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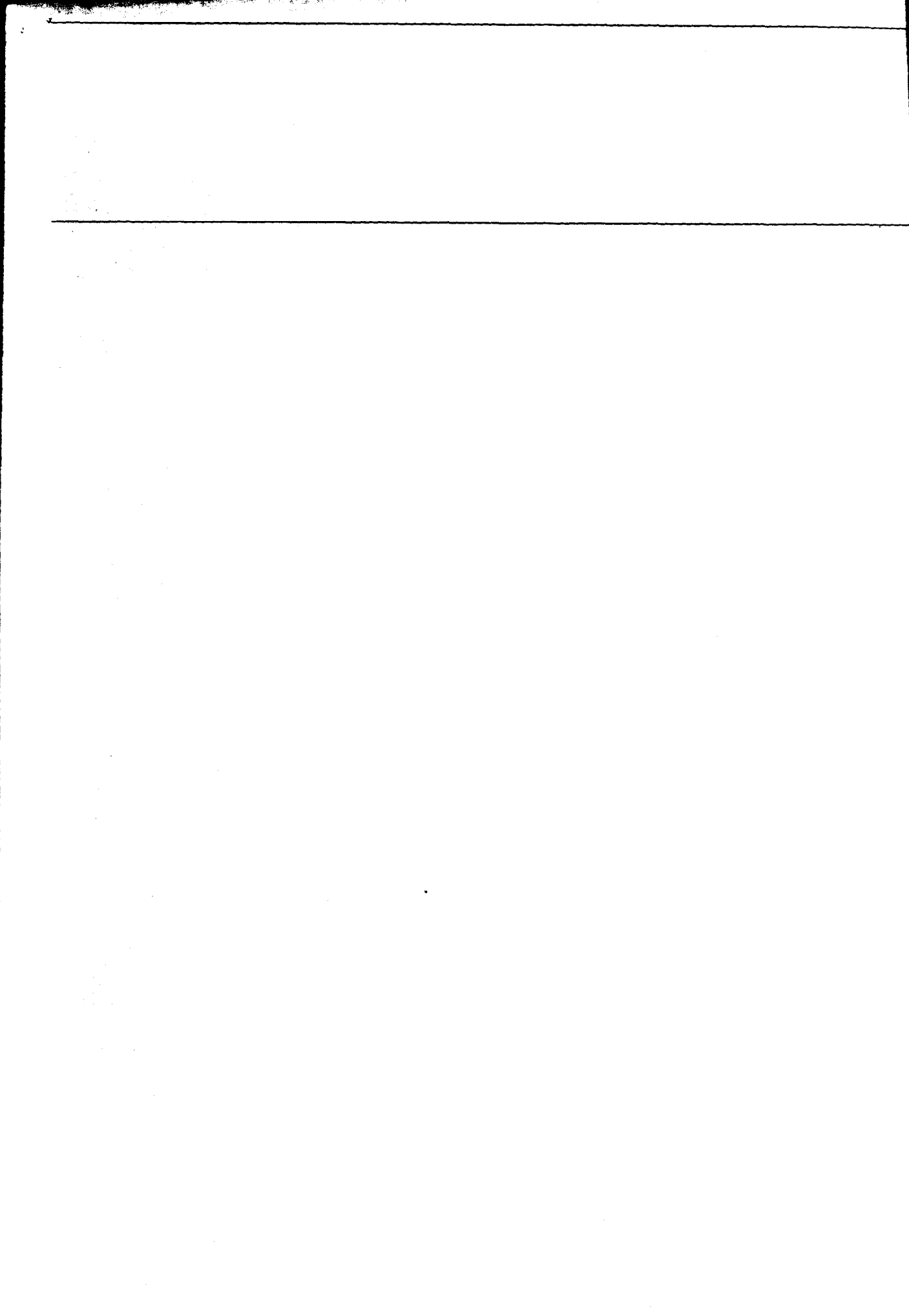
Report to the Chairman, Subcommittee on
Readiness, Committee on Armed Services,
House of Representatives

March 1989

AIRCREW TRAINING

Developing Objective Data to Support Flying Hour Programs







United States
General Accounting Office
Washington, D.C. 20548

National Security and
International Affairs Division

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March 9, 1989

The Honorable Earl Hutto
Chairman, Subcommittee on Readiness
Committee on Armed Services
House of Representatives

Dear Mr. Chairman:

In 1988 we briefed your Office on our follow-up review of the Tactical Air Command (TAC) and Strategic Air Command (SAC) flying hour programs. The objective of our review was to determine what the Air Force had accomplished since our 1986 report,¹ which discusses the need to develop quantitative data on which to base flying hour requirements. As requested at the time of our briefing, we are providing this report on the results of our review. Our objective, scope, and methodology are presented in appendix IV.

The Department of Defense (DOD) and the Air Force have efforts underway or planned to accumulate and analyze objective data and relate the data to flying hour requirements. We believe these efforts are a positive response to our 1986 observation that the high cost for flying hours dictates that greater emphasis be placed on objective measures of the benefits derived from different levels of flying. For fiscal year 1988 the Air Force programmed 1,328,000 flying hours for continuation training, at a cost of about \$1.5 billion.

DOD and Air Force efforts, in addition to helping identify cost-effective levels of flying hours, could have implications for training pilots and maintaining combat capability. Therefore, committing needed resources to their timely completion is important because of their potential to improve management and oversight of the flying hour programs significantly.

Synopsis of 1986 Report

The basic observation in our 1986 report was that TAC and SAC criteria for determining when a pilot or a crew was capable of undertaking its unit's full wartime mission and how many flying hours were needed to maximize pilot and crew proficiency to achieve full combat capability were largely based on the judgment of experienced pilots. We recognized

¹ Aircrew Training: Tactical Air Command and Strategic Air Command Flying Hour Programs (GAO/NSIAD-86-192BR, September 30, 1986)

that military judgment plays a role in determining combat pilot proficiency; however, we observed that the high cost per hour dictates that greater emphasis be placed on developing measures of the benefits derived from different levels of

Our report also discussed the systems used to report on training aircrews, including the Unit Status and Identity Report (USIR) system. On October 1, 1986, the Joint Chiefs of Staff changed the reporting system to the Status of Resources and Training System (SORTS), shifting the reporting emphasis from unit readiness to status of resources. We did not assess implementation of the new system, but our report provides a more detailed explanation of these reporting systems.

Actions Taken to Provide Objective Supporting Data

DOD and the Air Force have recognized the need to develop a system for aggregating data on the benefits of additional flying hours. For example, in June 1987 DOD issued a task order to the Institute for Defense Analysis for a study to provide "Improved Methods of Relating Flying Hour Activity to Operational Readiness and Performance Measures." This is a three-phase study, and phase I has been completed. A major phase I conclusion is that data exist to develop linkages between flying hour activity and measures of operational performance and safety for a wide range of aircraft. Phase II, which is under way, is expected to produce as many illustrative relationships between flying hours and performance as possible. Phase two is estimated to cost \$350,000 with the equivalent of 1 to 1-1/3 staff-years in fiscal years 1988 and 1989. Plans for phase III include a broad research program covering all the services and a wide range of aircraft types.

Researchers at the Institute for Defense Analysis told us that objective data will not be available on all aircraft for at least 2 to 3 years. Although data on a few aircraft could be sufficient for budgeting purposes, they believe 5 to 10 years of analysis will have to be completed before the data could be used to design training programs. Appendix II provides more details on this DOD study.

In addition to the DOD study, both TAC and SAC have undertaken and planned similar studies. TAC has undertaken a feasibility study to determine if it can identify the change in combat capability produced by changing the number of sorties flown. It also plans to relate training to mission requirements better, add specifics to the training required above the mission standard, and institutionalize a process to develop training requirements objectively. SAC also is performing a study to provide data to

B-52 flying hours and aircrew proficiency in support of flying hour requirements. It also plans to perform a second study that will analyze the current aircrew training system, assess the future training environment, and design a system that will provide combat capable crews to meet SAC's changing and varied missions. Appendix III provides more details on these studies.

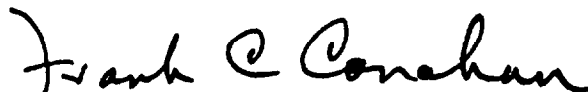
Agency Comments

DOD and Air Force officials met with us on December 22, 1988, and provided official oral agency comments on a draft of this report. They generally concurred with the report but provided updated data and explanatory and other technical comments that we have included in the report as appropriate. DOD did not provide written comments in time to be included in this report.

As arranged with your Office, unless you publicly announce its contents earlier, we plan no further distribution of this report until 30 days after its issue date. At that time copies will be made available to appropriate congressional committees; the Director, Office of Management and Budget; the Secretaries of Defense and the Air Force; and other interested parties.

This report was prepared under the direction of Harry R. Finley, Director, Air Force Issues. Other major contributors are listed in appendix V.

Sincerely yours,



Frank C. Conahan
Assistant Comptroller General

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Abbreviations

DOD	Department of Defense
GAO	General Accounting Office
GCC	Graduated Combat Capability
IDA	Institute for Defense Analysis
SAC	Strategic Air Command
SORTS	Status of Resources and Training System
TAC	Tactical Air Command
UNITREP	Unit Status and Identity Report

Readiness Reporting

In September 1986 we reported that the Department of Defense measured readiness at the unit level by using the Joint Chiefs of Staff Unit Status and Identity Report (UNITREP) System. Under this system, a unit receiving the highest readiness rating, C-1, was considered combat ready because the unit possessed its prescribed levels of personnel, equipment, time resources and was trained to perform the wartime mission for which it was organized, designed, or tasked. We also reported that Tactical Air Command (TAC) fighter pilots and Strategic Air Command (SAC) aircrews were flying well above this fully combat ready level.

DOD was concerned that our message to the Congress would be interpreted as implying that the Air Force was flying more sorties² and/or hours than were necessary. We clarified our report and stated that our intent was not to imply that the Air Force was flying more hours than were necessary. We further said that the Air Force was not flying the number of hours that we believed were required. Rather our basic observation as stated was that we need objective data to aid in judgments as to how many flying hours are necessary.

In response to the report, DOD emphasized that the readiness criteria used in the UNITREP System, as applied to Air Force flying units, represent only minimum standards. A C-1 rating, therefore, indicated only that a unit had met the minimum requirements for undertaking its primary mission. DOD stated that additional training beyond this level was required for two purposes: first, to gain a higher state of performance for a unit's primary mission and thus a higher assurance of success and survival in combat (i.e., minimum attrition rate), and second, to achieve a higher proficiency in specialized taskings and assigned secondary missions. We noted that the systems TAC and SAC used to develop their training programs (from which their flying hour requirements were derived) did not provide for this required training.

Status of Resources and Training System

On October 1, 1986, the Joint Chiefs of Staff revised its policy to require unit status reporting from readiness reporting. We did not assist in the implementation of the new system, but this revision changed the name of the UNITREP system to the Status of Resources and Training System (SORTS) and the subtitles from "combat ratings" to "category levels." The definition of a C-1 unit was changed from "... trained so that it is capable of performing the wartime mission for which it is organized, designed,

²A sortie is one operational flight by one aircraft.

tasked . . .” to “. . . trained to undertake the full wartime mission for which it is organized or designed.” (Underscoring added.)

SORTS focuses on the status of a unit’s resources and training measured against the resources and training required to undertake the unit’s wartime mission. Special taskings require additional training. Each combat, combat support, and combat service support unit of the operating forces of each service, including those of the National Guard and Reserve component, is measured in four areas—personnel, equipment and supplies on hand, equipment condition, and training. Each measured area is classified as C-1, C-2, C-3, C-4, or C-5, based on criteria for each area. For example, TAC and SAC calculated the training category level by determining the percentage of the wartime-required aircrews that are formed, available, and fully operational. A C-1 category level requires at least 85 percent of the pilots/aircrews to be trained to the appropriate level.

TAC Aircrew Capability Reporting System

TAC rates its aircrew capabilities based on the Graduated Combat Capability (GCC) tables in TAC Manual 51-50. The GCC system, which has been in effect since 1977, uses three capability levels and is based on the number of training sorties required for a pilot to achieve varying levels of proficiency.

- Level A sets the minimum number of sorties necessary for an aircrew to become sufficiently proficient to perform the unit’s primary mission. This level would require about 16 hours per month for an F-15 pilot in a tactical fighter wing.
- Level B sets the number of sorties required to increase the aircrew’s proficiency, lower attrition, train some aircrews in specialized tactics, and increase the unit’s ability to perform all its missions. This level would require about 20 hours per month for an F-15 pilot.
- Level C sets the number of sorties required for a unit to complete training in all its assigned tasks and be fully mission capable. This level would require about 27 hours per month for an F-15 pilot.

If 85 percent of a unit’s required aircrews is available and has completed all level A requirements, the unit is considered to be C-1 under SORTS. TAC also has a goal that 70 to 85 percent of its aircrews (depending on type of aircraft) per unit achieve level B, but it has not set a percentage of aircrews to achieve level C.

TAC's flying hour requirements and related costs for crews of selected aircraft to achieve the GCC levels in fiscal year 1988 are shown in table I.1.

Table I.1: TAC Flying Hour Program for Selected Operational Aircraft

Aircraft	Flying hours		
	Level A	Level B ^a	Level C
A-10	43,869	59,875	69,099
F-4	18,709	22,687	27,952
F-4G	11,719	14,171	18,332
F-15	51,377	69,002	85,570
F-16	89,040	107,139	141,186
F-111	9,949	11,328	14,184
Total	224,663	284,202	356,323
	Cost in millions		
A-10	\$59.7	\$81.4	\$94.0
F-4	51.8	62.8	77.4
F-4G	36.2	43.8	56.6
F-15	198.1	266.1	330.0
F-16	230.3	277.2	366.8
F-111	53.5	61.0	76.3
Total	\$629.6	\$792.2	\$1,001.1

Note: Totals may not add due to rounding.

^aBased on fiscal year 1988 programmed requirements.

The data in table I.1 show that TAC's programmed requirements for fiscal year 1988 cost about \$163 million (\$792 million - \$629 million) above the cost to achieve level A and that TAC needed an additional \$209 million (\$1,001 million - \$792 million) to have all pilots achieve level C (full mission capability).

SAC Aircrew Capability Reporting System

SAC has changed its capability reporting system to one similar to TAC's and has established mission readiness levels for individual crew members. These levels and the associated monthly flying hour requirements for B-52 aircraft are shown in table I.2.

Table I.2: SAC Readiness Categories and Associated B-52 Monthly Flying Hour Requirements

Readiness categories	Flying hour requirements per month
Combat capable	18.6 hours
Combat ready	22.3 hours
Fully combat ready	25.2 hours

Crews that meet the minimum combat capable level meet the SORTS requirements for C-1. Also, a unit needs 85 percent of its crews to be combat capable to be reported C-1 under SORTS.

Under the new system, SAC estimated its fiscal year 1988 B-52 flying hour program basically the same way it did in fiscal year 1985. It multiplied the fully combat ready flying requirement of 25.2 flying hours per month by 12 months by its 282 qualified crews. Table I.3 shows the total number of flying hours B-52 crews need to meet SAC's minimum readiness requirements (combat capable) and maximum readiness requirements (fully combat ready).

Table I.3: Flying Hour Requirements for B-52 Crews

Purpose of flying hours	Requirement level	
	Combat capable	Fully combat ready
Combat crews (282 authorized crews)		
25.2 hours per month		85,277
18.6 hours per month	62,942	
Other training and staff requirements	36,336	36,336
Total	99,278	121,613

In fiscal year 1988 SAC received 97,374 hours for its B-52 flying hour program—24,239 hours less than the number of hours needed for the fully combat ready requirement and 1,904 hours less than the hours needed for the combat capable requirement. However, as shown in table I.4, SAC maintained almost all of these aircrews at a combat capable level and over 90 percent at the fully combat ready level.

Appendix I
Readiness Reporting

Table I.4: SAC Aircrew Training Accomplishments From January 1987 Through June 1988

Training period	Percentage of crews completing training for	
	Combat capable	Fully combat ready
January through June 1987	99.2	92.3
July through December 1987	99.5	90.3
January through June 1988	99.3	92.5

To achieve these levels SAC would have had to reduce its flying hours for other training and staff requirements. Since our review SAC said its evaluation of staff flying requirements determined that an excessive number of hours had been allocated and programmed for other training and staff requirements. As a result, SAC stated that it reduced these activities about 8,000 hours in fiscal year 1989 and beyond, thereby increasing the total hours available for combat aircrew training.

Research Study on Measuring Benefits of Flying Hour Activity

In June 1987 the Office of the Assistant Secretary of Defense, Force Management and Personnel, issued a task order to the Institute for Defense Analysis (IDA) to perform a three-phase study entitled "Improved Methodologies for Relating Flying Hour Activity to Operational Readiness and Safety Measures." The task order said

"Development of flying hour requirements for the services has become more important as aircraft and missions have become more complex and budgets have grown more constrained. At the present time, the services develop their flying hour programs via the exercise of professional judgment. They decide what training events must be repeated with what frequency in order to achieve and maintain various levels of proficiency. This is a reasonable approach, but it leaves one with a flying hour requirement that is not explicitly validated in terms of the proficiency or safety of aircrews. The scarcity of resources has increasingly led to the request that flying hour budgets be justified in terms of improved operational capability. In other words, those responsible for the budget—in the services, in OSD [Office of the Secretary of Defense], and in the Congress—want better evidence about what we are getting for the money we spend on the flying hour program. In the absence of such evidence, it is likely to become increasingly difficult to justify funding for the flying hour program."

The objective of phase I of the study was to determine the feasibility of building quantitative relationships between capability and resources using information on the performance of aircrew personnel. In a December 1987 phase I report, IDA researchers said that less flying implies that more aircrews will not be fully trained for required tasks and that aircrews will not be qualified to perform as many missions. However, they found that the impact of reduced flying is not validated by explicit reference to the performance of any group of aviators. Reasons they cited for this situation are that making such a comparison requires data indicating aircrews' military performance and military performance is hard to measure. The report notes that the services go to considerable effort to develop indicators that are closely related to military effectiveness. However, the measures are generally used for management purposes in the field and not forwarded to higher headquarters or used to assess the effectiveness of personnel and training policies.

One conclusion resulting from phase I was that data exist to develop links between flying hour activity and measures of operational performance and safety for a wide range of aircraft. This included Navy data linking levels of flying to quality of carrier landings, accident rates, operational readiness evaluation ratings, and bombing accuracy. This also included Air Force data linking bombing accuracy for pilots of both F-16 and A-10 aircraft to levels of flying and to total pilot experience. Another conclusion was that both justification and formation of flying

hour policies would benefit from such links and that additional research to build these links should be supported.

IDA plans to adopt a model in which the experience gained through flying more hours manifests itself in two ways: (1) a short-term refreshing of skills that erode without practice but that can be fairly easily relearned and (2) long-term mastery effects from the incremental increase of total experience over a long period of time. If this model is successful, IDA believes both short-term and long-term criteria can be established for flying hour programs. These programs would then be oriented to ensuring not only that short-run qualification standards are met but also that a specified fraction of pilots surpass target levels of accumulated experience.

A crew member's ability to perform the required mission on call depends on capability when called. IDA said capability when called (readiness), according to the above hypotheses, depends on recent and total experience. If the hypotheses are confirmed, they should be factors in determining the flying hour program. The IDA paper reviewed a small number of studies, done for both the Navy and the Air Force, that quantitatively relate flying hour activity to operational performance and safety measures. They support the proposition that more flying results in measurably better performance.

Building on the results of these studies, phase II is expected to produce as many illustrative relationships between flying hours and performance as possible. It is estimated to cost \$350,000 with the equivalent of 1 to 1-1/3 staff-years in fiscal years 1988 and 1989. Choices have been made about which analysis to perform and the order of the analyses based on (1) the speed with which data are acquired, (2) the desire to produce analyses covering all the services and a wide range of aircraft types, and (3) policy interest in a particular service, aircraft type, or measure of performance. IDA cited as an example of policy interest the desirability of addressing our 1986 report on the supportability of the flying hour programs for TAC and SAC aircraft.

IDA began phase II by analyzing two major activities where data were most accessible—Navy carrier landings and the Marine air-to-ground mission. As of August 1988, IDA was attempting to incorporate the Navy air-to-air mission. It plans to expand its efforts in fiscal year 1989 to address TAC and either the Military Airlift Command or SAC. IDA researchers said that positive contacts have been made with all the commands.

If phase II proves to be successful, phase III is to be a broad research effort covering all the services and a wide range of aircraft types. According to the task order, this phase will involve IDA working with the services and DOD to gather the data necessary to implement phase II recommendations and consider integrating other operational data. During this phase IDA will determine the hardware and software necessary to carry out the recommendations and recommend modifications to available hardware and software; address organizational questions, such as whether the data for all the services should be held at a single location and whether each service should retain responsibility for its own data; and develop instructional manuals to provide service personnel with the expertise to apply the selected methodologies.

IDA researchers told us that they will not have quantitative data on all aircraft for at least 2 to 3 years. However, they believe they will not need data on all aircraft for budget justification purposes; data on a few aircraft would be sufficient. They expect that 5 to 10 years of analysis will be needed to use the data in designing training programs.

TAC and SAC Initiatives to Develop Objective Data

Since our 1986 report, TAC and SAC have undertaken or planned several studies to develop and use objective data to better support their flying hour programs. The results, however, appear to be 2 or more years away.

TAC Studies

TAC's Directorate of Analyses is performing a feasibility study entitled "Continuation Training Flying Hour Requirements Study." The study objective is to quantify the change in combat capability produced by changing the number or allocation of sorties flown. This will include determining

- the measure of combat capability or skill level related to each training event,
- the methods for computing numbers of sorties needed to fly specified training events, and
- the means of obtaining data required to support the analysis objective.

TAC officials said that this study is the first step toward developing a system to (1) more objectively project future flying hour requirements, (2) provide a better understanding of the number of sorties needed to become proficient in a specific training task, and (3) better allocate available sorties and perhaps increase combat capability via the same number of sorties. According to TAC officials, these efforts will be followed by an experiment at two fighter wings. However, it could be 2 years or more before a working model is constructed from which flying hour projections could be made. TAC officials also said two analysts will devote 25 percent of their time for 1 year to this effort.

TAC also is undertaking a study entitled "Mission Requirement, Training System, and Capability Measurement Review." The objective is to better relate the training system to mission requirements, add more specificity to the training above the basic mission ready standard, and institutionalize the process used to develop training requirements objectively. Nine officers in the Directorate of Fighter Operations, each dedicating about 20 percent of their time, and one officer in the Directorate of Operational Plans and Support, dedicating 30 percent, are performing this study, which is projected to be completed in December 1990.

SAC Studies

As a result of an August 1987 request from SAC's Director of Training to SAC's Office of Science and Research, SAC began a study that attempts to correlate B-52 flying hours and aircrew proficiency. The plan was to

(1) use data from operational readiness inspections made by SAC's Inspector General and bomb competition scores; (2) evaluate the performance of B-52 pilots, radar navigators, and electronic warfare officers; and (3) correlate total flying hour experience and the hours flown. However, initial analysis of data from the operational readiness inspections and the bomb competitions provided inconclusive results, causing the study's approach to be reconsidered.

A second study entitled "Aircrew Training 2000" is an effort to analyze the current aircrew training system, assess the future environment in which SAC training will occur, and design a system that will provide combat capable crew members to meet SAC's changing and varied missions. A SAC Headquarters study group composed of directors from many different specialties is the forum to be used in providing a multispecialty look at the environment and requirements under which SAC will train in the year 2000. In August 1988 this study, which had not been budgeted for, was still in the conceptual stage and had not received the SAC Commander's approval. Two officers had been assigned to the study part time, but an estimated completion date had not been determined.

Objective, Scope, and Methodology

The objective of our work was to follow up on matters discussed in a 1986 report concerning the Air Force's management of its flying program. In particular, we wanted to identify (1) changes TAC had made to their criteria for rating units and (2) the procedures the Air Force has under development to provide additional quantitative data which to base flying hour determinations.

We conducted our work between October 1987 and September 1988 in accordance with generally accepted government auditing standards. We visited SAC Headquarters, Offutt Air Force Base, Nebraska; TAC Headquarters, Langley Air Force Base, Virginia; DOD and Air Force Headquarters, Washington, D.C.; and IDA, Alexandria, Virginia. At each location we interviewed agency officials and/or reviewed pertinent study materials pertaining to Air Force and DOD efforts to develop quantitative relationships between flying hour/sortie levels and aircrew proficiency. We reviewed available quantitative data relevant to the flying hour programs but did not assess the reliability of the automated data providing these data.

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