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ANALYSIS OF OPERATIONAL CRITERIA AND USER REQUIREMENTS OF A NAVAL AIR REPORTING SYSTEM

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I. INTRODUCTION

The objective of the study was to survey (a) the organization and operation of the US naval air reporting systems in recent use and (b) the use made of report data generated by the systems in order to recommend operational criteria and user requirements for an ideal Naval Air Reporting System.

In the course of the Vietnam War several reporting systems were developed, in an attempt to satisfy needs for timely data on daily developments and longer term needs for planning and analysis. When the war began the Navy was using its own prewar 3480 series of naval air warfare reports, combined with the JCS all-service reports known as OP Messages. As JCS requirements for information increased, and a computerized data bank (Combat Activities Report, or COACT) was developed, it became obvious that the OP messages did not supply sufficient data to feed the system. Consequently a new system was set up as part of the Joint Operational Reports (JOPREP). In effect it was two systems, OPREP, the Commander's Operational Report, a system of messages, and MIDEFO, Mission Debrief Form, a formatted report designed to provide direct data input for COACT. The OPREP messages also provided input for three specialized data bases. MIDEFO, which proved difficult for personnel without specialized training to compile, was soon replaced by MIDS, Mission Debrief Sheet.

In 1971 PAIRS (Pacific Command Air Integrated Reporting System), a modified version of the Seventh Air Force's SEADAB (Southeast Asia Data Base), with a greatly reduced number of input items replaced COACT. Since COACT had been in use for most of the war period, and the fixed-length, or limited base, of PAIRS is not likely to suffice for intensive combat, this study focusses primarily on COACT. When not otherwise indicated, the term "reporting system" in this study refers to COACT and the related OPREP element of JOPREP.

Since this study is concerned with combat air reporting, there has been no survey made of the numerous other reports--maintenance, supply, ordnance, etc.--filed by the various units supporting the combat squadrons, and by naval surface forces, although some surface officers were interviewed. Such a survey might be useful. It would certainly highlight some of the data overlaps between reports. Those elements of such reports which appear to relate most closely to combat air operations have been included in the recommended series of reports.

HERO approached this study from two directions: (1) a survey and analysis of the several combat air reporting systems in use during the Vietnam War, and (2) interviews with those who participated in those systems, whether as contributors or as users. A list of the types of people interviewed is included in Annex H. It covers as wide a range as could be readily located, from squadron commanders to fleet commanders, and including technical personnel, analysts and military historians. While their reactions varied, in general operational people, the reporters, tended to be critical of reporting systems of any kind. Analytical people, users, tended to regard reporting systems as very important and absolutely essential, aiming any criticism at the inaccuracies in the data they received. While the reporters generally thought they were asked to provide too much information, the users would generally have preferred more.

In Chapter II of this report the various systems in use for combat reporting during the period of the Vietnam War are described briefly. Chapter III contains comments of men who were involved with reporting during the period, either as reporters or as users, in the form of excerpts from the HERO interviewers' reports of their conversations. From these two sources findings have been made, which are presented in Chapter IV. Chapter V is an evaluation of the OPREP and COACT systems against six basic characteristics of an ideal system which have emerged from this study. The final chapter contains recommendations of operational criteria and user requirements for an ideal Naval Air Reporting System and the types of reports such a system should include.

II. REPORTING SYSTEMS IN THE VIETNAM WAR[1]

3480 Series, Naval Air Warfare Reports

The 3480 Series, developed in peacetime but designed for reporting in combat, comprised ten reports, providing statistics on aircraft availability, missions flown, operational and combat losses of aircraft and crews, air attacks, and antisubmarine activity, in great detail. Except for the Air Summary Report they were handwritten on printed forms and transmitted by mail or courier. The Air Summary Report was transmitted by radio in a prescribed format. For carrier aircraft it was sent daily or after two to four strike days; shore-based units submitted it weekly. The other summary reports were submitted monthly or, in the case of the aircraft mission report, as the situation warranted. The aircraft availability report was also submitted daily. The other reports were submitted as the situation warranted or on the completion of a mission. Together these reports provided, within naval channels, a detailed picture of the activities of operational and support units in a combat status. The 3480 Series was discontinued in October 1965, except for the Air Attack Report and the Air Combat Report, which were continued until mid-1966.

OP Messages, JCS Air Operations Reports

In 1964 the Joint Chiefs of Staff required all services to submit operational reports on air strikes in North Vietnam and Laos ("out-of-country" strikes) in prescribed message formats, in a series known as OP Messages. There were six reports, one of them in two parts, narrative in form and structured only by paragraph topics. Three of the daily reports (OP-01, Missions intended within the next 24 hours; OP-02, Forces launched; and OP-03, Forces recovered) were discontinued about mid-1965. OP-00, 15-day intended operations, and OP-05, unusual incidents, remained unchanged. On 12 June 1965 a detailed format was prescribed for the two parts of the OP-04 post flight reports (initial and wrap-up) to fit the elements of a

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[1]Annexes A-F discuss these systems in more detail.

newly-installed computer data base (COACT). When this proved inadequate, the OP Messages were discontinued at the end of September 1965.

The Joint Operational Reporting System (JOPREP)

The Joint Operational Reporting System (JOPREP) prescribed in JCS Pub 6 in September 1963 did not include naval air combat reporting until two years later. In October 1965 two separate and component systems of JOPREP were prescribed for naval air combat: a series of message reports for rapid reporting, OPREP, and coded inputs to a computer data base, COACT. These two subsystems were in use for most of the period of the Vietnam War.

Commander's Operational Reports (OPREP)

Operating units began OPREP reporting on 1 October 1965. Five daily types of reports were required of all services flying air strikes. Designed to provide information on a timely day-to-day basis, describing current plans and operations in detail, briefly they reported intended missions (OPREP-1); takeoffs (OPREP-2); unusual events, including losses (OPREP-3); details of each mission at its completion (OPREP-4); and a daily summary (OPREP-5). They were submitted by operational units to the unified and specified commanders, CinCPac and CinCSAC, JCS and other appropriate commands and agencies, in message form, and, although formatted, provided narrative detail. These operational messages were useful to CinCPacFlt, FMFPac, FMAW and Com7th AF, who needed a timely source of combat data for day to day planning and implementation of operations.

The data provided in the OPREPs was fed into three computer data banks: OPREA (OPREP-5 Combat Air Summary File), maintained at JCS as its official statistical computer file, derived from the OPREP-5 reports which were daily summaries of the OPREP-4 reports; OPTAN, a target-oriented tape file maintained by the Defense Intelligence Agency (DIA) from OPREP-4 reports on air operations over North Vietnam that dropped ordnance (i.e., OPREPs covering ECM, CAP or escort missions were not included); and CAMRA, a target-oriented tape file maintained by CinCPac from OPREP-4 reports, photo interpretation reports (PIR), and forward air controller (FAC) reports of air strike operations over North Vietnam and Laos.

Combat Air Reconnaissance Activities File (COACT)

COACT was activated by JCS directive in June 1965. It was intended to give the JCS a complete data file on all air operations taking place in Southeast Asia. The OP-04 format was changed in June 1965 to prescribe the elements of data within each paragraph of the message to insure that all data required by COACT would be provided. (Prior to this time the message had been structured only by paragraph topics.) Two things soon occurred. First, the volume of radio traffic increased to an unacceptable level because of the large amount of data required, and second, although COACT prescribed the data elements, reports proved to be unsatisfactory for computer purposes.

In order to provide the proper data input into COACT, the Mission Debrief Form, MIDEFO, was prescribed by CinCPac on 1 October 1965 and the OP messages discontinued. Much of the data on the MIDEFO was entered in coded form in a format similar to the card-image used in COACT. MIDEFOs were prepared after each mission and flown to CinCPac Headquarters in Hawaii, where the information was keypunched for the data base. The coded format of MIDEFOs proved troublesome to people without special training, and they were replaced on 1 May 1966 by a plain-language form called the Mission Debrief Sheet, MIDS. This form, based upon debriefing of air crews, was filled out by Air Intelligence officers after each mission and flown daily by COD (carrier on board delivery) aircraft to the Philippines for coding and keypunching, and then the data cards were forwarded by Autodin to CinCPacFlt.

There were three versions of COACT, the last (COACT III) being implemented in September 1966. To meet its requirements, the MIDS form was expanded from two to five pages; the following topics were covered: mission, target, sortie, results, load, aircraft incident, enemy defense, missile encounters, and comments. A few items were deleted from the report in 1967 and some forty were eliminated toward the end of its use, in late 1970, leaving about 120 items. COACT reporting was discontinued on 1 February 1971.

Pacific Command Air Integrated Reporting System (PAIRS)

PAIRS replaced COACT in 1971. It was a modification of the Seventh Air Force system and brought Navy and Marine Corps air combat data together with Air Force data into the Southeast Asia Data Base (SEADAB), which had previously contained only Seventh Air Force data. PAIRS is a fixed-length data base, with a much smaller number of input items than COACT. It is generally considered an interim system, to be replaced under the requirements of a combat situation.

Inputs to PAIRS were Frag Orders (similar to OPREP-1), OPREP-4 messages, post strike Bomb Damage Assessment (BDA) reports taken from OPREP-4s, interpretation of post strike reconnaissance photographs and BDA reports from airborne forward air controllers when available. The data from these inputs were keypunched into an IBM 360 computer in the theater (Tan Son Nhut Air Base). A daily OPREP-5 message was a computer output sent to all services. Another output was a magnetic tape file forwarded up the chain of command via Autodin when possible.

The Historical Development of the Reporting System

The 3480 Series provided data that was detailed and accurate and in the Navy served the purpose of providing "addressees with all useful combat information concerning naval aircraft."[2] It was the only one of the reporting systems covering combat air operations data on aircraft availability and antisubmarine activity. Because they were handwritten aboard ship and sent by mail or courier the 3480 reports were subject to a minimum of errors, omissions and garbles such as are found in later reports that had to be encoded for radio transmission or processed for computer input.

The JCS requirement of OP Messages made continuation of both systems an intolerable burden. Since much of the information was duplicated in the OP Messages, on 4 August 1965 the Chief of Naval Operations authorized CinCPacFlt to discontinue all 3480 reporting not required by CinCPacFlt. On 1 October all but the Attack Report and the Air Combat Report were discontinued. These too were discontinued for Marine Corps units. On the same date, the OP Messages, which had proved to be inadequate for supplying the input for the computerized data base, COACT, were replaced by the MIDEFO, and the OPREP message system was activated.

Apprehension that the MIDEFO, with its requirement for coding of entries to fit the computer's needs, would prove too difficult for carrier personnel not trained for computer processing, had led CinCPacFlt to continue with the two 3480 reports. Misapprehension proved justified. In the summer of 1966 the new Navy form, MIDS, was approved. The two surviving 3480 reports, which had served as a supplement to and check on the accuracy of the MIDEFOs, were then discontinued.

From the fall of 1965, then, there were in effect two reporting systems, OPREP, and COACT, with MIDEFO and then MIDS providing the input for the computerized COACT. OPREP messages were supplying

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[2]NWIP-10-1(A), "Naval Air Warfare Reports," Paragraph 100.

prompt information in detail on combat missions, including reports on new enemy weapons, aircraft and target systems, in partially narrative form. They permitted a degree of precision not available in the computer-oriented MIDS reports, and proved valuable as a check on the accuracy of COACT data. OPREP was the source of data for immediate needs, while COACT supplied a storage and retrieval capability for longer term requirements.

COACT was sortie-oriented and was designed to store in an automated data base all of the information about every sortie flown. However, it had some very definite limitations, and these eventually caused it to be dropped, while the more traditional OPREPs continued. Input to COACT had to be put in language to fit the data base, and this requirement introduced errors, both through incorrect coding and through distortion resulting from the rigidity of the codes. (For example, dive angle could be recorded only as steep, shallow or level.) Narrative information, of which the MIDS contained some, was omitted from the computerized base, or if entered was often misinterpreted. Early COACT data (1965) was found to be very inaccurate when compared to data supplied by OPREP, and the whole system always remained suspect in many eyes. On the other hand, COACT data has proved very useful to analysts, particularly in studies which measure statistical trends over long periods of time. Those who have recognized and allowed for its limitations have found it a useful source of information, and it is the only ready source for detailed data on the Vietnam War.

To the operational commanders during the war, COACT was of little or no use, since it was not geared to providing timely data such as was needed for daily decisions. They seldom or never saw anything that appeared to come out of it, and the burden of reporting in great detail for it became onerous. The mechanics of handling the enormous amounts of material to be put into the computer system also became very burdensome. Complaints from the operating units of CinCPac finally resulted in a reduction of the reporting requirements and eventual discontinuation of COACT in February 1971.

The introduction of PAIRS reduced the reporting requirement considerably. It also provided a computerized base that, because of the fact that most of the data was entered within 24 hours of completion of a mission, was of immediate value to tactical commanders, who had had no use at all from COACT. However, PAIRS was considered only an interim solution unlikely to fill the Navy's needs in periods of heavy combat.

III. COMMENTS BY PARTICIPANTS

In the course of this study approximately 75 people were interviewed, representing at least 34 different types of experience related to the combat air reporting system of the Vietnam War period. Many of those interviewed served during the war in two or three billets which involved either reporting or the use of combat air reports. The list of types of people interviewed is included in Annex H; the interview form used is included as Annex G. An attempt was made to talk with people who knew different facets of the reporting system, in order to understand the points of view of those who reported and those who used the results at various levels and for various purposes. It is obviously not possible to determine all the uses to which the data will be put, but a general distinction may be made between operational decisions, analysis, and historical study. People in each of these categories of user were interviewed, as well as some who flew combat missions or commanded combat units.

Almost without exception the interviewees expressed unhappiness with some aspects of the reporting system. Although the points of dissatisfaction varied widely, there was a clear distinction between those who had had experience with the inputs, and those who wanted information from it. While the latter wanted more details the former thought there was already too much asked of them. There were differences, too, among those who used the system, according to the uses they made of it.

The comments made in each interview were subsequently summarized by the HERO interviewer. Since these summaries do not lend themselves to statistical analysis, selected excerpts from them have been quoted here under five broad headings: General Comments on the System; Specific Details; Uses and Value; Other Reports; and Problems and Recommendations. These headings are not the categories used in the interviews (see Annex G, the interview form), but emerge as a logical organization of the comments. Although some of the comments could be related to more than one heading they are quoted only once.

General Comments on the System

Practicality

1. "Too high a level was trying to 'fly the aircraft' and run the war. . . . There was too much requirement for information from operational people."

2. "There was overzealous implementation of the 'Source-Data Automation' philosophy. Going to the grass-roots level to collect data for automated systems in machine compatible format will always result in successful implementation of the first half of the 'GIGO' (Garbage In-Garbage Out) algorithm, when non-ADP oriented personnel have ADP oriented requirements laid upon them."

3. "The required mass of data, many times not available for reporting because of the inability of the air crew to report it, caused the attitude toward the reporting system to be bad and this in itself prevented reporting of significant data which would have been forthcoming with more realistic requirements."

4. "Not enough thought has been given to the accurate determination of what really can be reported, and in what terms. Some of the questions asked of combat elements almost encourage guessing or generalization."

Simplification

1. " . . . would like to see some way of simplifying reports to reduce the amount of time and effort involved, and . . . a tape recording of the debriefing might contribute to this purpose."

2. "Inability or unwillingness to stabilize the data reporting requirements created problems for the source level personnel in that the requirements were not only difficult for untrained personnel to properly respond to no matter how well motivated to do a good job, but compounded the problem by large and frequent changes. On the processing end the attempts to recreate data where none previously existed and to make valid comparison between one year's data base and the next year's when the basic definition of many data elements have changed produced results /which/ can only properly be called 'dubious,' at best, and more properly 'misleading,' or 'erroneous.' The lesson here is to make a reporting system simple to start with and then keep it that way."

3. " . . . a complicated reporting system is impractical from the operational point of view and if insisted on results in 'gun decking' . . . making up information for a report (that is not

necessarily true) in order to make the reporting unit look good on the record."

4. " . . . noted the tendency of senior elements situated at some distance from the action to 'over-manage' and to ask for masses of irrelevant detail. He attributes this to the availability of high-speed, high-capacity communications."

Accuracy and Precision

1. "The major problem was that air crew members were required to respond to questions that they were not able to answer accurately. This resulted in giving information that did not necessarily reflect the truth but was insisted on by the reporting system."

2. "There was too large a requirement for detail that was difficult for the operational people to provide with any degree of accuracy."

3. "There was too much detail /which it was/ not possible to get from pilots. The result was that questions were answered anyway, by /stock answers/, giving the system what it asked for even though it was not available, and, as a result, not necessarily accurately."

4. "The most difficult part of the reporting system was the requirement to furnish data that it was not possible for air crews to give accurately. Because of this answers were given because the requirement was there and not necessarily because that was what happened."

5. "Accuracy of information was not uniformly high. This was due in large part to the tensions under which pilots operated. Night operations were particularly troublesome in this connection. As a result there were built-in flaws in the debrief information. . . . 'In-and-out' data--speed, altitude, dive angle, etc.--are not seen as very useful or accurate."

6. " . . . the pilots' reports on the details of launch, attitude and altitude were reasonably accurate. . . . These are things on which highly accurate details are /not/ needed, because they are technical things covered quite precisely in pre-combat testing. They're nice to have, but not necessary."

7. "The accuracy of reporting information /was questionable since/ a pilot would be unlikely to report things that were uncomplimentary to himself."

8. "Pilot reports of bomb damage assessment were unreliable."

9. "An elaborate reporting system, such as that required by COACT, tends to force conclusions, e.g., how many bridges were destroyed? Even though a precise answer is not possible or not accurate, the box form requires a specific answer and the box must be filled in."

10. "A /pilot/ would describe the location of a SAM site to the best of his ability, but would not be sure of the exact coordinates. The form did not allow for approximations, so the information would be reported as a precise location. This would result in information that appeared to be precise but in fact was only an estimate."

11. "Pressure to look good to higher headquarters caused distortion of data, such as accident rates, maintenance, in commission rates, etc."

12. "There was a general feeling that the reports did not provide reliable information for weapons analysis. . . . Frequently results being reported by weapons laboratory observers would conflict with those gleaned from the reporting system."

13. "Not enough thought has been given to the accurate determination of what really can be reported, and in what terms. Some of the questions asked of combat elements almost encouraged guessing or generalization."

14. "OPREP-4 messages that attempted to report on results /were dubious/, when obviously the pilots who were flying had no basis for giving such results."

Specific Details

Categories (The interviews were related to the categories of data in the COACT system, data taken entirely from the MIDS forms filled out after each mission. These observations of the few interviewees who commented in detail on the various items or categories are keyed to the categories shown on the interview form in Annex G.)

A. Basic Mission Identification

1. " . . . only items 8 through 11 were needed."

2. "All data in this category were supplied by the AI officers."

B. Primary Target Data

1. " . . . all items were useful but could not all be reported."

2. " . . . all items with the exception of 15, weather over the target, could be given by other than air crew and should not have been included as reporting items in the MIDS."

3. "The data elements here were reported by AI and were felt to be necessary for the operational units in their intelligence file."

C. Sortie Data

1. " . . . could be obtained from the operations staff with the exception of items 10 through 14."

2. "Items 6, and 10 through 13, are the only ones necessary."

3. "Some information here is not critical to the sorties. (Launch unit ID, Sortie Card ID, etc.) Those things that are easy to answer by /people/ other than aircrew should not be asked; i.e., anything that you can get from another source should not be asked from air crew."

4. "This data was valuable to the squadron commander to compare his squadron's performance with other similar squadrons. He also could evaluate the maintenance in his squadron with other similar squadrons."

5. "The squadron operations filled in items 5 and 7. Category 7 was not clear whether all aircraft, including missions such as tankers and ECM should be counted. Many of the other items called for in this category were filled in in the ship's printing office, although the time over the beach in North Vietnam was reported by pilots on the mission."

6. "Data for items 5, 6, 7 were provided by squadron operations and the remaining items provided by the AI debriefers."

D. Ordnance Load Data

1. " . . . could be obtained from ordnance with the exception of items 2 and 3."

2. "Only the information on jettisoned or returned ordnance had to be reported by aircrews on the mission."

3. "Why ask the pilot? Why not ask ordnance, particularly aboard ship?"

4. "This information was reported by the armament people in the carrier and not the air crew. If air crew changed aircraft they would report the armament loaded on their aircraft if different /from/ the original load."