, along with the visual capabilities and other cues, can be more expensive than hardware fidelity. Additionally, the services recognize the vast difference in the missions of commercial aviation and tactical aircraft, as well as the policies on flight hour substitution, which makes required simulation very different.

In its third point, Defense cites several Navy regulations. We agree that the Navy has regulations and, in fact, recognize that all the services have these regulations. Nevertheless, having regulations does not guarantee they are being implemented as intended, and Defense provided no additional evidence to demonstrate the regulations were being implemented.

3.   GAO found that although training units had included
simulators for specific training, operating units had not
included them for training experienced pilots. (pg. 4-5)

DoD Position: Nonconcur. Each of the Services require the per-
formance of specific training to be conducted in simulators by
experienced pilots assigned to operational units. The Army
requires a minimum of 20 simulator hours a year for each of its
pilots stationed at a facility with simulator support.
Additionally, the Air Crew Training Manual (ATM) stipulates
maneuvers to be performed in the simulator for each aircraft.

The Navy uses operational flight trainers for periodic
proficiency qualification, preparation and review for experienced
pilots. Current Navy directives pertinent to this policy are
COMNAVAIRLANTINST 3500.42E, AIRLANT Ltr. Ser 0365 of 9 June 1980,
and COMFITWINGONEINST 3500.4A, 3710.3C. Additionally, formal
syllabi for fleet pilots are in use for the 2E6 Air Combat
Maneuvering Trainer at FITWINGONE, Oceana, Va.

In the Air Force, Tactical Air Command (TAC) regulation 51-9,
Employment of Aircrew Training Devices, requires that simulator
training officers prepare lesson plans for all simulator
training. These lesson plans tailor the simulator training to
best meet the operational role of each wing. At Langley AFB,
nine separate simulator lesson plans have been developed to
simulate world-wide air-to-air employment. Operational F-15
pilots are required by TAC regulation 51-50, Flying Training, to
train 18 hours per year in the simulator. According to the
training records documented in the TAC Automated Flying Training
Management System (TAFTRAMS), F-15 pilots at Langley AFB trained
an average of 22 hours per year in the simulator while instructor
pilots at Luke AFB averaged over 60 hours per year instructing
and training in the simulator.

GAO Comment

Although we did not include the Army in our dis-
cussion on page 4, our information supports that
pilots stationed at an Army facility with simulators
are required to use the simulators 20 hours a year.
Our review of the Aircrew Training Manual, however,
showed that while the manual describes overall train-
ing needs, as well as tasks which could be taught in a
simulator, it does not require specific tasks to be
performed in the simulator during the required 20
hours. Furthermore, Army officials at the locations
visited told us that operational commands have no
structured syllabi.

Regarding Defense's comments about the Navy, we recognize on page 5 that operational flight trainers are used for periodic proficiency training and qualification. However, neither that fact nor the regulations cited by defense constitute incorporation of simulators into specific training syllabi for experienced pilots. In fact, only one cited regulation was relevant; and while it described ways simulators could be used, it left the use up to the squadron commander's discretion.

We disagree with Defense's comment that formal syllabi for fleet pilots are in use for the 2E6 at Oceana, Virginia. The only 2E6 syllabus for fleet pilots at Oceana consists of three lesson plans for exercises, which pilots must do on the 2E6 before participating in a specific air combat maneuvering exercise with actual aircraft. This limited application is a step in the right direction but, in our opinion, certainly does not constitute the guidance necessary for a device as costly and as complicated as the 2E6.

The Air Force regulation cited requires pilots to train in simulators 12 hours a year, not the 18 hours Defense mentioned and not the 4 hours referred to in our draft. (We have changed our report accordingly on p. 5.) Nevertheless, our point was that while minimum hours are required, specific training to be done during those hours is not specified. Although Air Force regulations require preparation of lesson plans, operational units we visited said that use of the devices was left up to the pilot and no lesson plans were provided.

4. The Navy's F-14 and the Air Force's F-15 operational flight trainers had been incorporated into their training course for new pilots but not for operating units where only minimum hour requirements for simulator use was established such as periodic proficiency qualifications preparation and testing. (pg. 5)

DoD Position: Nonconcur. F-14 and F-15 operational squadrons are using the operational flight trainers (OFT) for exactly their designed function. The OFT's are designed to provide instruction and refresher in navigation, instrument, take off/landing and normal/emergency operating procedures. The use of the OFT for proficiency qualification preparation and testing for experienced pilots is a valid use of the training medium.

GAO Comment

Although Defense disagrees with our statement
that pilots in operating units were required to use
the operational flight trainers for only a minimum
number of hours, the information it presents does not
disprove our data. Defense does not address the prob-
lem of (1) defining which tasks can best be taught on
the devices and (2) requiring the devices to be used
for these tasks. Also, Defense does not mention that
the devices can be used for additional tasks. For
example, according to Navy publications, the opera-
tional flight trainers for the F-14 can be linked to a
radar and weapons trainer and can provide team
training in tactics.

5. The Services do not always analyze their training needs
nor incorporate simulators into training programs, and as a
result they are left with systems that may not meet their needs
and that may not be used as effectively as they could be.
(pgs. 5 and 6)

DoD Position: Nonconcur. As discussed above, simulators have
been incorporated into unit training programs for pilots and the
Services have analyzed their training needs. As a result, the
Services have used simulators effectively to improve pilot
training and attain higher levels of readiness. Limitations in
flight simulator capabilities to satisfy some pilot training
needs has been constrained by technology, not a failure to
analyze training needs.

Navy directives addressed in response to Finding #2 apply. These
three directives provide overall guidance for the development of
aviation trainers as well as specific responsibility and
authority for phases of the planning, programming, budgeting and
acquisition process. The development of every major aviation
trainer must be conducted within the framework of these
directives. The more recent addition of the ISD MIL-T-29053B
(TD) provides a more specific discipline to the training
requirements and has introduced the concept of an instructional
system. This concept, incorporated in the training device
acquisition process in 1979, has provided a new dimension to the
training analysis conducted by the Navy. The ISD process allows
a systems approach to training. This allows the total training
(training media, hardware, courseware, etc.) to be integrated
into a training syllabus. The integration permits the proper
phasing or placement of the trainer in the training process. To
impose current acquisition milestones on 1972-1974 acquisition
processes is inappropriate.

GAO Comment

Defense is restating our conclusions from items
#2, #3, and #4. (Refer to item #2 for a discussion of
service directives and the services' use of the ISD
process.)

6. The Navy's 2E6 air combat maneuvering simulator ($18 million) is only being used primarily to provide new pilots basic air-to-air tactics training while it was designed for additional capabilities. (pg. 5)

DoD Position: Nonconcur. In the particular case of the 2E6, the trainer is supposed to prepare a pilot for air combat maneuvering (ACM), rather than act as a substitute for airborne ACM. Preparation requires task-oriented training for air crews on the initial phases of in-flight air combat maneuvering training. The trainer is generally used up to the limits of its capability to learn valuable procedures which make airborne time much more meaningful. In addition to new pilot training, fleet pilots use the trainer to enhance their air-to-air combat maneuver skills in missile envelope recognition, (1-v-1, 1-v-2, and 2-v-1), weapon selection and firing, air-to-air guns against both maneuvering and nonmaneuvering targets, offensive/defensive maneuvering against other aircraft, inter and intra cockpit communications, threat familiarization, safe disengagements, section coordination in multi bogey environments, for which formal syllabi are in use at COMFITWINGONE, Oceana, Va. Copies of these syllabi were provided to the GAO team during their visit. Utilization reports for this device (3M, COMFITWINGONE and FASODET, Oceana data) for the past 24 months show that the 2E6 device was used 48% by fleet squadron pilots, 47% by Fleet Readiness Squadron (FRS) and 4% by others.

GAO Comment

Defense's response covers three areas: substitution, tasks being performed on the simulator as specified in syllabi, and utilization reports.

First, we make no mention in our report of substit ng 2E6 simulation flights for flying the actual airc t. We agree that time in the 2E6 should make airborne time much more meaningful.

We do not agree with Defense's statement that the Navy is using the 2E6 to the limits of its capability because the Navy recently contracted to determine the 2E6's capability. (See p. 5.)

Numerous Navy officials at headquarters and in the field told us that it was unreasonable to expect the fleet squadrons to be able to effectively use a device as complicated as the 2E6 with no structured lesson plans or even descriptions of what the device is capable of doing. The only syllabus available for fleet pilots is the one described in item #3 (which was developed 2 years after the 2E6 was fielded.) Even doing the tasks described in Defense's response does not mean the simulator is being used to the limits of its capability, since the tasks listed for

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air combat maneuvering could represent anything from a
basic introduction to very difficult situations.

Although Defense's response showed 48 percent
usage for fleet squadron pilots and 47 percent for new
pilots, our data shows, and Navy officials at Oceana
and the Atlantic Air Command agreed, that at any
particular time only about 10 new pilots are eligible,
while 46 fleet pilots are available, for training on
the 2E6. Because total utilization of the device for
both groups is about equal, evidently new pilots, who
are required to learn only minimum tactics skills, are
receiving far more training on the 2E6 than fleet
pilots.

7.   The 2E6 was also scheduled for use in the Navy's Pacific
air command but the Command has expressed doubt as to the 2E6
effectiveness and believed that equivalent training could be
obtained from other simulators. As a result the Command did not
receive nor request the 2E6.   (pg. 5)

DoD Position: Nonconcur. The Navy's Pacific Air Command
requested that modifications be incorporated into the procurement
of the second 2E6. The modifications included radar and full
weapons systems capabilities with back seat crew stations. Since
funding was not available to effect these modifications, AIRPAC
redirected its requirements to modification of the 2F-112 with a
single dome, now in place. This trainer does not provide 1-v-2
or 2-v-1 tactical air crew training capabilities. Since funding
to incorporate the modifications for the 2E6 was not available,
the Navy decided to rebudget for the second trainer in another
year.

GAO Comment

Defense does not refute our statement, but merely
provides additional information needing explanation.
According to documents at the Pacific Air Command, the
modifications to the 2E6, which the command requested,
were necessary to make the device adequate for train-
ing air combat maneuvering beyond basic levels. The
command questioned in numerous messages to Navy Head-
quarters the wisdom of funding such an expensive
device which would not meet the command's require-
ments.

Also, we question whether adding the capability
to maneuver against or with a third aircraft (the dif-
ference cited by Defense between the 2F112 and the
2E6) justifies the millions the 2E6 will cost. Even
if funding had been available, we believe the Navy
would have been ill-advised to install a 2E6 for the
Pacific Air Command, given the overwhelming objection
to it, and especially in view of the dearth of train-
ing materials to ensure proper use. No evidence was

presented to show that the Pacific Air Command has
reversed its opposition to the 2E6.

8. The 2F95 for fleet squadron training has been used less
than 50 percent of the available training time because it is used
mostly for pilots' practice before flight qualifications tests in
actual aircraft and has not been made part of the squadron's
training program because it did not specifically meet fleet
squadron training needs. (pg. 6)

DoD Position: Nonconcur. The 2F95 trainer is being used for the
purposes for which it was intended. It does not meet all
squadron training needs but the reason is limitations of 1960's
technology, not a failure to properly analyze training needs.
It has limited capabilities by design but is an excellent trainer
for instruments, navigation, normal and emergency system
operating procedures, and night carrier landing training. This
device is incorporated into the AIRLANT F-14 Fleet Squadron
Training programs to the extent of its capabilities by direction
of OPNAVINST 3710.7K, COMNAVAIRLANT letter Serial 0365 of
9 January 1980, and FITWINGONEINSTR 3500.6.

GAO Comment

Although Defense disagrees with our statement
about use of the 2F95, it takes no exception to the
amount of time we reported the device was used or how
it was used. Defense points out the limitations of
the device but does not explain why all the features
were not used. In addition, Defense states that the
device was included in fleet pilot training programs
and cited Atlantic Air Command documents; however, as
stated on page 6, the 2F95 we examined was at the
Pacific Air Command, not the Atlantic Air Command.

9. Service regulations require that training needs be
analyzed to justify buying simulators but GAO found that training
needs are not always adequately analyzed to form the criteria for
developing new simulators. (pg. 6)

DoD Position: Nonconcur. As stated above in the response to
Findings #2 and #5, the Services do analyze their training needs
to form the basis for the development of new simulators. The
training analysis and documentation of training needs for all new
simulators is done under the Instructional Systems Development
process. For example, new simulator programs for the Army's
AH-64, Navy's F/A-18, and Air Force's F-16 and B-1B have
extensive documentation.

GAO Comment

This statement generally repeats item 2. The
only new information in Defense's response concerns
several new simulator programs, none of which we
studied and, consequently, cannot comment.

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10.   In the Navy, two simulators, the TH-57 (helicopters)
and the EA-6B cockpit procedures trainer have had hardware
decisions made without training needs analyzed.   (pg. 6)

DoD Position: Nonconcur. Cockpit procedures trainers such as
the TH-57 and EA-6B have fairly standardized training require-
ments and the Navy has much experience and knowledge regarding
the training needs to be satisfied. The Navy's experience and
knowledge on training needs was considered as a part of the
decision regarding these trainers. In all cases, hardware
decisions concerning a trainer are reviewed by a Fleet Project
Team to ensure training needs are properly evaluated. Reviews
are conducted by the Navy in accordance with the documents cited
in the response to Finding #2.

GAO Comment

As pointed out on page 6, our source for the
statement that hardware decisions on the TH-57 and
EA-6B were made without training needs assessments was
a Navy official from the organization responsible for
training equipment. Nevertheless, we believe
Defense's reasons for not assessing training needs,
such as Navy knowledge and review by a Fleet Project
Team, are inadequate. The Fleet Project Team's
review, for example, is more a roundtable discussion
than a rigorous analysis of training needs and the
best way to meet them.

11.   The Navy plans to buy another 2E6 ($23.3 million) which
is of concern because training needs were not analyzed for the
initial trainer and incorporated into operating units' training
programs, also, a user for the planned 2E6 has not been
identified.   (pg. 6)

DoD Position: Nonconcur. Training needs were well identified by
the Navy for the 2E6 Air Combat Maneuvering (ACM) simulator.
(See response to Findings 2, 5, 6, 7, and 9.) The 2E6 was
conceived, designed, and is used as a part-task trainer
specifically to prepare aircrews for in-flight Air Combat
Maneuvering training. The first 2E6 trainer is incorporated into
fleet squadron training. A second device is programmed for
AIRPAC to fulfill the 1-v-2 and 2-v-1 ACM requirements which are
not present in the 2F112.

GAO Comment

Although the need for an air combat maneuvering
simulator was espoused repeatedly and numerous meet-
ings were held to discuss equipment characteristics,
we saw no evidence during our review that an analysis
of tasks which needed to be taught was developed to
support the equipment capabilities, and Defense

provided no additional evidence that any such analysis
was performed.

Defense also states that the 2E6 is incorporated
into fleet squadron training and that a user exists
for an additional device. Items #2 and #7 provide our
comments on these issues. The Pacific Air Command's
strong objections further support our position that a
user for an additional 2E6 has not been identified.

CONCLUSIONS:

1. Simulators are becoming an increasingly important
element of military training but they are becoming more costly.
(pg. 7)

DoD Position: Concur.

2. Added benefits from their large investment can be
achieved if the Services developed simulators to meet proven
training needs and incorporated them into specific training
programs. (pg. 9)

DoD Position: Concur. The Services conduct extensive reviews of
their simulator programs to ensure training needs are justified.
Through the Instructional Systems Development (ISD) process,
simulators are incorporated into specific training programs.

RECOMMENDATIONS: That the Secretary of Defense.....

1. Approve budget requests for flight simulators only after
the Services have analyzed their training needs and proven that
the needs cannot be met with existing simulators. (Specific
review should be made of the pending purchase of an additional
2E6.) (pg. 7)

DoD Position: Concur. The Services analyze and review their
training needs as a part of the preparation for the program and
budget review process. The simulator procurement program is
reviewed and updated each year during the program cycle. Budget
decisions for all new simulators are made subsequent to the
completion of several program reviews.

2. Require the Services to incorporate simulators into
their training programs. (pg. 7)

DoD Position: Concur. The Department agrees with the
recommendation in principle; however, the incorporation of
simulators into the training plan for pilots is an integral part
of the DoD Instructional Systems Development Process. Further,
each of the Services has identified specific simulator training
that is required for pilots.