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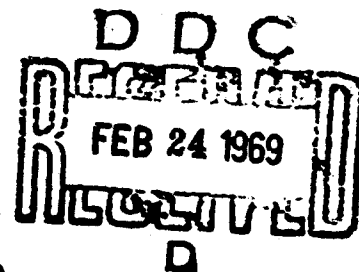
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THE RAND/TAC INFORMATION
AND ANALYSIS SYSTEM: VOLUME I—
DATA COLLECTING AND EDITING

Fred Finnegan and Anders Sweetland

PREPARED FOR:

UNITED STATES AIR FORCE PROJECT RAND



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PREFACE

The RAND/TAC information and analysis system provides for the collection, processing and analysis of operations, maintenance and supply data, using an IBM 1401 computer to assist in data purification and in the management and evaluation of aircraft operations and support at base level. The system is unique in that the data collected are identified with the specific sortie (and in some instances to the specific leg within the sortie). This allows the user to perform many kinds of analyses not ordinarily possible, relating mission use to reliability, manpower and spares usage.

The system grew out of a number of special field tests (e.g., Rapid Roger, Skoshi Tiger, Tack Down) exploring the feasibility of using a small business computer to assist with materiel and operations problems at base level. In the tests prior to Combat Dragon, it was necessary to "create" the maintenance analysts through an extensive educational process. Combat Dragon was unique in that Air Force personnel carried out the entire project from data collection through final writeup with no assistance from RAND, other than the initial training in the use of the system.

It is now possible to organize the loose collection of notes, procedures and programs into a formal system description. Accordingly, this RAND effort comprises four Memorandums containing essentially the package of materials used in training the Combat Dragon team. The information is organized as follows: Volume I (RM-5666-PR) is for data collectors and editors responsible for providing the data bank to be used in subsequent analyses; Volumes II (RM-5667-PR) and III (RM-5668-PR) are for analysts (especially people who will be doing maintenance analysis) to familiarize them with the available programs and analysis products, and to encourage them to ask questions and explore the data in an imaginative way; and Volume IV (RM-5669-PR) is for the "data services branch" of the evaluation or analysis team, to identify procedures and to impart an understanding of what the analyst is attempting to do.

Surprisingly, even though the system is entirely computerized, readers need not have a knowledge of computer hardware and software to

follow the text. A knowledge of the details of aircraft weapon systems would be useful, for although we describe such operations, the descriptions are somewhat cursory. In particular, a familiarity with aircraft maintenance procedures would be useful.

The concepts, techniques and programs of the RAND/TAC information and analysis system should be adaptable to future Air Force base-level management information systems, whether manual or highly mechanized. Provided that the appropriate computer is available, the RAND/TAC system can easily be introduced at a base and used without modification for field tests or other purposes. Recent changes in a number of standard Air Force forms and in data linkages, however, may make them preferable for a particular base exercise to the RAND/TAC forms.

With modest changes to current Air Force data collection procedures and reprogramming of the analysis packages, the system would provide a valuable supplement to current base analysis reports--a supplement more attuned to questions that are and should be asked by base maintenance management. The system will also provide a detailed guide and check list for the design-development of new base-level information systems and should provide direct input to analysis portions thereof.

SUMMARY

The RAND/TAC information and analysis system provides for the collection, processing and analysis of operations, maintenance and supply data, using a small business computer to assist in data purification and in the management and evaluation of aircraft operations and support at base level. It is unique in that operational and logistics variables are interrelated through several features of the data and analysis systems to permit identification of operational events connected with a particular sortie and relate these to explicit maintenance or supply actions preceding or following the sortie, management actions, and key environmental conditions.

The system consists of a series of forms for collecting operational data, maintenance actions, maintenance manpower availability, aerospace ground equipment (AGE) utilization, supply demand, cannibalization and issue data, a series of computer programs and manual procedures for editing, reformatting and processing to provide basic displays, and other programs to provide basic analysis packages. The system is designed to minimize duplicative recording of data elements, and has flexible computer programs to permit a wide variety of analyses.

The four volumes constituting this effort present a complete system description, together with instructions on how to perform analyses using the system programs. Volume I (RM-5666-PR) contains the description of and procedures for collecting and editing the data--the forms, procedures and program operating instructions. Volumes II (RM-5667-PR) and III (RM-5668-PR) are concerned with the analysis programs and procedures, and with analysis design and methods. The first emphasizes how the programs work, the second how questions can be answered. In a sense both volumes are written for a career that currently does not exist in the Air Force: the maintenance analog of the operations analyst. A person interested in this field should be versed not only in maintenance but also in data processing, computers, statistical methods, and experimental design.

Each time RAND participated in a special field test, such as Combat Dragon, Skoshi Tiger, and Tack Down, it was necessary to "create" the maintenance analysts by an extensive educational process. Volume

II attempts to encapsulate the first part of that educational process. It introduces the prospective analysts to the data bank, the programs and the procedures needed to process the operations, maintenance and supply analysis data.

Volume III is based on the second stage of the learning process. It assumes that the user has now mastered the elements of the program and can focus his attention on answering questions. Thus it addresses analysis fundamentals: dependent and independent variables, data fields, sorting, data selecting and tagging. Then it discusses a variety of areas of interest to maintenance management and shows how each can be explored with the system. Finally, some of the background and philosophy of experimental design is discussed.

Volume IV (RM-5669-PR) describes the computer programs used with the system. To encourage a rapprochement between the analysts and the programmers, we have attempted to include sufficient information for the programmer to understand the general outlines of what the analyst is attempting, as reflected by the functions of the computer programs.

ACKNOWLEDGMENTS

It is 'mpossible to credit all those who made contributions to the system. Hall Logan (TAC-OA) and Sergeants James Fisher and Melvin Ericson (TAC) provided most of the maintenance procedures. Calvin Gogerty (RAND) designed the entire supply inclusions. Chauncey Bell (RAND) designed the "off-equipment" bench repair procedures. Sergeant Jack Marshall and Technical Sergeant Elias Martinez contributed to the 1401 programming, as did Mrs. Colleen Dodd of RAND. Major John Munkvic is chiefly responsible for the operations aspects. A special thanks is due Miss Doris Dong of RAND who did the art work.

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GLOSSARY

Abort rate	The rate of aborted sorties made by a unit in a given period. The most frequently used equation is the following: $\text{abort rate} = \frac{\text{sorties aborted}}{\text{sorties attempted}}$.
Action taken	The type of maintenance performed: repaired, removed and replaced, calibrated, etc.
AGE	Aerospace ground equipment.
AGE utilization	A display showing both active and standing flight-line utilization of AGE.
Aircraft display	Also called flight-line display and flight-line queue sort. Shows pictorially the maintenance and status history of each aircraft for a 24-hour period.
Base-line	Such data are counts of the times an event was attempted, e.g., sorties flown in a certain category.
Break-rates	Along with write-ups, break-rates are the major independent variables in determining aircraft recovery and turnaround, and are therefore the major determiners of sortie generation capability. Break-rates are determined for both aircraft and aircraft systems. The equation is as follows: $\text{break-rate} = \frac{\text{system fix count}}{\text{sorties flown}}$.
Chi-square	An analysis program that makes statistical comparisons of frequency counts to determine whether nonrandom behavior exists.
Code 799	No defect discovered.
Code 800	Removed or replaced to facilitate maintenance.
Code T	Removed for cannibalization.
Code U	Replaced after cannibalization.
Combat Dragon	An exercise with A-37A aircraft in Vietnam.
Cost-effectiveness	An exercise with F-4C aircraft at MacDill Air Force Base.
Daily package	Processing of operations, maintenance, supply and scheduling data by means of edit, error listing, and aircraft and work center displays.
Delay time	The accumulation of work interruptions on each system and each work center, by aircraft.
Demand rates	Most frequently, supply demand rates. Most frequently, $\text{demand rate} = \frac{\text{demand (request)}}{\text{sorties flown}}$.

Deviation-Degradation (DEVDEG) program	A computer program. Lists and counts missions' deviation-degradation data from the 308 forms.
Dichotomous data	Data that has only two categories: for example, yes-no, 0-1, hit-miss, aborted-nonaborted, malfunctioned-nonmalfunctioned.
Easy data	Data collected by one person at a single collection point, as opposed to tough data.
Edit mask card	Locates the decimal phase that is edited into the data field just before printing.
Edit program	Searches for and identifies errors, reformats data, relieves data recorder of all possible unnecessary burden.
Eight/two pocket	Card drop pocket on the 1401.
Eighty-eighty (80-80) listing	Records are printed as they exist on the card (or tape) without separation of the fields.
Error listing	An image of each card containing a computer-detected error plus a description and location of each error.
ETIC	Estimated time to in-commission status.
ETR delay code	Equipment temporarily removed.
Field location card	Locates low- and high-order positions of the fields on the record.
Flight-line display	See aircraft display.
Frequency Counter (FREQ) program	Searches any field of unknown and unsorted data, builds a table, and counts the frequency of entries in the field.
Gang punch	To punch identical or constant information into all of a file of cards.
Gross fix time	Period from touchdown to end of maintenance. Includes unscheduled maintenance only.
Gross turnaround	Period from touchdown to end of maintenance, includes both scheduled and unscheduled maintenance.
Hard data	Keypunched data, as opposed to soft data.
Harmonic mean	The method of computing helps minimize the effect of unequal sample size by using the reciprocal of n .
Hourly Frequency Accumulate	A program that computes the frequency counts for resource utilization for each of the 24 hours during the day.
How malfunction code (how mal)	Describes the nature of the malfunction: burned, distorted, cracked, overheated, etc.

Independent variables	May affect system behavior, as opposed to dependent variables, which are the things being affected.
KBA	Killed by air.
K-97 report	Deck of maintenance data forwarded to the Logistics Command.
Lag time	Period from touchdown until maintenance begins.
Man-hours	Hours of direct labor.
Manpower Utilization Sequence	Relates personnel utilization (direct on-equipment labor) to sorties flown.
	Manpower utilization Searches each minute of the hour to find the number of men working each hour.
	Manpower available Produces a summary card showing the number of men available for each hour of each work center day.
	Touchdown counts Produces a card for each day showing the number of touchdowns for each hour of that day.
Mission essential items	Essential items for accomplishing the objective of the sortie.
MDC	Maintenance data collection portion of AFM 66-1.
MND	Maintenance nondeliveries.
Net fix time	Active fix time when work is being accomplished. Lags and delays are not included, refers only to unscheduled maintenance.
Net turnaround	Same as net fix time except it includes the scheduled maintenance as well.
NORM	Not operationally ready, maintenance.
NORS	Not operationally ready, supply.
NORS-G	Not operationally ready for supply, grounded.
N/P pocket	Card drop pocket on 1401.
NRTS	Not reparable this station.
Observed frequency	Count of successes, failures, aborts, etc.
Off-equipment file	MDC records of bench repair actions.
On-equipment bench repair	Repair done without item going through conventional materiel control channels.

OR rate	Operationally ready rate: OR rate = hours ready/hours possessed.
Oxnard format	The output format of the Edit program always includes clock hours. Oxnard refers to the project for which the format was designed.
Oxnard project	An exercise with F-101 aircraft at Oxnard Air Force Base.
Pearson product moment correlations	Statistical measure showing the amount of relationship between two measures.
PS code	Primary-secondary code. A column (in record format Ms) for use as a squadron (or other) designator.
Quantitative data	Manhours, elapsed time. Contrasts with frequency count data.
Rapid Roger	An exercise with F-4C aircraft in Thailand.
Recombine program	A special purpose program used in the Recovery Sequence. Eliminates duplications, adds a dummy sortie card to the end of each tail number subset and merges the sortie deck output by Single, First and Last with the nonsortie data output by Compute Elapsed Time.
Recovery Sequence	Preprocessed edit output data. This involves computing elapsed times, converting to Julian Calendar, and coding the sortie data for first, last and single sorties of the day. Requires Col. 80=0, =2, =3 records. Involves four programs: Compute Elapsed Time: Single, First, and Last; Recombine; and Clint.
Recovery Summary (RECSUM) program	An analysis program. Provides a complete, readily comprehensible summary of aircraft recovery and turnaround in a one-page general summary with back-up pages containing detail.
SAC Full Force	An exercise with B-52, B-47, KC-135 and KC-97 aircraft.
Sequential Frequency Distribution	Summarizes and displays events across 24-hour period.
7-cards	Produced by Clint program. Aircraft recovery records that include only the unscheduled maintenance action and the postflights. Aircraft turnaround records that include both scheduled and unscheduled maintenance data.
8-cards	Produced by Clint program. System records that include both scheduled and unscheduled maintenance actions.

9-cards	Produced by Clint program. Work center records that include the scheduled and unscheduled maintenance actions of all work centers.
Sick bird analysis	Determines whether individual tail numbers show atypical write-up rates based on the sorties flown, by obtaining the sortie and write-up counts for each aircraft card, using Chi-square testing for nonhomogeneity.
Single, First and Last (S/F/L) program	A special program used only in the Recovery Sequence. Makes a single sortie card from the pairs of sortie cards resulting when a flight crosses midnight. The program also determines and tags by tail number the sequence of sorties flown each day.
Skoshi Tiger	An exercise with F-4C, F-5A, and F-100 aircraft in Southeast Asia.
Soft data	Data not keypunched, as opposed to hard data. Generally verbal information.
Sortie length	Measured from takeoff to chock time (engine shut-down).
Sparrowhawk	An exercise with F-4C, F-5A, and A-4 aircraft at Eglin Air Force Base.
Splattergrams	Displays write-ups, sortie-by-sortie, to give a snapshot history of each aircraft. Program computes write-up rates for each aircraft and prints them at the end of each tail number.
Spread-field list	Provides a listing with each field isolated from the adjacent one by blanks. Much easier to read than an 80-80 listing.
Support general codes	Scheduled maintenance codes.
Supply 1050 system	The 1050 is the standard supply computer.
System repeat write-up analysis	A repeat write-up is identical to the write-up on the previous sortie.
Tack Down	An exercise with C-130 aircraft at Pope Air Force Base.
Throughput time	Time it takes to get a job out of the computer, measured from request to delivery.
Tough data	Data collected by many persons at many points, tough to get.
TMS	Type, model and series of aircraft.

Turnaround data	Output that includes all maintenance actions.
Units produced	A count of maintenance actions. Each job is assigned one unit of work.
Vector	A record that describes the status of a system at a given time.
When discovered code	Code showing when the malfunction is discovered: before flight, during flight, during inspection, etc.
Work Center Display	Also called work center queue sort. Shows 24-hour pictorial history of work center.
Work unit codes analysis	Summarizes on one page all the meaningful information on form 300 records for each work unit code.
Write-ups	A malfunction is "written-up," i.e., described. Along with break-rates, write-ups are the major independent variables in determining aircraft recovery and turnaround.
Z-score	Score expressed in sigma units.
ZI	Zone of Interior (USA)
Zone punch	11-punch (-) or 12-punch (+) on card used when punching Alpha or special characters.

I. INTRODUCTION

BACKGROUND

During the past several years considerable effort has been expended in determining the feasibility and desirability of using a small business computer at base level to assist in maintenance management. At first the approach was both piecemeal and empirical: isolate a maintenance problem; attempt a computerized analysis; if feasible and desirable, develop it. The first programs were written for the SAC Full-Force exercise (B-47 and KC-97 aircraft) in late 1962 and, shortly after that, for the Oxnard Project (F-101 aircraft).^{*} The major dimensions of the system were outlined during a laboratory project at RAND (LP IV) in 1963. During this time, because the augmented AFM 66-1 data system had been continued at Oxnard, a number of ideas were designed and developed in the laboratory and tested in the field.^{**}

Following this, the program package was used in a number of special studies and exercises. Among the better known are Tack Down at Pope AFB (C-130 aircraft); Cost Effectiveness at MacDill AFB (F-4C); Sparrowhawk at Eglin AFB (F-4C, F-5A, A-4); and Skoshi Tiger in Southeast Asia (F-4C, F-5A, F-100). Each exercise contributed additions and refinements. Additions that had usefulness beyond the immediate needs of each exercise were further developed and refined.

With the completion of Skoshi Tiger, it seemed evident that, with some minor additions, the package of programs was sufficiently complete to serve as the nucleus of a maintenance analysis system. But the package could not be used outside RAND, since no attempt had been made to document the system. And to complicate matters, the package was a mixture of programs--some that could only be run on an IBM 1401,

^{*} C. F. Bell, and T. C. Smith, The Oxnard Base Maintenance Management Improvement Program, The RAND Corporation, RM-3370-PR, November 1962.

^{**} A. Sweetland, The Use of Computers in Air Force Maintenance Management and Analysis, The RAND Corporation, RM-4228-PR, October 1964

others that could only be run on an IBM 7044. In the main, the "daily package" (the edits and displays) was programmed for the 1401 and used on-site for editing data. The data were then sent to RAND where most of the analysis was done using the 7044 programs.

By early 1966 it was apparent that (1) the package was complete enough to serve as the nucleus for a maintenance analysis system at base level, and (2) that the programs could be adapted to a small business computer, given these minimum characteristics:

- 16,000 core storage
- 4 tape units
- index registers
- multiply and divide feature
- high-low-equal-compare capability.

Exploration with Hqs TAC and USAF encouraged us to develop the package for the smaller computer (IBM 1401, programmed in Autocoder). Preliminary testing began at Nellis AFB shortly after that. The possibility that the system could be used in the Rapid Roger Exercise (F-4C aircraft) added definite impetus to the development. As a point of historical accuracy, it should be noted that for the Rapid Roger Exercise the plans were to collect and edit the data on-site in Thailand. The analysis was to be done at Eglin AFB by TAWC personnel whom RAND would train to use the 7044 package. Because our Skoshi Tiger Exercises had convinced us that on-going, on-site analysis was highly desirable, we brought along the 1401 adaptation of the analysis package. Although only a limited amount of on-site analysis was done, it was sufficient to demonstrate the value of such an approach.

The major part of the Rapid Roger analysis was done at Eglin AFB using the 1401 version of the system. This revealed some additional programming needs. During this time it was decided that the system would be used in the Combat Dragon Exercise (A-37A aircraft in Vietnam), with minimal assistance from RAND. Prior to Combat Dragon, RAND personnel had done most of the analysis. But for Combat Dragon, RAND would provide the system and its description, and train Combat Dragon personnel in its use. Accordingly, the data forms were updated, the edit programs rewritten, and several new programs provided along

with the system description and instructions on how to use the package. These latter were informal to say the least. Following Combat Dragon, the system was again reviewed. Some minor changes were made to simplify recording and to make the system more general purpose. This is the system described here. As the package stands, it can be adapted to fit the needs of most exercises in less than a week. We are not so confident that we believe this is the final version; however, the major parts of the system have remained essentially the same for several years. The changes have been in the details.

THE SYSTEM

A major characteristic of the RAND/TAC information and analysis system is that all data can be related to the specific sortie. Although operations, maintenance and supply analysis are usually done independently, this system collects and identifies data on all three by specific sortie. This enables the user to explore the interrelationships among the three, allowing him to perform many desirable analyses.* A typical instance is offered by the question: "What do I need to deal with the problem of combat damage?" Only when all three data types can be related to the specific sortie can we determine (1) the circumstances that are most apt to result in combat damage, and (2) the costs in airframe time, men, parts and equipment necessary to recover the aircraft.

A second, and perhaps more important, reason for identifying data by sortie is that it makes possible the use of many mathematical methods for dealing with stochastic phenomena. These are generally identified under the rubric of probability and statistics. They range in complexity from the simple determination of a test for differences between two means to the highly sophisticated multivariate techniques. These methods add a powerful tool to the type of analyses described here.

* A. Sweetland, Toward an Integrated Data System for Weapon Effectiveness Analysis (U), The RAND Corporation, RM-4855-PR, March 1967 (Confidential).

In creating the programs, we followed two closely related maxims. First, as far as possible, we developed general purpose rather than special purpose programs. Second, we used a modular concept. The following illustrates.

The most common sequence in our analyses consists of four operations (modules): select, tag, sort, process.

1. Select a subset of the data (e.g., 2-digit system recovery data for January and February).
2. Tag the data (i.e., separate the pre-modification from the post-modification records, and identify "tag" both groups).
3. Sort (majoring on 2-digit system code and minoring on tagged codes).
4. Process (compute an analysis of variance for each system to determine the impact of the modification on recovery time).

The philosophy advanced here is that it is better to have four general purpose modules than to have one special program to do all four. The implications are profound: in a real sense the system is designed to help answer tomorrow's questions rather than yesterday's. In other words, the system is designed for creative exploration, not for obtaining a set of standard outputs prompted by a set of predetermined requests.

To follow the subsequent exposition, some knowledge of data processing vocabulary is necessary: field, record, file, alpha, numeric, alpha-numeric, gang-punching, and sorting by majors and minors. Figure 1 illustrates these.

SEX	GRADE	WEIGHT	
BOY	7TH	120	8
BOY	7TH	123	8
BOY	8TH	127	8
BOY	8TH	121	8
BOY	8TH	129	8
GRL	7TH	110	8
GRL	7TH	111	8
GRL	8TH	114	8
GRL	8TH	117	8

Fig. 1 -- A 9-record data file

Each record (a punched card in this instance) contains four fields: the sex, grade and weight of each individual plus a gang-punched "8". The records are sorted first by grade, putting the 7's in front of the 8's. Then, they are sorted by sex (i.e., major on sex and minor on grades also expressed--sorted by grade within sex). The entries in the sex field are alpha (A); grade, alpha-numeric (AN); and weight, numeric (N).

II. THE DAILY PACKAGE

The procedures and methods described in this section are the necessary tools for obtaining a bank of valid data, valid being defined as a true description of the events that transpire. Production of the daily package begins shortly after midnight when the day's operations, maintenance, supply and scheduling are collected, key-punched and passed through the computer for the first time. Of the several elements that result, three have most immediate interest.

- a. The error listing. This shows an image of each card containing a computer-detected error plus a description and location of each error.
- b. The aircraft display (also called flight-line display or flight-line queue sort). This shows, pictorially, the maintenance history of each aircraft for the preceding day.
- c. The work-center display (also called the work-center queue sort). This shows the pictorial history of the work center.

These three are used together to begin production of the data bank. As will be shown, each has auxiliary functions. But at this stage, our major objective is to get usable data. The heart of the daily package is the computer edit. It is the sine qua non. Its development is always the first step in any new venture.

THE EDIT PROGRAM

The Edit program serves three purposes: (1) it searches for and identifies data errors; (2) it reformats data; and (3) it relieves the data recorder of all possible unnecessary burden. A description of how these three purposes are accomplished follows.

Searching for and Identifying Errors

The Edit program addresses intra-record errors. In trying to isolate errors, each record is treated separately. (For inter-card comparisons see the discussion of the aircraft and work-center displays.) About 200 tests of legality are made. These lists fall into

four general categories--missing data, illegal data, improper alpha or numeric entries, and field comparison errors. The errors are tagged with the appropriate mnemonics in Fig. 2: Blank = "B", Error = "E", Alpha-numeric = "A", and Compare = "C".

The tests are designed to detect errors that have caused the most trouble during the several years we have been analyzing maintenance data. Since these experiences have been mostly associated with special tests and exercises, the edit contains this bias. Some errors have been more serious than others; thus two levels of error control are provided.

1. Output that cannot be processed by the analysis package is rejected immediately. For instance, maintenance data collection (MDC) records must have credible start and stop times, crew sizes, tail numbers, and work centers.
2. Switch action controls output of records with less serious error. For instance, a missing how-malfunction code may or may not be important to the circumstances.

The first two rows of Fig. 2, the Error Edit Listing, locate the columns (1-80). The card image is shown in the third row bounded by periods. The fourth row gives the mnemonic of the type of error. The first reject shows field compare ("C") error. Column 22 contains a "2" indicating an unscheduled maintenance code ("B") in the work-order prefix. Accordingly, the work unit code (Cols. 32-36) should not begin with zero, and there should be entries for action taken, when discovered, and how malfunctioned in Cols. 37-41. The "6" above "reject" indicates that this record is the 6th card in the input deck. The second reject shows the start time (0800) greater than the stop time (0700). The errors on the remaining records can be diagnosed by cross-reference with the recording form identified by the card code in Col. 80. This sample consists of data coming from form 300 (the Maintenance Data Collection Record, see Appendix B). The summary at the bottom of Fig. 2 indicates that the sample of 25 records contains 35 fields of error.

The K-97 report is the deck of maintenance data forwarded to the logistics command. This deck is surprisingly clean. Although the edit program does not include the complete conventional K-97 edit, experience will show that it accounts for a substantial part of it.

4

•REJECT•

9

10

•REJECT•

12

13

•REJECT•

14

15

•REJECT•

Fig. 2 -- Error edit listing

We have developed and used both error edits (this and the conventional K-97 edit), but thus far we have felt no need for the obvious--one edit combining both. We use both. The use is determined by the particular needs of the moment.

The Reformatting Function

A major feature of the system is its ability to build a single record from diverse records. This implies the capability of sorting and/or merging the diverse set of records which, in turn, necessitates a common format of one or more fields. Unfortunately, a format that lends itself to this kind of processing is inevitably difficult to record and to keypunch. The solution has been to design the data forms to ease the user's job (recorder and keypuncher) and have the computer reformat. The point is not trivial: poorly designed record forms increase error rates by several hundred percent.

The output format of the Edit program is referred to as the Oxnard format, after the project for which it was first developed. (See record formats, Appendix F.) Oxnard formats always have the tail number in Cols. 35-38, the start time (day, month, hour and minute) in Cols. 9-16, and the primary-secondary code in Col. 79. The card code in Col. 80 is generally created by adding a zone punch to the card code on the keypunched form.

The Processing Function

The computer can relieve the data recorder from a sizeable number of annoying tasks: converting from hour and minute to hours and tenths, recording Julian dates, computing man-hours, and computing elapsed times must all be done manually if a PCAM (punched card accounting machinery) system is used. These tasks can all be given to the computer.

Recording of the AFM 66-1 MDC data is substantially reduced by the automatic production of tail-number related data. As conventionally used, each on-equipment AFTO 200 series form requires entering the aircraft type, model, serial number (TMS), prefix, tail number and

suffix. All these data, except the second digit of the prefix, can be determined from the tail number. The following sequence takes advantage of this: the tail number is entered once at the top of the 300 form, and during keypunch is automatically duplicated by program drum card control on each succeeding record. During editing the computer senses the tail number and supplies the associated TMS and related data from a table (see format M2, Appendix F). Using the rather modest estimate of a thousand cards per day per squadron, this single step eliminates the recording and keypunching of approximately 20,000 characters, since the data are computer produced. Being computer produced, these 20,000 characters are error free.

The table containing the TMS and related data also includes a column for use as a squadron (or other) designator. This is referred to as the primary-secondary aircraft code or, more frequently, the PS code. The code to be used is a local option. It has also been used to designate aircraft type, and to distinguish test group from control group. It may also be used to identify flights, etc. Since the PS code is used for sorting control, any alpha or numeric code may be used. Do not use special character punches since they are used for program control.

Besides the savings the automatic generation of the tail-number data provides, the edit also provides for automatic work order number generation. The saving here is reflected chiefly in support general records. This saving is accomplished by checking the circle (block 22, form 300) representing the desired work order prefix (e.g., A = service, B = unscheduled maintenance). The following work order numbers appear automatically, plus the action taken (A), when discovered (W), and how malfunctioned (Mal) codes as indicated.

Automatic						
Maintenance Type	Check	Work Order	Work Unit	A	W	Mal
		Number	Code			
Service	A	AA7481FP	01300	0	0	000
Preflight	D	AD7481FP	03100	0	0	000
Postflight	C	AC7481FP	03200	0	0	000
Hourly	E	AE7481FP	03300	0	0	000
Periodic	P	AP7481FP	03400	0	0	000
Special inspection	S	AS7481FP	*	0	0	000
Unscheduled	B	AB7481FP	*	*	*	*

* Must be entered on 300 form.

For the various exercises we discouraged the automatic generation of the service actions. The recorder checks circle A and enters the appropriate work unit code. The computer automatically zeros out the action taken, when discovered and how mal codes. This same technique is used for phased inspections when we wish to keep track of individual phases.

The Edit program accepts only card input. Because installations differ markedly in their needs, a variety of output control is available. If desired, four sets of outputs are available on cards or tapes (see page 14 for details on switch settings):

1. Good data--records that have passed the edit test. Output is in Oxnard format (card or tape output).
2. Bad data--failed the edit test. The output is in the original format (i.e., formatted as keypunched) (card format).
3. Good data in AFLC (171-14) format (K-97 deck) (card format).
4. Error edit listing. See Fig. 2.

Each erroneous card produces four printed lines: a column locator showing the card column counts (1-80); a card image showing the contents of the 80 card columns--this record is bounded by periods ("."); and an error identifier--a mnemonic code under each column in error. An earlier version of the Edit program also produced a series of verbal definitions, e.g., "illegal tail number." The labor to update the verbals was more than their worth, although it did have some value as a training aid.

The Edit program accepts the keypunch formats given below. Note that some input cards generate more than one output. Note also that several operations and supply forms are used. Special edit programs are used for the latter.

The maintenance edit program will accept any data, but illegal punches (laced cards) cause it to halt. After the Col. 80 is tested. If the Col. 80 entry is illegal, the record and message "ERROR COL 80" is printed. If the card code is legal, the program branches to the section containing the tests appropriate for the format defined by Col. 80.

Input Data Form	Output Noun	Output Col. 80
300	Maintenance data	0
300	Delays	1
302	Sorties flown	2
302	Sorties scheduled and not flown	S
302	Sortie comments	B
303	Aircraft status	3
305	Available manpower*	E
306	AGE utilization*	F
307	Mission-GO	G
308	Deviation-Degradation	H
309	Comment	9
30D	Debrief	M

* Not displayed in queue sorts.

Before processing with the Edit program, cards should be sorted by card code (Col. 80) to facilitate editing. The editors may have requests for additional ordering (e.g., time within tail number, report number). Each installation will have different needs.

The Edit program requires a number of tables to accomplish some of the edits (see Fig. 3). The work center and AGE tables include the nouns, in English, corresponding to the codes. The tail-number tables include the auxiliary TMS, serial number data, and so on. Each table may not contain duplicate records, and must be sorted in ascending order: (1) work center table, Cols. 3-7N; (2) tail number table, Cols. 12-15N; and (3) AGE table, Cols. 1-2N. Because of the edit program's size, the following constraints are necessary: work center tables are limited to 140 records, tail-number tables to 90 records, and AGE tables to 50 records.

Since an overlay of the program is necessary, the three sets of tables followed by a table loading "stopper" card (format C4) are inserted between cards 16 and 17 of the object program deck, which is serialized in Cols. 73-75. The object deck is followed by a control card (format C6) containing the constants necessary for producing the K-97 deck.

Considerable variation in processing is possible by setting the switches on the computer.

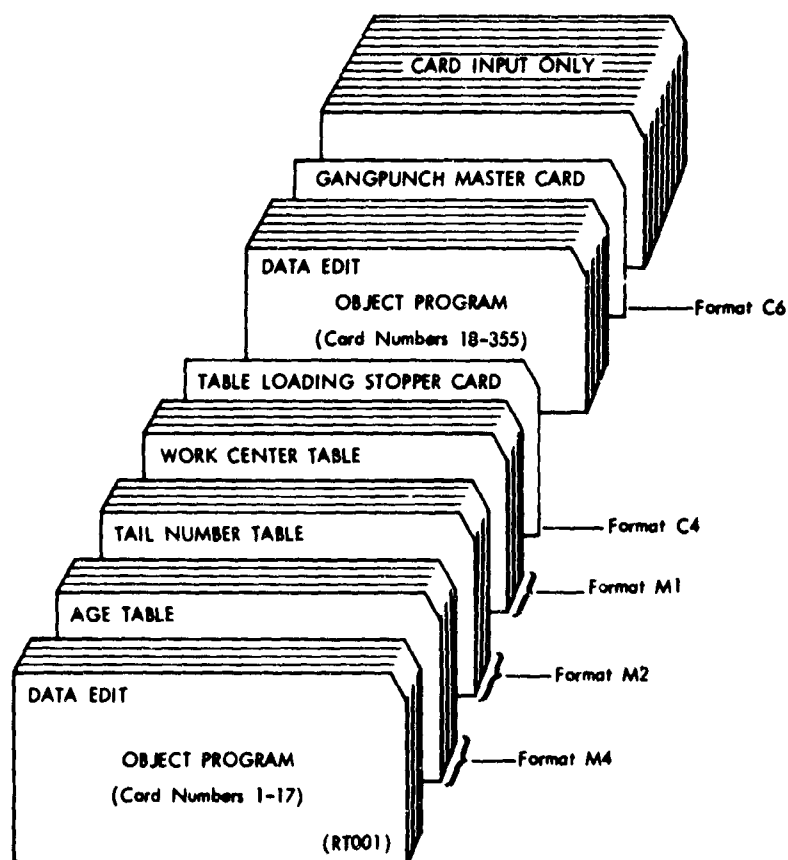


Fig. 3 -- Edit program setup

Switches I/O and A are always set "on".

Switch B--"off" writes nonrejected (good) data on tape unit 1 in the Oxnard format.

"on" suppresses the writing of this tape.

Switch C--controls the level of edit.

"off" rejects only the critical errors.

"on" rejects all detected errors.

Switch D--normally set "off".

"on" suppresses the error edit listing (Fig. 2).

The "on" setting also eliminates the need for a tape on unit 2.

Switch E--"on" suppresses the punching of a duplicate deck of cards rejected by the program.

"off" produces this deck (in the N/P pocket of the 1401).

Switch F--"on" eliminates the punching of the K-97 deck.

"off" allows the K-97 deck to be punched (in the 8/2 pocket).

Switch G--"off" produces a deck of data in Oxnard format
(in the 4 pocket).
"on" suppresses this punching.

The ample amount of control that the switch selections provide is deliberate because each base differs in its physical setup. Hence the sequence of data collection, keypunch and editing procedures that works best at one location is not necessarily the best for the next. The switch controls enable the user to flex with the immediate needs. Note that the procedures used during learning and shakedown are often not the most efficient for steady-state operation. As a general statement, procedures are determined by the nature of the exercise, the physical location of data collectors and editors, keypunch and computer, and the experience in using the system. Hence there is no "best" set of procedures. Establish an initial set of procedures and plan to change it several times as learning accrues.

THE DAILY DISPLAYS (QUEUE SORTS)

A major system objective is to get information into the head of the human as quickly and as painlessly as possible. This objective implies that it is insufficient merely to summarize data. They must be presented so the mind immediately comprehends what is happening. We wish to minimize that "WHAT is happening" effort so the mind can concentrate on "WHY it's happening as it does." The most effective methods for getting "instant comprehension" are the extensive use of pictorial and verbal output. Indeed, a substantial part of our programming efforts are concerned with obtaining the best possible pictorial (spatial) and verbal presentation.

The gains that are obtained when the emphasis is on pictorial-verbal presentation are well illustrated by comparing Figs. 4 and 5. Figure 5 contains the data of Fig. 4 plus verbal information. Although Fig. 5 contains more information, the comprehension of content and the interrelationships among the data are much greater for Fig. 5.

Without elaborating on the psychology of learning, retention and recall, we will just say that when an observer can perceive the underlying organization in a mass of data, he can absorb and retain much

DATE 09-01		AIRCRAFT SERIAL NUMBER 0773							
START TIME	STOP TIME	CREW SIZE	WUC	WC	ET	TMH	AWT	H/M	RPTNO
0001	2400	P	75140		24.0		N		
0001	0042	U			.7				
0002	0006	1	0413C	12043	.1	.1	00S	000	2231A
0016	0030	2	0411D	13231	.2	.5	00S	000	2231B
0031	0100	3	74190	14320	.5	1.5	GFB	730	2231C
0101	0110	2	01140	12043	.1	.3	00A	000	2231D
0111	0155	2	03200	12043	.7	1.5	00C	000	2231E
0111	0130	2	01310	12043	.3	.7	00A	000	2231F
0301	0400	4	0137X	12061	1.0	4.0	00A	000	2231G
0536	0645	2	03100	12043	1.1	2.3	00D	000	2231H
0701	0715	2	01310	12043	.2	.5	00A	000	2231J
0731	0800	2	01120	12043	.5	1.0	00A	000	2231K
0800	0900				1.0		NEVA	147	C09/30
0901	0915	4	01480	12043	.2	1.0	00A	000	2231A
0901	0915	2	01120	12043	.2	.5	00A	000	2231L
0921	0930	2	01310	12043	.1	.3	00A	000	2231M
0931	1000	2	74100	14320	.5	1.0	YDB	383	2231B
0931	0950	1	0413C	12043	.3	.3	00S	000	2231N
0931	0945	1	01140	12043	.2	.2	00A	000	2231P
0942	1300	U			3.3				32231
0951	1100	2	03200	12043	1.1	2.3	00C	000	2231Q
1001	1200	2	74130	14320	2.0	4.0	RFB	029	2231C
1101	1125	1	01330	12043	.4	.4	00A	000	2231A
1116	1200	3	74130	14320	.7	2.2	CZB	029	2231C
1201	1230	2	13250	13370	.5	1.0	9ZB	020	2231C
1201	1245	2	74100	14320	.7	1.5	XFB	799	2231D
1246	1300	2	1114A	14320	.2	.5	QFB	800	2231E
1301	1310	2	74370	14320	.1	.3	HDB	799	2231F
1416	1450	4	0137X	12061	.6	2.3	00A	000	2231G
1601	1620	1	01310	12043	.3	.3	00A	000	2231H
1711	1800	2	01120	12043	.5	1.0	00A	000	2231J
1800	1920				1.3		HATC	218	A20/00
1931	2100	1	03200	12043	1.5	1.5	00C	000	2231K
1931	1950	1	0413C	12043	.3	.3	00S	000	2231L
1941	2000	4	0137X	12061	.3	1.3	00A	000	2231P
1942	2400	U			4.3				
1951	2045	2	74100	14320	.9	1.8	YDB	255	2231A
1951	1959	1	01140	12043	.1	.1	00A	000	2231M
2001	2015	1	01300	12043	.2	.2	00A	000	2231N
2001	2030	1	76400	14340	.5	.5	GDB	092	2231Q
2046	2115	2	74120	14320	.5	1.0	PFB	008	2231B
2101	2150	2	74120	14320	.8	1.7	AZB	008	2231B
2115	2145		74120	14320	.5		B	FR	2231C

Fig. 4 -- Typical machine utilization

(Data extracted from Fig. 5)

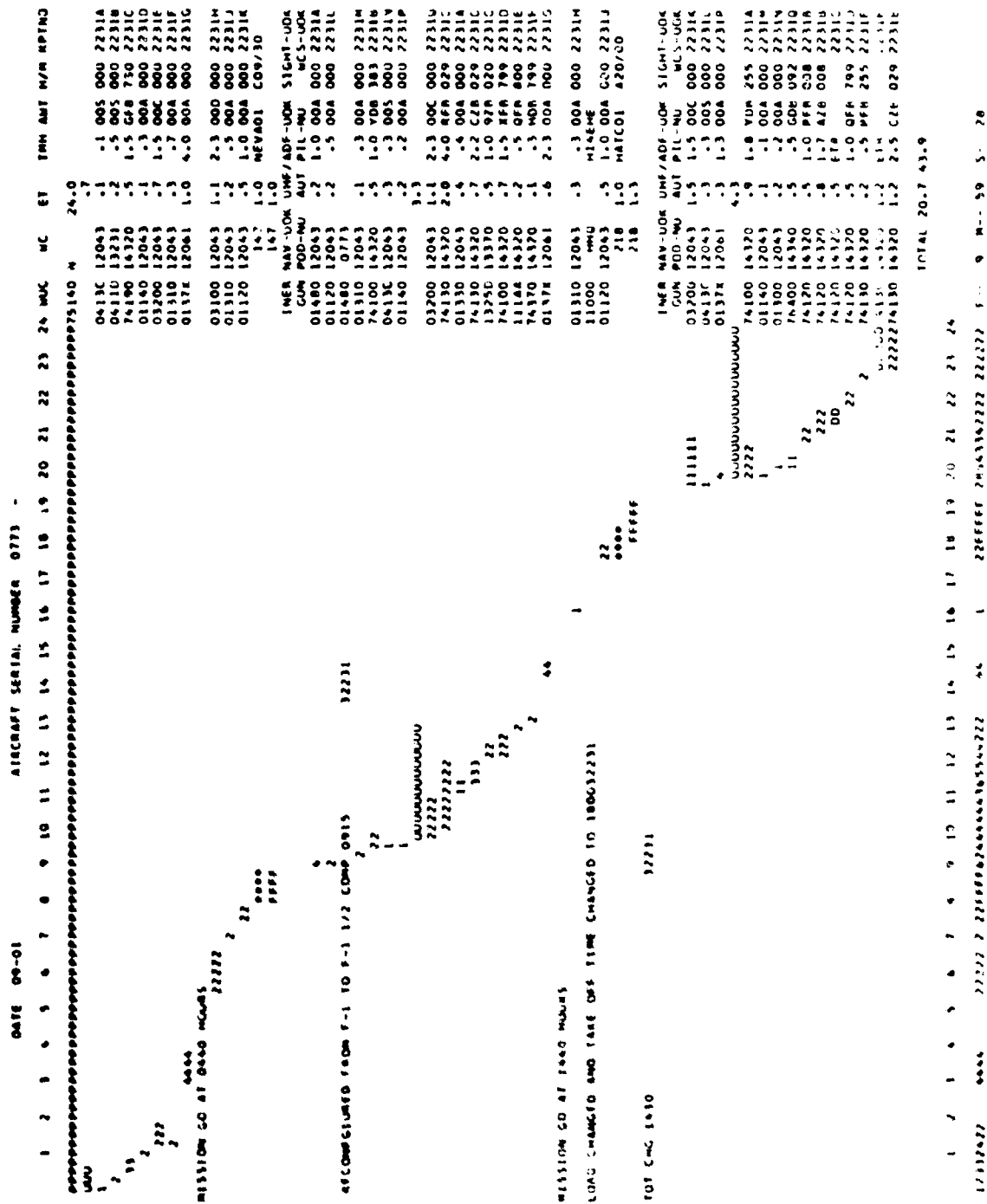


Fig. 5 - - Flight-line display (queue sort)

with their headquarters sanctioned takeover charge; the mission call signs were Nova and Halc.)

more. Thus the pictorial-verbal presentation of aircraft data increases the absorption-retention factor by several hundred percent. (A common request after exposure to the displays is to include more detail.)

The displays serve three purposes:

1. System monitoring. They provide a means for comprehending the interweaving of a complex set of relationships among operations, maintenance, supply and scheduling.
2. Error editing. They complement the error edit, which is concerned with intra-card errors. They also permit the review of inter-card relationships and quickly expose data omissions and inconsistencies. (See section on error editing sequence.)
3. Analysis initiation. They provide a starting point for analyses, which generally begin with hand computations based on display data. Reviewing the displays almost always evokes the response, "Oops, that factor didn't occur to me." Let this response occur a few times and initiating analysis by reviewing the displays becomes a way of life.

To understand the displays, the following general observations are desirable. To make meaningful displays, it is necessary to "round" the numbers a certain amount. As a result, the displays do not always accurately represent the data since the display unit is a 15-minute period (96 units comprise 24 hours) and time deviations must be greater than 7-1/2 minutes (i.e., greater than 15/2 minutes) to show on the displays. At the request of maintenance personnel, we have made one exception. If a maintenance team does a fix, regardless of how short, the fix is shown. The basis of the request is the desire to see all resource demands. Therefore, if a team does three 5-minute fixes in a 15-minute period, three teams appear to be working. This apparent error is not included in any of the data, since computations are not based on the pictorial representations. The apparent error can be quickly detected by referring to the man-hour and elapsed time computations given on the right-hand side of the displays.

The following describes the various entries on the queue sorts:

1. Clock-hours are shown 1-24 across the page. Entries under this are in 15-minute units--one character equals 15 minutes.

2. Team size is shown as a numeric entry, i.e., 2222 indicates a two-man team has worked four 15-minute periods.
3. Sorties scheduled are shown by asterisks. Missing asterisks indicate an unscheduled sortie.
4. Sorties flown are shown by a series of F's, i.e., FFFFFFFF shows an hour-and-a-half flight.
5. Delays are indicated by one or more D's.
6. Aircraft status is indicated by the following codes:

Alpha Code	AFM 65-110	Status
U	A	Unscheduled maintenance
N	N	NORS grounding
P	P	NORS nongrounding
B	B	Phased inspection
C	C	Periodic inspection
E	E	Battle damaged
M	M	NORS-G battle damaged
G	G	Crash damaged
F	F	Time compliance TO
D	D	Hourly
R	R	NORS delay

The NORS grounding or nongrounding and unscheduled maintenance is detailed, along with the work unit code to the right of the display, as a G or an N.

7. Verbals are self-explanatory.
8. Pictorial summaries at the bottom of each page show the sorties flown and manpower utilized data. The F (flyers), M (men-working), S (white-space) summary to the right of this is a count of the 15-minute entries on the pictorial summaries. If more than nine men are used, a two-line summary appears.

The pictorial representations under the 24-hour display are detailed in several fields to the right. The major part of this information is conventional AFM 66-1 data. The following codes appear:

WUC (work unit code) AFM 66-1.

WC (work center), the work center that does the work.

ET (elapsed time), computed by subtracting start time from stop time.

A (action taken) AFM 66-1.

W (when discovered) AFM 66-1.

T (type of maintenance), the second character of the work order prefix, AFM 66-1.

H/M (how malfunctioned) AFM 66-1.

TMH (total man-hours)--the elapsed time is multiplied by the team size.

RPTNO (report number)--only the last 5 characters appear. More properly it is the original report number. It is used to locate data during the editing process.

The following additional information will appear in the right-hand detail:

Sortie data codes for type of sortie flown, type of deviation (MND, AIR, CNX, etc.), mission number, and flight crew codes, if used.

Delay data codes for type of delay (MEN, AGE, etc.)

Debrief data codes showing usage and problem (UOK for used and okay, NU for not used, MAL for malfunction).

The definition of start and stop time may be varied depending on the analysis objectives. Where the concern is on local resource utilization, for example, travel time (i.e., between flight-line and work center) should be included. In other instances (i.e., hardware oriented analyses) only the active repair time should be recorded. Our most frequently used definition of start and stop time has included set-up and clean-up time, but not travel time. It is important to note that the start and stop time cannot be a casual determination since it has a substantive effect on resource utilization data.

As indicated, the daily displays provide a ready comparison for detecting inter-card inconsistencies. Without exception, the first detection is that of maintenance being done while the aircraft is in flight. Since this horrifies some people, a few comments to help maintain perspective are in order. First, some in-flight maintenance is legal. The obvious case occurs when maintenance personnel do airborne checks and tests. If the sortie is a functional check flight and the work unit code indicates a special test or inspection, the in-flight action is almost always legitimate. Second, when start-stop time definitions include get-ready and clean-up time, "in-flight" maintenance may occur. This is generally shown in the first and last 15 minutes of flight. In some instances it may be longer. Including travel time increases this apparent error.

Another point worth mentioning is that over-concern with in-flight maintenance errors may divert attention from more serious errors: missing sortie records, unpaired removals and replacements, and long fixes (e.g., the 0900-1100 fix gets keypunched as 0900-2100). In terms of aircraft turnaround and resource allocation analysis, these latter errors are much more serious.

The programs will display all the data containing clock hours (Oxnard formats). For most purposes this is generally desirable. There are times, however, when so much data obscure a particular interest. We wish to suggest some ways to simplify the displays. First, all data need not be included. For example, displays using only the sortie and unscheduled maintenance data yield a greatly simplified picture of aircraft recovery sufficient for many purposes. Similarly, a person interested in supply problems might use only the sortie, NORS, cannibalization and reparable generation data. Or, someone interested in special studies on uploading might look only at those actions (loading, configuring, arming, inspections, etc.) germane to the problem.

The second technique for simplifying the displays requires a little more ingenuity in that it involves comprehending what can be done by gang-punching. For example, we might want to display the daily flight pattern. To do this, we would tag all the sortie data of a given day with a single tail number. The resulting display would show the sorties scheduled and flown for that day. Adding the deviation data (Col. 80 = B, H, similarly punched) would yield a complete summary of sortie success for that day.

Gang-punching a common day in the start and stop time fields, and using a month's data for each work center, gives a good picture of work center demands around the clock. The same can be done to display AGE utilization. By similar treatment of the deviation data, one might determine what effect time of day has on deviations (i.e., when are most aborts and maintenance deviations occurring).

The complete set of Oxnard formats is generally processed only by the tail number display, Fig. 5. Data must be sorted as shown.

Major	Col. 79	AN	PS code
	Cols. 35-38	N	Tail number
	Cols. 11-12	N	Month
	Cols. 9-10	N	Day
	Cols. 13-16	N	Hour-minute
	Col. 80	AN	Card code
Minor	Cols. 73-78	AN	Report number

Generally, only the maintenance (Col. 80=0) and delay (Col. 80=1) data are included in the work center display, Fig. 6. The "0000" tail number (under TN) indicates actions against the fleet--the same servicing was done on several aircraft. To avoid excessive recording, only one 300 form line entry is made, instead of one for each aircraft. The work center data must be sorted as shown.

Major	Cols. 62-66	AN	Work center
	Cols. 11-12	N	Month
	Cols. 9-10	N	Day
	Cols. 13-16	N	Hour-minute
	Col. 80	AN	Card code
Minor	Cols. 73-78	AN	Report number

Note that when a consolidated maintenance concept is not used (when there are separate maintenance squadrons for each aircraft squadron), it is not necessary to pre-sort on Col. 79. The first digit (Col. 62) of the work-center field identifies the nonconsolidated units.

The same program (queue sort) is used to print both the aircraft and work-center displays. If tape input is used, it is always mounted on unit 4. An optional control card (format C7), punched as shown below, allows for selection and printing of data for a specific day.

Col. 1	11-4-8
Cols. 2-3	N Day (precede with zero)
Cols. 4-5	N Month (precede with zero)

The control card is followed by the table of tail numbers (format M2), the table of work centers (format M1), and a table loading stopper card (C4) shown in Fig. 7.

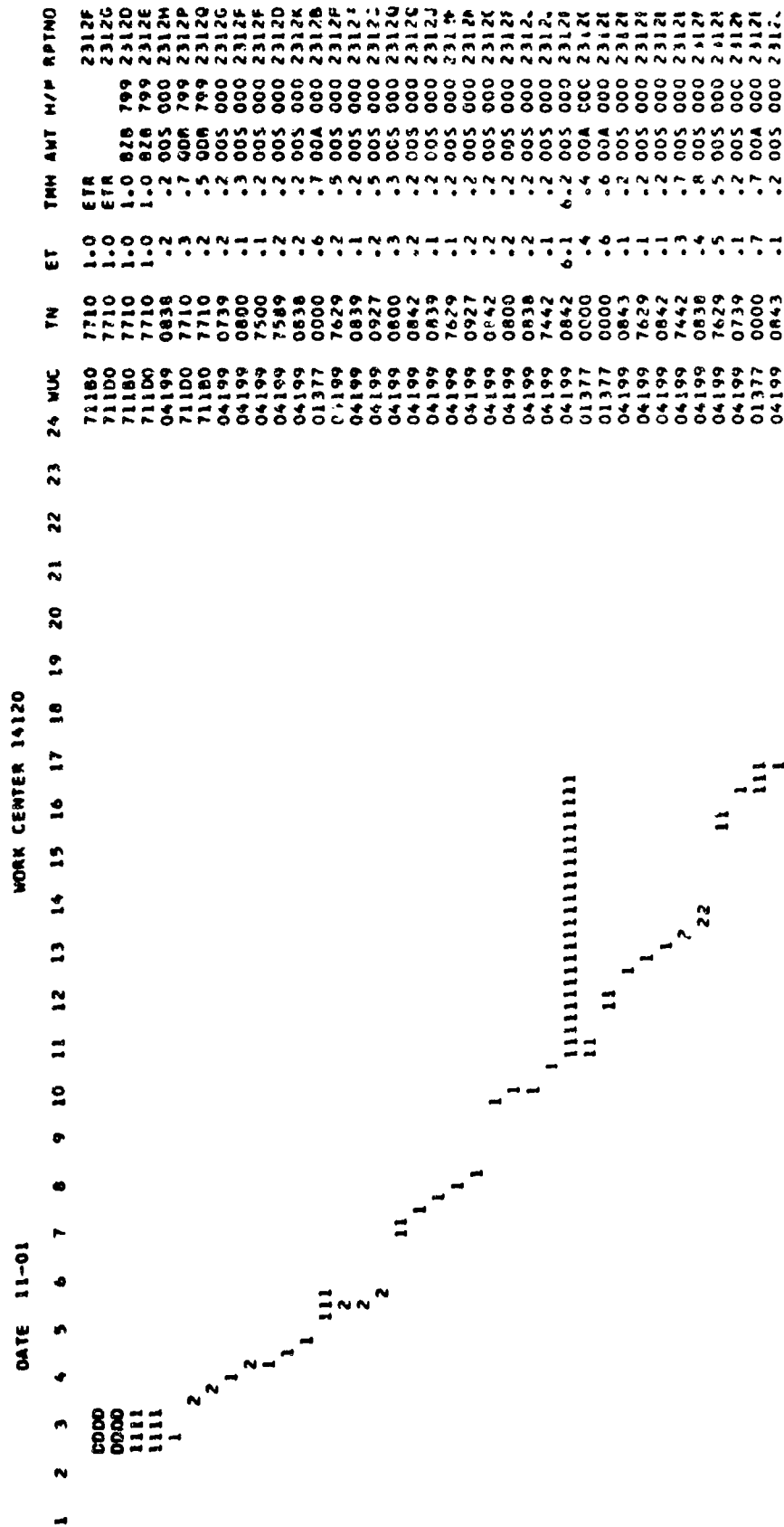


Fig. 6 -- Work center queue sort

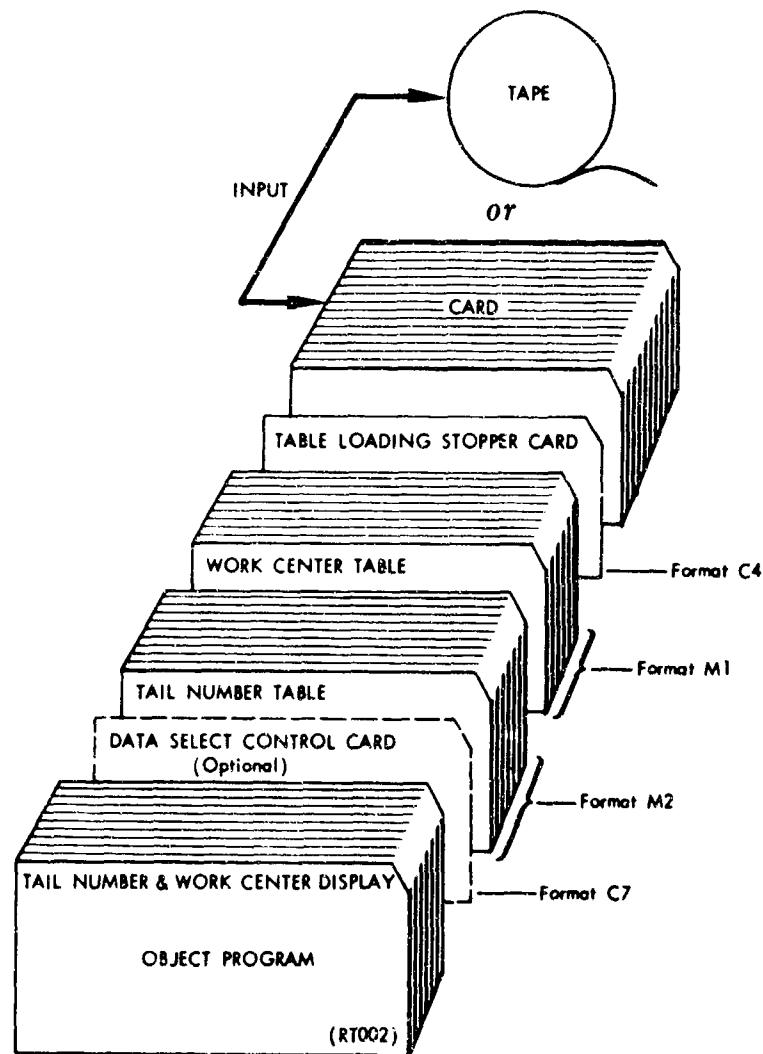


Fig. 7 -- Tail number and work center display program setup

The following switch actions control the processing.

Switches I/O and A are always "on".

Switch B--"on" for card input (switch C must be "off").

Switch C--"on" for tape input (mount on unit 4, switch B must be "off").

Switch D--"on" eliminates a list of "no action" (no data recorded) tail numbers from end of printout.

Switch E--"on" for work-center display.
"off" for tail-number display.

Switch F--"on" suppresses a summary of activity at end of each tail number. Only the squadron summary appears.

Switch G--"off" suppresses printing of all data not containing the day and month punched in the control card (format C7).
"on" prints all data.

As a suggested procedure, set switches F "on" and G "off" when processing one day's sample; when processing samples accumulated over several days (such as a weekly or monthly recap), set switches F "off" and G "on".

THE DATA EDITING SEQUENCE

The editing sequence produces a data file containing a valid representation of system actions. Invalid representation comes from three kinds of error. The first is the obvious recording-transcription error resulting from improper recording or keypunching. The second is the subtle error that generally cannot be isolated until the data are displayed pictorially, thus making it possible to see how the records are interrelated. These latter errors involve instances where maintenance is seemingly done while the aircraft is in-flight, or the aircraft is shown flying while in a NORS grounding condition. Duplicate records are also revealed. The third type of error, missing data, is the most difficult to detect and correct; the data are not recorded or the record is lost. Typical examples are a critical part that is apparently removed and never replaced, or the combat sortie that shows no upload action.

The recording-transcription errors are the easiest to deal with. The manuscripts are keypunched and the deck is processed using the edit program. The image of each card containing an error is printed along with the column locator and a mnemonic code indicating the type of error--see Fig. 2. This card image is then compared with the manuscript, and keypunch errors are corrected. This step is made easier by separating manuscripts into record types and maintaining the sequence integrity of both manuscripts and keypunched decks.

For critical data, such as the sortie cards, there is no substitute for listing the cards and comparing this listing with the

manuscripts. This is done to detect errors beyond the capability of the computer edit (e.g., a legal but erroneous tail number is shown on the 10:00 o'clock mission).

At this point the editing process has provided a listing of detected errors (keypunch errors have now been eliminated) and a tape containing the data that have passed the edit. This tape is then sorted "by time within tail number."

Major	Cols. 35-38	N	Tail number
↓	Cols. 11-12	N	Month
↓	Cols. 9-10	N	Day
Minor	Cols. 13-16	N	Hour-minute

Next, the sorted tape is processed using the tail-number display program. This display is then reviewed to isolate inter-card inconsistency. The emphasis of this search is determined by the objectives of the exercise. Those things most directly related to exercise objectives are scrutinized more closely.

Missing data have their major impact on break-rates, demand rates, and abort rates. This is seen in the computations: break-rates equal write-ups per sorties flown. If the numerator data are missing, the rates are spuriously low; if the denominator data are missing, the rates are spuriously high.

A quick inspection of the displays reveals much omitted data: postflight inspections are not preceded by sortie cards (and vice versa); removals are not followed by replacement; and abort cards show no subsequent maintenance. In each such instance, the first step is to determine whether they are among the list of cards rejected by the computer edit.

The second step is to check the long jobs--those fixes lasting 10, 15, 20 or more hours. One of the unpleasant facts of life is that there are a sizeable number of jobs that take a long time. Another unpleasant fact is that handwriting can be atrocious; the job that took from 11:00 to 12:00 o'clock ends up on the keypunched card as taking from 11:00 to 22:00 o'clock. There is no absolute way of determining data validity other than by checking with the work center. A check on the validity of these long jobs is mandatory because of the

tremendous effect they have on the means and, especially, the variances. A good rule of thumb is to verify all jobs that last longer than plus four sigma (four standard deviations above the mean). As described in the other volumes, several programs provide this information.

The problems of missing and erroneous data are best resolved by prevention. In the case of MDC data, there is no substitute for periodically visiting the flight-line and checking the 781A entries against the 300 form entries. The objectives of the visit are three-fold (in order of ascending importance): (1) to detect and correct errors; (2) to train flight-line personnel to correct documentation; and (3) to make friends. When addressing the problem of other kinds of data error (for example, sortie data, sortie deviation data, aircraft status data), the visit is generally limited to objectives 2 and 3 since no ready cross-check (like the 781A) exists.

With the previous steps accomplished, the data collector can begin visiting the various shops and the flight-line. He brings along the computer error-edit output with all keypunch errors corrected (never show anybody keypunch errors); if he is visiting the crew chiefs or job control he brings along the aircraft display, with errors marked in red. If visiting the shops, he brings along the work center display similarly marked (see Fig. 8). He also brings the associated recording sheets. As has been stated, particularly during his first visits, his objectives are to educate and make friends. Getting accurate data is a secondary objective during shakedown.

Following all flight-line and shop visitations, the resulting corrections are keypunched and the new records are processed by the computer edit program. Note that in certain instances (such as the case of the 11:00 to 22:00 record corrected to 11:00 to 12:00) it is necessary to manually remove the faulty 11:00 to 22:00 card from the input deck and replace it with the corrected card. This manual replacement is necessary for all corrections that have previously passed the edit. The correction computer-editing sequence is iterated until all cards pass. Then this final computer edit output is merged with the permanent data bank.

At this point it is desirable to assure our data collector that the processing is not the enormity he has assumed. Once the system

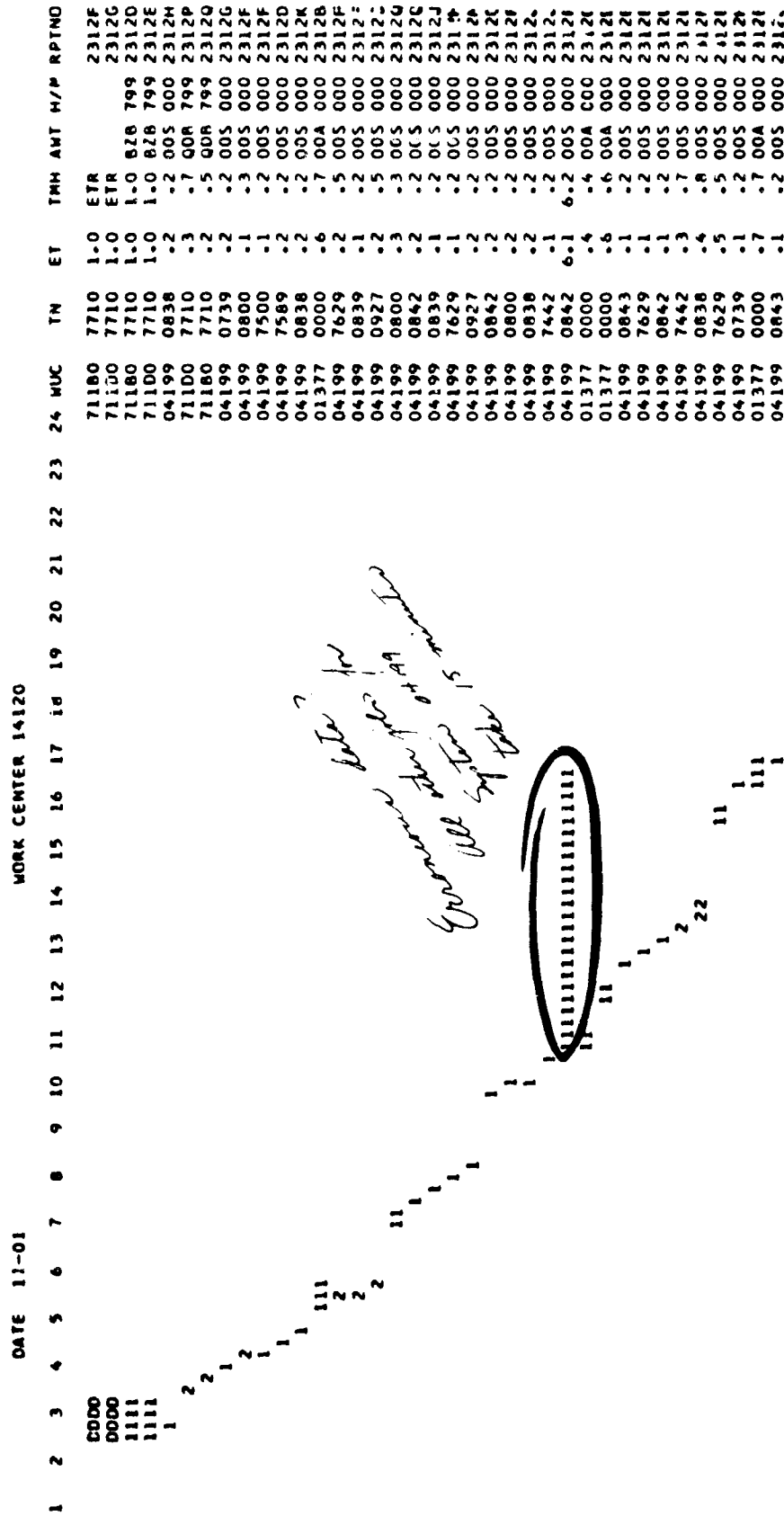


Fig. 8 -- Work center display (queue sort)

has been operating for a few weeks, the error rate will have dropped to manageable levels and the major part of the educational program will have been accomplished. The data collector has two strong factors working for him: he has made a lot of friends by materially reducing the amount of recording required, and he has a set of data displays that maintenance personnel can comprehend. That these factors are effective is illustrated by the following examples.

In the Rapid Roger Exercise, the daily record volume was approximately 1500 cards. The average number of computer rejected cards was fewer than 40 after some experience with the system. A scan of the 80-80 listing of the sortie cards (the most critical records) generally showed fewer than three that needed correction. As a general statement, 30 of the 40 cards contained such obvious errors that they could be corrected on the spot, rather than returned to the work centers for correction. At Oxnard, where the system was first started, we used the awkward over-printed AFTO 200 series forms. Despite the clumsiness of the system, the MDC error rate averaged fewer than five cards for the daily output of 600 to 800 cards. Note well that both systems involved daily editing and correcting of errors. In both instances the error rates were those occurring after shakedown. Initially, a quarter to a third of the records contained errors.

III. RECORD FORMS

The recording forms and their associated computer processing procedures included in the appendixes are not offered as a final or recommended solution to data collection problems. This is true especially for the 300 form and the associated computer edit, which has attracted considerable attention because it substantially reduces the amount of recording necessary. The 300 form was adapted from the 305 form designed by USAF (the Base Maintenance Systems Design group at Bolling Air Force Base). In turn, the 305 has been adapted from the 301 and 319 forms developed by the Project ARISE group (a RAND-Air Defense Command exercise conducted at Richards-Gabour Air Force Base). All adaptations had the commendable objective of reducing the amount of data recording. All adaptations had essentially identical content--that of the AFTO 200 series augmented by the addition of clock hours. The differences existed only in the organization.*

Although the forms, per se, are not offered as a solution to the difficult problem of maintenance recording, we feel the philosophy behind them must play a part in the final determination. The single objective of the philosophy is to produce a deck of cards that accurately represents the events that transpire. The thesis is that error prevention is the best solution to error problems. The following tenets are germane.

1. Reduce errors by reducing recording. The amount of recording is determined by counting the characters needed to complete a record. As a general statement, error rates increase faster than character counts. That is, the relationship is non-linear; hence 8-character records will produce more than twice the errors of 4-character records. Reduced recording is a profitable area to explore for its own sake as well as for error reduction. As an extreme example of what can be done, the typical AFTO 200 series document requires approximately 150 characters; the 300 form requires approximately 20 to record the same action.

*The new AF form 349 contains the same information as these other forms (i.e., augmented 66-1). In future exercises we would use form 349 in preference to form 300, thus saving the cost of training. The only changes required would be to establish keypunch instructions for the form and to make a minor modification of the Edit program to sense the proper fields.

2. Have self-contained recording forms. The ideal form can be filled out and keypunched without special instructions. Instructions and codes should be given on the form whenever possible.
3. Have multi-record and single-rowed forms. Multi-record implies that several (10-30) records are entered on the same recording form. Multi-record forms are made possible by using a special box at the top of the form for recording constant information. Such information is recorded only once. It is produced on all subsequent records by program drum card control or by pressing the duplicate button on the keypunch. Single-rowed implies that the record is not continued on the next line. Single-rowed records are preferable for two reasons: they are easy to scan for missing and erroneous data, and they foster a good bit of incidental learning-- "this column (field) never contains alpha entries. This column never has entries smaller than 0001 or greater than 2400."
4. Have forms that facilitate the abstraction of field (data) from ground (form). Printing forms with light colored ink is, by far, the best single technique for facilitating this abstraction, particularly when combined with the use of soft-lead recording pencils. It is also helpful to separate fields by single vertical lines, rather than give each a separate box. A separate box for each character is undesirable. Use pips, or better, nothing at all. Fields should never consist of more than five characters because of the complications of memory span factors.
5. Use numeric codes. If you must use alpha codes, only use mnemonic codes; give keypunch a copy. In either case, Alpha-numeric codes should be avoided at all cost since they produce error rates several hundred percent greater than numeric codes.*

Use codes sparingly. Most coding systems are victims of a vicious cycle having its genesis in the fact that codes are, at best, a bed of Procrustes. At the beginning, it is discovered that the list of codes does not cover all situations so the list is extended. Unforeseen situations arise so the list is extended to accommodate these. Since no two situations are really alike, the previous sequence is iterated until the list of codes becomes too cumbersome to use. The inevitable result is a long list of codes, a few of which are used rarely, if ever. Two solutions are possible: cull non-used codes from the list and be satisfied with less discrimination, or use the information record that enables verbal description.

* A. Sweetland, and S. Osowitz, Factors Affecting Coding Errors, The RAND Corporation, RM-4346-PR, April 1965.

6. Use special recorders. These are people specifically assigned to record the data. Recording is their major responsibility. Generally, this luxury is not available. The alternative is to have as few recorders as possible, i.e., rather than have 350 maintenance people recording the mission number on the flight-line, figure out a way to have one specialist make the record during debriefing.

Most exercises entail recording two separate kinds of data. The first of these (often called "hard" data) are elements that lend themselves to punched card storage and hence to computer manipulation. In addition, a large amount of "soft" data are generally gathered. These are usually not keypunched for two reasons: (1) reducing from a verbal to a coded basis loses too much information, or (2) the event happens with such infrequency or is so tangentially related that it is not worth the cost of setting up a punched card system. Combat battle damage is an example that meets both these criteria.

In some instances, it is both desirable and possible to translate soft data into hard data. An example is offered by part of the Combat Dragon flight crew debrief data. Rather than set up a coding system (in Combat Dragon) for factors influencing mission effectiveness, the comments were recorded to insure complete information, since coding always involves a loss of information. At a later date these comments could be scanned to see if clusters appeared. If so, the data could be coded for statistical manipulation.

The data collection contingent has an entirely different division of data types. There are the "easy" data which a single person gathers at a single point (such as debriefing data) and the "tough" data which many people gather at many points (such as the AFTO 200 series data). It is the tough data that should demand the most effort in manuscript design, editing procedures, and training. It is impossible to give sufficient attention to all the details. And any changes, especially additions, should be attended with a great deal of soul-searching.

For example, in the middle of Rapid Roger, the decision was made to add the "laundry mark" of the job supervisor to the line entries

on the Form 300. This would allow (1) research on the effect of skill level and (2) identification of the source of recording error. The addition of the laundry mark may seem trivial. But note that the average entry on the Form 300 is twenty characters for unscheduled maintenance. (Support General entries are considerably less.) A 5-character laundry mark increases the amount of recording, keypunching and items to edit by 25 percent.

For this addition we needed to ask, "Are the gains worth the 25-percent increase"? In most instances the answer would have been a resounding and emphatic, "No," principally because there had been no rigorous determination of exactly how the laundry mark was to be used. In effect, 250 people were going to be asked to increase their recording effort by 25 percent on the basis that the data "would be nice to have in case..." But in this instance there was a mitigating factor. The increase in effort was not truly 25 percent. Everybody knew his laundry mark, hence there would be no need to issue a special set of codes or to establish special training procedures. The increase in load amounted to three seconds of pencil scratching. Had the additional burden been required of the single-point single-person, little hesitancy would have been involved since the increase in load and monitoring requirements would have been trivial. In neither instance, however, should the addition be tolerated without a specific and rigorous description of how the data would be used, including some samples of the analysis contemplated.

Appendixes A through E contain essentially the forms used in Combat Dragon, modified to function as more general purpose forms. Our experience has been that each exercise from Oxnard to Combat Dragon is unique, and some input forms have to be changed to reflect this uniqueness. (The procedures and the error edit program must reflect these changes too.) Most changes have consisted of adding data elements to the forms. For example, the 300 form used in Combat Dragon includes the addition of the aircraft symbol and the mission number. The basic data have not changed appreciably, however, since the first days at Oxnard. They consist of MDC data extended by clock-hours and team size plus the description of the sortie (or

attempted sortie). Hence our general feeling is that although the collection formats will probably change, the edit program will test the same elements.

To minimize these changes, the following layout and procedures have been provided.

- a. Constant information (i.e., date) appears at the top of the forms.
- b. Prerecorded information (i.e., mission number) appears at the left of the forms.
- c. Transient and unique information (i.e., clock hours) to the right.
- d. The areas used for comments are sensed and reproduced in the edit output. This allows the extension of the recording system without program modification. Thus if aircrew identification is desired, the first several columns of the comments can be used for this by instructing keypunch about the proper columns. No other changes are necessary.

The appendixes are set up with the forms and explanations for their use as follows:

Appendix B contains the operations data (100 series)
Appendix C contains the maintenance data (300 series)
Appendix D contains the supply data (400 series, except
303 CC 80=W)
Appendix E contains the personnel data (200 series)
Appendix F contains the facility survey.
Appendix G contains the keypunch instructions and formats

All operations and maintenance forms containing data directly related to the mission include the date, the tail number and the Combat Dragon mission number (indicated by CDM), thus providing a means of "marrying" these two sets of information. The supply data are married to the maintenance data through the common elements of tail number, date and Federal Stock Number (occasionally the part number is substituted). Appendix C describes the form 300. Since this form provides the major part of the tough data, the directions and procedures are much more detailed than for the other documents. Although the form 300 is only one of a score, it requires more attention than all others combined. This emphasis is also reflected in the computer error edit program.

Appendix A

LIST OF FORMS AVAILABLE FOR RAND/TAC SYSTEM

These forms are contained in Appendixes B through G of this volume.

Operations Forms

CD form 101	Sortie Debriefing
CD form 101	Debriefing of Combat
CD form 101	Degradation Factors During Flight to and from Target
CD form 101	Degradation Factors During Combat
CD form 101	Combat Crewmembers' Comments and Recommendations
CD form 101	BDA
CD form 102	Joint Services Anti-Aircraft Fire Incident and Damage Report
CD form 103	FAC Poststrike Debriefing Checklist

Maintenance Forms

MIP form 305 test/	
RR form 300 test	Maintenance Data Collection Record
RAND form 300	Maintenance Data Collection Record
RAND form 302	Sorties Flown, Scheduled or Scrambled
RAND form 303	Aircraft Status Summary
RAND form 305	Manpower Availability
RAND form 306	AGE Utilization
RAND form 307	Mission Go
RAND form 308	Deviations-Degradations
RAND form 309	General Purpose Information Record
RAND form 30D	F-4C

Supply Forms

CD form 303	Record of Cannibalization
CD form 401 (Part A)	Demand Register
CD form 401 (Part B)	Demand Register
CD form 402	Receipt or Cancellation Register
CD form 403	NORS register

Personnel Forms

CD form 200	Personnel Data Worksheet
CD form 201	Personnel Information Data
CD Form 202	Supervisor's Information Data
CD form 204	Aircrew Experience Record

Facilities Forms

Form F-1	Airfield Facilities Survey--Monthly
Form F-2	Airfield Operations, Safety and Weather Survey--Daily

Facilities Forms (Continued)

Form F-3	Motor Pool Survey--Weekly
Form F-4	Electrical Power Generation Survey--Monthly
Form F-5	POL Facilities Survey--Monthly
Form F-6	Munitions Facilities Survey--Monthly
Form F-7	Supply Facilities Survey--Monthly
Form F-8	Maintenance Facilities Survey--Weekly

Keypunch Formats

Edit Program Input

Format A	Debrief Summary
Format B	Form 300 (On-aircraft maintenance)
Format C	Sortie--Scheduled and/or Flown
Format D	Status Card
Format E	Manpower Available
Format F	AGE Utilization
Format G	Mission Go
Format H	Deviation/Degradation
Format I	General Purpose Comment

Edit Program Output

Format J	Debrief Summary
Format K	On-Aircraft Maintenance
Format L	On-Aircraft Work Delay
Format M	Sortie Flown
Format N	Sortie Scheduled, Not Flown
Format P	Sortie Comment
Format Q	Aircraft Status
Format R	Manpower Available
Format S	AGE Utilization
Format T	Mission Go
Format U	Deviation/Degradation Comment
Format V	General Purpose Comment

Program Output Summary Cards

Format W	24-hour spread
Format X	Analysis of Variance
Format Y	RECSUM
Format Z	Frequency Count
Format AA	Off-Equipment (AFTO 211) Manhour

Program Control Cards

Format C1	Lag/Delay
Format C2	Analysis of Variance
Format C3	Aircraft Histogram
Format C4	Table Loading Stopper
Format C5	Manpower Utilization Title Card
Format C6	Edit Program Gangpunch Master Card
Format C7	Display Program Date Select
Format C8	Display Program Tape Output
Format C9	Tape Input

Keypunch Formats (Continued)

Program Control Cards (Continued)

Format C10	General Title Card
Format C11	Histogram Title Card
Format C12	Field Selector
Format C13	Compute Elapsed Time Program--code selector
Format C14	Frequency Count (FREQ) Field Locator Card
Format C15	Chi-Square Title Card
Format C16	Chi-Square Field
Format C17	Correlation Field Designation
Format C18	Correlation General Title Card
Format C19	Correlation Field Designation Table
	Stopper Card
Format C20	Correlation Independent Variable Test
	Control Card
Format C21	Analysis of Variance Header Card

Master Tables

Format M1	Work Center Master
Format M2	Tail Number Master
Format M3	2-Digit System Table
Format M4	Edit Program AGE Table

Clint Program Summary Records

Format R1	Aircraft
Format R2	2-Digit System
Format R3	Work Center

Combat Dragon Card Form 101 Operations Cards

Format CD1	Sortie Debriefing
Format CD2	Debriefing of Combat
Format CD3	En Route Degradation Factors
Format CD4	Degradation Factors on Target
Format CD5	Flight Crew Comments and Recommendations
Format CD6	BDA
Format CD7	Battle Damage Assessment Remarks

Combat Dragon Supply Edit Output Cards

Format CD8	Demands, Receipts, and Cancellations
Format CD9	Cannibalization Tape Format
Format CD10	NORS

Combat Dragon Supply Edit Input Cards

Format CD11	Demands, Receipts, and Cancellations
Format CD12	Cannibalization Card Format
Format CD13	NORS

Appendix B

OPERATIONS PROCEDURES AND FORMS

This appendix contains the unmodified Combat Dragon operations procedures and forms designed by Major John Munkvic. Because exercises vary so, the forms would undoubtedly be extensively modified for another exercise.

Operations forms 101, 102 and 103 are described here. Form 101 has five parts: sortie debriefing; debriefing of combat; degradation factors during flight to and from target; degradation factors during combat; and combat crew members' comments and recommendations. One set of this information was completed for each flight of two or three aircraft. Instructions are given below for properly filling out each part of the form. Forms 102 and 103 are both self-explanatory.

The form 101 is interesting because verbal information can be included on it to detail factors of mission degradation and flight crew recommendations.* It also includes coded information that can be used for selecting specific areas of interest. For example, if a person were interested in looking at ordnance as a mission degrading factor, he could select those records containing the required information and list 80-80; these would be the CD4 formats containing "05" in Cols. 25-26. His review of this specific information would quickly reveal any major trends or factors so that they could be isolated for more intensive research. See Volume IV for computer procedures.

1. Instructions for NZ cards, "Sortie Debriefing"

Columns 1-24 are self-explanatory.

Column 25 designations are the following:

N--none
G--ground
A--air

*The flight crew consisted of the pilot and an observer. The latter was a member of the Combat Dragon Evaluation Team, and functioned as both observer and recorder.

Columns 26-27 designations are the following:

WX--weather
SY--sympathy
HQ--higher headquarters
OP--operations
AC--aircraft
MN--maintenance nondelivery
OT--other

Columns 28-31 are self-explanatory.

Columns 32-33 are self-explanatory except for BD--battle damage.

Columns 34-37 are self-explanatory.

Columns 38-44 name the station where aircraft was recovered.

Columns 45-49 designations are the following:

T--Tacan
P--pilotage
U--UHF
R--radar
F--FM

Columns 50-56 are self-explanatory.

Columns 57-58 designations are the following:

Y--yes
N--no

Columns 59-73 designations are the following:

N--number
T--type ordnance one letter code
S/A--safe/armed

2. Instructions for PZ cards, "Debriefing of Combat"

Columns 1-24 duplicate Columns 1-24 of NZ cards.

Columns 25-27 designations are the following:

P--was target prebriefed?
D--diverted to
S--scrambled to target

Columns 28-51 are self-explanatory.

Columns 52-69 are self-explanatory (averaged between the pilots).

Columns 70-72 require a one-letter code, although 2 are used at present: A--random, and B--box.

3. Instructions for OZ cards, "Degradation Factors During Flight to and from Target"

Columns 1-24 duplicate Columns 1-24 of NZ cards for "Sortie Debriefing"

Columns 25-26--insert the ID number corresponding to the type of comment being made. If comment exceeds capacity of columns on that card, another or several cards are punched with an A, B, D, etc. in Column 78 for added identification information, e.g., AOZ, BOZ.

4. Instructions for QZ, "Degradation Factors During Combat," and RZ, "Combat Crew Members Comments and Recommendations," cards

The instructions are essentially the same as for the OZ cards.

5. Instructions for SZ cards, "Battle Damage Assessment"

Columns 1-24 duplicate Columns 1-24 of NZ cards.

Column 25--insert target 1, 2, or 3.

Columns 26-27--insert target type 2-letter code.

Columns 28-29--insert corps area supported, 01, 02, 03, or 04.

Columns 30-39--Number 1 through 9, then insert 1-letter code for type of bomb. For example

30	31	32	33	34	35	36	37	38	39
6	I	5	W	4	H	3	V	2	K

This is the total of all ordnance delivered by the flight:

Columns 40-41 receive a 2-digit entry for structures destroyed.

Columns 42-43 receive a 2-digit entry for structures damaged.

Columns 44-45 receive 2 digits for total sampans destroyed.

Columns 46-47 receive 2 digits for total number sampans damaged.

Columns 48-50 are self-explanatory.

Columns 51-53 are self-explanatory.

Columns 54-55 are 2 digit, self-explanatory.

Columns 56-64 need number of bombs, 1-letter code for type of bomb, and a 1-letter code for type of fuse, e.g., 3 M A.

Columns 65-66 are for total confirmed KBA for the flight.

Columns 67-69 have target elevation entered in hundreds of feet, e.g., 300 feet is 003.

Columns 70-77 need type of Hung Bomb, rack station, type of bomb, and a 1-letter code. Rack stations are counted from #1 outboard left wing to #8 on extreme outboard of right wing.

Other BDA is not keypunched. It is used for additional comments only.

SORTIE DEBRIEFING

SUBJECT	KEYPUNCH LOCATION	DATA															
CDM	1-2																
TAIL NO.	3-6																
DATE	7-10																
FRAG NO.	11-15																
CALL SIGN	16-22	D	R	A	G												
PILOT	23-24																
ABORT TYPE	25	N	G	A													
ABORT REASON	26-27	WX	SY	HQ	OP	AC	MN	OT									
ABORT TIME	28-31																
RECOVERY DIVERSION	32-33	NO	WX	BD	HQ	OP	AC										
DIVERSION TIME	34-37																
DIVERTED LOCATION	38-44																
ENG NAV TO TGT	45	T	R	P	F												
ENR NAV RETURN	46	T	R	P	F												
ENROUTE COMM TO TGT	47	U	F														
ENR COMM RETURN	48	U	F														
COMM ON TGT	49	U	F														
OPERATION SUPPORTED	50-56																
GUN CAMERA	57	Y	N														
STRIKE CAMERA	58	Y	N														
ORDN JETTISONED	NONE	N	T	S/A	N	T	S/A	N	T	S/A	N	T	S/A	N	T	S/A	
	59-73																
LOCATION OF JETTISON	NONE																
CARD CODE	79-80	N	Z														

DEBRIEFING OF COMBAT

SUBJECT	KEYPUNCH LOCATION	DATA									
1st TARGET WAS	25	P	D	S							
2d TARGET WAS	26	P	D	S							
3d TARGET WAS	27	P	D	S							
UTM COORDINATES 1st TGT	28-35										
UTM COORDINATES 2d TGT	36-43										
UTM COORDINATES 3d TGT	44-51										
QUALITATIVE DESCRIPTION	NONE										
RENDEZVOUS WITH FAC	52-53				Use Scale 01-10						
COMM WITH FAC	54-55										
FAC CONTROL	56-57										
TARGET ACQUISITION	58-59										
TARGET RETENTION	60-61										
TACTICS USED	62-63										
ORDNANCE ADEQUACY	64-65										
COMMUNICATIONS	66-67										
A/C PERFORMANCE	68-69										
BASIC TACTIC ON TGT 1	70										
BASIC TACTIC ON TGT 2	71										
BASIC TACTIC ON TGT 3	72										
CARD CODE	79-80	P	Z								

DEGRADATION FACTORS DURING FLIGHT TO AND FROM TARGET

ID NO.	SUBJECT	YES	NO	ID NO.	SUBJECT	YES	NO	ID NO.	SUBJECT	YES	NO
0 1	BRIEFINGS			0 6	IFR CONTROL			1 1	HANDOVER TO FAC		
0 2	MAINTENANCE			0 7	NAV AIDS			1 2	WX		
0 3	ORDNANCE			0 8	COMM			1 3	RECOVERY		
0 4	A/C SYSTEMS			0 9	A/C PERFORM			1 4	UNUSUAL EVENTS OR SIGHTINGS		
0 5	TWR CONTROL			1 0	CONTF AGENCY			1 5	OTHER		

[illegible]

ID NO	SUBJECT	YES	NO	ID NO	SUBJECT	YES	NO
0 1	A/C SYSTEMS			0 6	CONTROL		
0 2	A/C PERFORMANCE			0 7	WX		
0 3	COMM			0 8	FRIENDLIES (Position markings, etc.)		
0 4	NAV AIDS			0 9	BRIEFINGS		
0 5	ORDNANCE			1 0	PILOT FATIGUE		
				1 1	OTHER		

[illegible]

COMBAT CREWMEN'S COMMENTS AND RECOMMENDATIONS

ID NO.	SUBJECT	YES	NO	ID NO.	SUBJECT	YES	NO
0 1	BRIEFINGS			0 6	CONTROL		
0 2	TACTICS			0 7	NAVIGATION		
0 3	ORDNANCE			0 8	COMM		
0 4	A/C SYSTEMS			0 9	BASE FACILITIES		
0 5	A/C PERFORMANCE			1 0	OTHER		

[illegible]

BDA

SUBJECT	KEYPUNCH LOCATION	DATA		
		TGT 1	TGT 2	TGT 3
TGT TYPE	26-27			
CTZ	28-29			
ORDNANCE EXPENDED	30-39			
STRUCT DESTROYED	40-41			
STRUCT DAMAGED	42-43			
SAMPANS DESTROYED	44-45			
SAMPANS DAMAGED	46-47			
% TGT COVERED	48-50			
% ORDN ON TGT	51-53			
SEC EXPLOSIONS	54-55			
DUDS (NO., TYPE, FUSE)	56-64			
KBA	65-66			
TGT ELEVATION	67-69			
HUNG ORDN	70-77			
CARD CODE	79-80	S Z	S Z	S Z

OTHER BDA

CONFIDENTIAL (when filled in)

-47-

JOINT SERVICES ANTI-AIRCRAFT
FIRE INCIDENT AND DAMAGE REPORT
(INCIDENT REPORT)

TO:

FROM:

I. SPOT REPORT

1. Date/time group: _____
(Time of incident or hit in local time)

2. Type aircraft _____

3. Aircraft activity at time of incident or hit (check one):

a. On ground _____ b. Taking off _____

c. En route _____ d. Landing _____

e. Tgt attk _____ f. Other _____

4. U.T.M. coordinates of AA fire: _____

5. Aircraft's absolute altitude (AGL): _____

6. Intensity of fire (check one):

a. Light (LT) _____ Moderate (MOD) _____ Intense (INT) _____

b. Small Arms (SA) _____ Auto Wpns (AW) _____ .50 cal _____

20 MM _____ Other (explain) _____

7. Number of individual hits: _____

8. Aircraft reaction (check one or more):

- (1) _____ Crashed
- (2) _____ Forced to land, later destroyed
- (3) _____ Forced to land, later recovered
- (4) _____ Mission not completed
- (5) _____ Continued to fly

9. Casualties (use N/A if none):

US: KIA _____; WIA _____; MIA _____ VN: KIA _____; WIA _____; MIA _____

10. Advisory information (i.e., this is fourth hit in two days from this particular area, etc. Delete if not applicable): _____

II. SUPPLEMENTARY INFORMATION (used for hits ONLY):

11. Mission number: _____
12. Type task(s): _____
13. Aircraft serial number: _____
14. Pilot's name and rank: _____
15. Airspeed in knots when hit: _____
16. Reading in degrees: _____
17. WX conditions in area: _____
18. Type of formation: _____
19. Position number _____ in flight of _____ aircraft.
20. This was _____ pass through area this msn for this aircraft.
21. Helicopter or fixed wing armed escort present? Yes _____ No _____
If yes, fixed wing _____ or helicopter _____.
22. Was source of ground fire observed? Yes _____ No _____.
23. Direction of source: From _____ o'clock position.
24. Estimated range of source: _____ meters.
25. Estimated number of rounds observed: _____. Tracers? Yes _____ No _____.
26. Aircraft damage: _____

27. Name, rank and serial numbers of casualties and extent of injury:

28. Was aircraft hit in protected area (i.e., self-sealing tank, armor plate, etc.) and if so describe effectiveness of device or kit.

29. Damage to property or equipment other than US agencies? Yes _____
No _____. If yes, explain in remarks section.
30. Remarks (include any recommended changes in tactics that might prevent similar battle damage): _____

FAC POSTSTRIKE DEBRIEFING CHECKLIST

The following questions are to be used as a guide to debriefing the Forward Air Controller and VNAF observer following all airstrikes directed by them. Debriefing need not be limited to these questions, but every effort should be made to obtain all information of any significance pertaining to the strike. Enter all significant information in the Airstrike Report form and forward by SSB radio to the DASC ASAP. If the report is too lengthy to pass by radio due to traffic, the FAC may elect to fly the report to the DASC:

1. Was the target fixed base or fleeting type?
2. Did the target consist of troops, structures or both?
3. Were troops reported to be in the open end and on the move, in dug in positions, camouflaged, in contact with friendly troops, attacking outpost?
4. Was target heavily wooded or open?
5. Was target a VC base area, training center, medical supply area, rest camp, como and liaison station, troop quarters, arms factory or storage area, food storage area, headquarters (political or military), etc.?
6. Was target a VC infiltration or supply route?
7. Was strike made in response to immediate or preplanned request, or target of opportunity?
8. Had target been subjected to Psy War effort to warn civilians?
9. How recent was target intelligence? What was the source and reliability?
10. Was target in proximity to Cambodian border?
11. Do target coordinates listed indicate the limits of the target area such as a quadrangle or triangle, the limits of the actual bomb pattern, or a pinpoint with radius?
12. How many structures were destroyed or damaged and what type, if other than dwellings?
13. Did you actually observe VC on the ground prior to the strike?
How many?
14. Did you see bodies after the strike? How many?

15. Did you observe direct hits on locations where you knew VC to be?
16. Can you make a reasonable estimate of VC casualties based on numbers observed in the target area and the effectiveness of the strike?
17. Were civilians observed leaving the area before, during or after the strike?
18. Was ground fire encountered during the strike? What type and intensity?
19. Were anti-aircraft positions spotted?
20. Were any strike aircraft hit?
21. Were VC defensive positions struck?
22. Were any secondary explosions observed by you or the strike pilots? How did you know they were secondary explosions? Color of smoke? Fire ball? Height of smoke?
23. Were any sampans or boats destroyed or damaged? Were VC in boats?
24. Were any unusually large boats observed?
25. Were fires started that were of unusual intensity or duration?
26. Did ground fire prevent a detailed BDA of the strike?
27. Did weather prohibit or inhibit the strike?
28. Did you base your estimate of percent target destruction on the amount of destruction achieved within the bomb pattern, or on amount of destruction desired?
29. Did strike aircraft arrive at designated rendezvous on time? Did you?
30. Did fighters receive and acknowledge all target information?
31. Did they see and acknowledge your target mark?
32. Did you mark with rockets or smoke grenades?
33. Was coordination between FAC, fighters and Strike Control satisfactory?
34. Were communications difficulties encountered?
35. Did strike pilots follow TAC directions?
36. Was ordnance accurately delivered?

37. Was ordnance suitable for target and mission?
38. Were there any duds?
39. Do you recommend additional strikes on this target?
40. Were you in contact with anyone on the ground or in the air who observed the strike? Did they give you an evaluation?
41. Were friendly positions clearly marked, if in close air support?
42. Was poststrike intelligence requested of ARVN S-2?
43. Follow-up data: Sector S-2.

CODES FOR CDM FORM 101

LOAD CONFIGURATION CODE

C. CBU-24	P. LAU-3 HEAP
D. M117 LD	Q. LAU-3 HEAT
G. MK81 LD	R. LAU-3 MIX
H. MK82 HD	S. LAU-32B/A or 59A
I. MK82 LD	T. TANK DROP
J. AN-47A4(100WP)	U. DROP TANK EMPTY
K. CBU 19/A	V. GUN POD
L. UNFINNED NAPALM	W. CBU-14
BLU 27/BLU 1	Y. CBU-25
M. UNFINNED NAPALM	Z. CBU-29
BLU 32 or 23B	
O. EMPTY	

DEFENSE

ALERT STATUS

<u>Type</u>	<u>Intensity</u>	
S. SMALL ARMS	L. LIGHT	G. GROUND
M. MED ARMS	M. MED	A. AIR
H. HEAVY ARMS	H. HEAVY	R. STRIP
N. NONE	N. NONE	S. SCHED
U. UNKNOWN	U. UNKNOWN	

DELIVERY ABORTS

TYPE APPROACH

AW. WEATHER	V. VFR
AK. SMOKE	A. GCA
AD. BATTLE DAMAGE	B. TACAN
AM. MALFUNCTION	R. GCT/GCA
AL. LOST (NO TGT)	
AC. CONTROLLER	
AR. WRONG TGT	
AP. PILOT DECISION	
U. UNSCORABLE	

WEATHER

Condition

Precipitation

S. SCATTERED	U. UNDERCAST	Y. YES
B. BROKEN	I. IN CLOUDS	N. NO
O. OVERCAST	L. BETWEEN LAYERS	
C. CLEAR		

Visibility
TO NEAREST N.M.

Ceiling
TO NEAREST
HUNDRED FEET

ALPHA-NUMERIC CODES LIST

TARGET TYPE

AA. AA/AAA SITE	BV. BIVOUAC
SM. SMALL ARMS	CV. CAVE
37. 37 MM	DR. DRUM (POL)
57. 57 MM	EC. CAMP
SW. AUTOMATIC WEAPONS	FY. FERRY
AR. AREA/DEPOT	AP. FERRY APPROACH
AM. AMMO	LA. FERRY LANDING
CM. COMMUNICATIONS	FD. FORD
OR. ORDNANCE	IS. ISLAND
SG. STAGING	MP. MOUNTAIN PASS
SP. SUPPLY	RD. ROAD
BS. BASE	IN. ROAD INTERSECTION
BU. BUNKER	TU. TUNNEL
HT. HUTS	TH. TRENCHES
ST. STORAGE/WAREHOUSE	UN. UNKNOWN/UNIDENTIFIED
FT. FOOT BRIDGE	TS. TROOPS
PN. PONTOON	LZ. LANDING ZONE PREP
FA. FACTORY	TC. TROOPS IN CONTACT

MISSION DESCRIPTION

03. AIR INTERDICTION	21. WX RECCE
05. CLOSE AIR SUPPORT	35. ESCORT/COVER
06. DIRECT AIR SUPPORT	50. ADMINISTRATIVE
09. SAR CAP	51. LIAISON
10. DEF CAP	53. MAINTENANCE
11. RES CAP	54. AIRBORNE ALERT
12. BAR CAP	55. RADIO RELAY
13. TAR CAP	97. OTHER
18. VISUAL RECCE	

CONTROL CODE

TERRAIN

C. FAC (AIRBORNE)	F. FLAT	W. WATER
G. FAC (GROUND)	R. ROLLING	V. RIVER
M. MSQ	M. MOUNTAINOUS	K. KARST
	C. COASTAL	I. ISLAND

Appendix C

MAINTENANCE PROCEDURES AND FORMS

This appendix contains maintenance forms 300 through 30D, and descriptions of how to use those that are not self-explanatory. The bulk of the appendix concerns the 300 form itself. With the advent of the new AF form 349, most of the contents of this appendix could be omitted. Because the 300 form, unlike the others, is used by many people, we have attempted to explain it as thoroughly as possible. The material is presented in the following order:

1. From the Rapid Roger exercise, a letter from the Chief of Maintenance introducing the 300 form. And an enclosure, Rapid Roger Data Collection, which is a simplified set of procedures suitable for general distribution.
2. The Manual Error Edit Procedures developed by SMS Melvin Ericson at the end of the Rapid Roger exercise.
3. The Combat Dragon Form 300 Introduction and Procedures, originally developed at Nellis AFB by Sgt James Fisher, which was used almost verbatim in Rapid Roger and again in Combat Dragon. The only change for Combat Dragon was the addition of the procedures for blocks 54-59.
4. The procedures and codes to complete maintenance documents 302, 303, 305, 306, 307, 308, 309, and 30D.

The reader will notice that the forms are designed to collect a considerable amount of loading-reconfiguring data. This was done because such data are not available except in the combat setting. Job durations of these actions play a major role in aircraft turnaround in the theater since combat loads, like servicing, are required for every sortie.

FROM: DMM

SUBJECT: Rapid Roger Documentation

TO: All Maintenance Personnel

1. Rapid Roger has many aspects to be considered, but one of the most important is the maintenance area. This test will either be terminated or extended based on the performance of the maintenance people. This is why we are emphasizing the accuracy and completeness of maintenance data collection, proper maintenance procedures, and sound safety practices. Don't ever get the idea that any single action is unimportant. Each and every action must be done promptly, by the book, safely, and accurately documented. By doing this we can conclude the test on the target date and go back to a normal operation. Without the full cooperation of each man, completion of the test could be prolonged.

2. The documentation consists of completeness and accuracy. I believe that the completeness speaks for itself. There are so many entries that must be made on each form, whether it is a RR Form 300, 210 or 211. Double check your entries to make sure that you have entered everything. Accuracy can be determined in many ways at the source of documentation, but it takes a lot of research to correct the errors at a later date and, subsequently, a lot of manhours are wasted.

a. The first source of concern is the accuracy of the start and stop times that are entered on the RR Form 300. If you start a post flight, for example, at 0800 and complete it at 0930 the same man cannot also enter an intake inspection (0413C) during the same time period. The intake inspection must start at 0931 or have been completed before 0800. The same principle is also true for drag chute installations (01140) and launch and recovery (01120). If these jobs are not completed in this manner, the manpower research shows that the same crew was doing two jobs at the same time and indicates that more people were needed than was actually necessary. This is checked by an IBM computer run which identifies each job that is completed by the start and stop times and compares it with the man number that is placed in the right-hand border of the RR Form 300. If one man completes more than one job during the same time period, it will show as an error. What I am saying is that if an intake inspection is included in the post-flight, it must be entered before or after the post-flight start or stop times provided that the same man number is used to identify both lines.

b. There are a few exceptions to this rule; a CSD and a generator change is an example. A man removes a CSD and generator as one unit and he must record each on the RR Form 300 as removed because each is an ACMS item. Two items must be recorded for ACMS and they both were removed at one time. If the CSD is listed as removed from 1430 to 1530 with a crew of two, and a generator as removed from 1430 to 1530 with a crew of two, this will show up as needing four men for one hour

instead of two men. To solve this computer-introduced problem, we are asking you to remove the CSD from 1430 to 1500 and remove the generator from 1501 to 1530 with a crew size of two men. This will account for all of the manhours expended and show that two men were working instead of four when the IBM run is made for the manpower people. This example holds good for any two or more items that are removed as a unit. There are several more examples of this situation that affects the A&E squadron also.

3. As a recap, here are some general documentation instructions:

a. All maintenance actions that occur on an aircraft must be documented.

b. The same employee number cannot appear on the RR Form 300 lines that have overlapping start or stop times.

c. Start or stop times, along with crew size, must be accurate. If the crew size changes before a job is finished, close out the RR Form 300 line, with no units complete, and start another line with the new crew size.

d. A new delay code is now available for use to account for equipment temporarily removed (ETR). This code will normally be entered by the mechanic that does the removal. The start time of this type delay begins with the stop time of the removal action (P). The stop time is the same as the start time of the installation action (Q). This means that any time a unit is removed on action taken code P (removed) for further shop processing, two entries must be made on the RR Form 300. One entry is for the removal action and the second entry is the ETR delay entry to show that the aircraft is delayed because equipment is in shop for Bench Check and/or Repair.

e. The RR 300 original report number with the line identification number A, B, C, etc., (example 10472D) must be entered in the AFTO 781A in the report number space immediately above the corrective action block. The original report number must also be entered in Block "F" of any AFTO 211 that is initiated by a reparable/recoverable item removal for shop action. This original report number must also appear on all 210's initiated in shop to show partial job completion (Ref T.O. 00-20-2-10, para 1-12).

f. It is very important that the basic work centers are properly identified on the RR Form 300. Many mechanics have had a basic work center change, so find out what the new W/C code is and use it for the duration of the test.

RAPID ROGER PROJECT OFFICE

APO San Francisco 96304

RAPID ROGER DATA COLLECTION

1. The instructions contained in this compilation are an up-dated recap of the original Rapid Roger Training Handout. Reference should be made to 8 Tac Ftr Wg Chief of Maintenance letter, Rapid Roger Documentation, 9 Nov 1966.

2. The Rapid Roger Form 300 is the basic maintenance actions recording document in the RAND/TAC system. It is designed to do the following:

a. To reduce the paper work in documenting on-equipment aircraft actions.

b. To more firmly establish the AFTO Form 781 as the primary document for servicing actions and for narrative descriptions of discrepancies and the associated corrective actions.

c. To increase the accuracy of the maintenance data being collected.

d. To collect several new elements of data.

e. To eliminate the repetitious data entries required on the AFTO 200 series forms.

3. The form will be inserted in the DD Form 781 binders at midnight. At this time the crew chief enters the aircraft tail number (block 1-4), the suffix (block 5-6), the day and month (block 7-10), and the basic work center (block 11-15). He also places his name and rank in the crew chief block. The remaining blocks (16-20 thru 49-53) are used to record maintenance actions. These are detailed in the following:

a. Block 22, Automated Work Order and Work Unit Code Selector. An X in the appropriate circle is translated by the computer into the appropriate work order prefix. For example, if B is checked, the computer produces the prefix AB. Further, for most support general actions, the computer will also produce the appropriate work order number, work unit code, action taken, when discovered, and how malfunctioned codes as shown on the following chart.

<u>LETTER</u>	<u>WORK ORDER NO.</u>	<u>WUC</u>	<u>A</u>	<u>W</u>	<u>MAL</u>
A	AA (tail #) FP	01300	0	0	000
C	AC (tail #) FP	03200	0	0	000
D	AD (tail #) FP	03100	0	0	000
P	AP (tail #) FP	03400	0	0	000
(Blank)	AA (tail #) FP	01370	0	0	000

b. Note that checking one circled letter eliminates the need for recording 18 characters of data (work order number thru how mal); this, plus the elimination of narrative and signatures, reduces the amount of recording to less than a fifth of that normally required on AFTO 200 series forms.

c. When B is checked for unscheduled maintenance or P is checked for the fix phase of a phase inspection, the work unit code, action taken, when discovered and how mal must be entered in the appropriate blocks. When you desire to indicate a specific action when A is checked, a specific phase when P is checked, or whenever S is checked, the work unit code must be entered, but the computer will supply the zeros in the action taken, when discovered, and how mal blocks.

d. A general rule for the selection of the proper prefix can be found in the following guide:

(1) Prefix A will be used for general support work unit codes 01XXX thru 09XXX with the exception of 03XXX and 04XXX.

(2) Prefix C will be used for work unit code 03200, basic post flight.

(3) Prefix D will be used for work unit code 03100, preflight.

(4) Prefix S will be used for work unit code 04XXX, special inspection.

(5) Prefix P will be used for work unit code 0341A thru 0341M and for work unit codes 10XXX thru 99XXX when the aircraft is in phase inspection.

(6) Prefix B will be used for work unit codes 10XXX thru 99XXX when aircraft is out for unscheduled maintenance.

e. The RR Form 300 requires four entries not required by the AFTO 200 series forms. They are start and stop time, crew size, employee number, and removal action.

f. Blocks 23-26. Enter the hour and minute of the start of the maintenance action.

g. Blocks 27-30. Enter the hour and minute of the completion of the action or time stopped even if the action is not completed.

h. Block 31. Enter the team size (i.e., enter 2 for a two-man team). If the crew size changes, close out the entry, with no units complete, and open a new line with the proper start time and the new crew size.

i. Blocks 32-36 thru 43-47. The entries for work unit code, action taken, when discovered, how mal, units, and assisting work center are the conventional AFM 66-1 entries. Note that action taken codes "S" and "R" are not compatible with the RR Form 300, and unless

these actions are simultaneous they will not be used. Code P should be used for all removal actions, and code Q for all installations. Items installed on code Q will normally have a how mal code of 799 or 800.

j. Block 48. Check "NO" except when a removal action (codes P, R.) is entered in the action taken block. When a recoverable item is removed on code P, or R, and a AFTO 211 is to be used, this block will be checked "YES".

k. Blocks 49-53. Aircraft hours are only recorded in the top line on the front and back of the RR Form 300 unless there is a change. If there is a change, this is recorded in the appropriate line.

l. The employee number (last name initial and last three digits of AFSN) of the man or senior member of the crew that actually accomplished the work on that line entry will be entered at the end of the line entry in the right hand margin.

m. Removal and/or replacement actions (bottom of RR Form 300) is used to record actions on ACMS and Time Change items only. (Items identified in the 1F-4C-06 code manual by an asterisk or TCI). The line number, or numbers, if removal and installation was done on separate lines, will be entered in the Part B line number block. The name of the ACMS or TCI part will be entered in the space marked AFTO 211 Block G report number. The Federal Stock Code, part number, and serial number of the item removed and/or installed must be entered. Time change item actions must be called to the attention of the Records Section by circling, in red, the appropriate letter in block 21 of the upper part of the RR Form 300.

n. Delay recording will be accomplished by noting the start and stop time of the delay on RR Form 300. The prefix, work unit code, and assisting work center code are also entered along with the appropriate delay code (in blocks 39-41). The delay codes are

- (1) AWP - Awaiting parts (grounding condition only).
- (2) AGE - No AGE available.
- (3) MEN - No personnel available.
- (4) WSC - Work stoppage for conflicting maintenance.
- (5) ETR - Equipment Temporarily Removed for shop repair.
- (6) MUN - Munitions Delay (loading crews only)

NOTE: Delays due to weather will not be recorded on this form. Weather delay information is picked up through A.V.C.

4. AFTO Form 211. These forms will be completed in accordance with existing procedures with the following exceptions. Copy 1, except for ACMS and Time Change Items, will be destroyed. For ACMS and Time Change Items, copy 1, AFTO 211 will be sent to Aircraft Records Section.

On copy 3, for bench check and repair actions, the start time will be entered in block C, stop time in block D, and crew size in block E when needed to support an ETR on the RR Form 300. The RR Form 300 original report number must be entered in block F (original report number) of the AFTO Form 211.

5. The following procedure will apply to all "on aircraft" removal actions. Each unit removed must be entered as a separate line entry on the RR Form 300. Each item removed for subsequent shop processing must have an ETR delay entry to show the time the aircraft was delayed because of equipment in the shop. This delay will start when the item is removed and will stop when the reinstallation is started. If the item remains out of the aircraft past midnight, the crew chief is responsible for closing out the entry at 2400 hours and initiating the ETR entry on the new form. Each time an item is installed, the corresponding ETR entry must be located and the stop time inserted.

FREQUENTLY USED CODES FOR FORM 300

WORK ORDER PREFIX
(Second Character)

A SERVICE
B UNSCHEDULED MAINTENANCE
C BASIC POSTFLIGHT
D PREFLIGHT INSPECTION
E NOT USED
P PHASE INSPECTION
S SPECIAL INSPECTION
MUNITIONS

DELAY CODES

AWP AWAITING PARTS
AGE AWAITING AGE
MEN AWAITING PERSONNEL
WSC CONFLICTING MAINTENANCE
MUN AWAITING MUNITIONS
CON CHANGE OF CONFIGURATION
TTT LOAD CREW TRAINING
ETR EQUIPMENT TEMPORARILY REMOVED

WHEN DISCOVERED

A BEFORE FLIGHT ABORT AIRCRAFT
B BEFORE FLIGHT NO ABORT AIRCRAFT
C INFLIGHT ABORT
D INFLIGHT NO ABORT
E AFTER FLIGHT AIRCRAFT
F BEFORE FLIGHT AIRCRAFT
H BASIC P O INSPECTION
J PREFLIGHT INSPECTION
M PHASE INSPECTION
P FUNCTIONAL CHECKFLIGHT
Q SPECIAL INSPECTION
R QUALITY CONTROL CHECK

ACTION TAKEN

F REPAIR--MINOR
G REPAIR--BITS-PIECES
H EQUIPMENT CHECKED--NO REPAIR
J CALIBRATION--NO ADJUSTMENT REQUIRED
K CALIBRATION--ADJUSTMENT REQUIRED
L ADJUSTMENT/RESET
M DISASSEMBLE
N ASSEMBLE
P REMOVED
Q INSTALLED
R REMOVE AND REPLACE
S REMOVE AND REINSTALL
T REMOVE FOR CANNIBALIZATION
V CLEAN
W DEFERRED
X TEST-INSPECTION-SERVICE
Y TROUBLE SHOOT
Z CORROSION TREATMENT
U REPLACE FOR CANNIBALIZATION

RR TAIL NUMBER DISPLAY

F FLYING
D DELAY
N NORS
P PHASED INSPECTION
S SPECIAL INSPECTION
WUC WORK UNIT CODE
WC WORK CENTER
ET ELAPSED TIME
TMH TOTAL MANHOURS
AWT 1ST DIGIT - ACTION TAKEN CODE
2ND DIGIT - WHEN DISCOVERED CODE
3RD DIGIT - 2ND DIGIT OF WORK ORDER
H/M HOW MAL CODE

Part A

1-10 Tail Number	11-12 Date	13-15 Basic	16-20 Original Report Number	21-25 Crew Chief
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LINE # WORK ORDER PREFIX

A	1-10 A	11-12 B	13-15 C	16-20 D	21-25 E	26-30 F	31-35 G	36-40 H	41-45 I	46-50 J	51-55 K	56-60 L	61-65 M	66-70 N	71-75 O	76-80 P	81-85 Q	86-90 R	91-95 S	96-100 T	101-105 U	106-110 V	111-115 W	116-120 X	121-125 Y	126-130 Z	131-135 AA	136-140 AB	141-145 AC	146-150 AD	151-155 AE	156-160 AF	161-165 AG	166-170 AH	171-175 AI	176-180 AJ	181-185 AK	186-190 AL	191-195 AM	196-200 AN	201-205 AO	206-210 AP	211-215 AQ	216-220 AR	221-225 AS	226-230 AT	231-235 AU	236-240 AV	241-245 AW	246-250 AX	251-255 AY	256-260 AZ	261-265 BA	266-270 BB	271-275 BC	276-280 BD	281-285 BE	286-290 BF	291-295 BG	296-300 BH	301-305 BI	306-310 BJ	311-315 BK	316-320 BL	321-325 BM	326-330 BN	331-335 BO	336-340 BP	341-345 BQ	346-350 BR	351-355 BS	356-360 BT	361-365 BU	366-370 BV	371-375 BW	376-380 BX	381-385 BY	386-390 BZ	391-395 CA	396-400 CB	401-405 CC	406-410 CD	411-415 CE	416-420 CF	421-425 CG	426-430 CH	431-435 CI	436-440 CJ	441-445 CK	446-450 CL	451-455 CM	456-460 CN	461-465 CO	466-470 CP	471-475 CQ	476-480 CR	481-485 CS	486-490 CT	491-495 CU	496-500 CV	501-505 CW	506-510 CX	511-515 CY	516-520 CZ	521-525 DA	526-530 DB	531-535 DC	536-540 DD	541-545 DE	546-550 DF	551-555 DG	556-560 DH	561-565 DI	566-570 DJ	571-575 DK	576-580 DL	581-585 DM	586-590 DN	591-595 DO	596-600 DP	601-605 DQ	606-610 DR	611-615 DS	616-620 DT	621-625 DU	626-630 DV	631-635 DW	636-640 DX	641-645 DY	646-650 DZ	651-655 EA	656-660 EB	661-665 EC	666-670 ED	671-675 EE	676-680 EF	681-685 EG	686-690 EH	691-695 EI	696-700 EJ	701-705 EK	706-710 EL	711-715 EM	716-720 EN	721-725 EO	726-730 EP	731-735 EQ	736-740 ER	741-745 ES	746-750 ET	751-755 EU	756-760 EV	761-765 EW	766-770 EX	771-775 EY	776-780 EZ	781-785 FA	786-790 FB	791-795 FC	796-800 FD	801-805 FE	806-810 FF	811-815 FG	816-820 FH	821-825 FI	826-830 FJ	831-835 FK	836-840 FL	841-845 FM	846-850 FN	851-855 FO	856-860 FP	861-865 FQ	866-870 FR	871-875 FS	876-880 FT	881-885 FU	886-890 FV	891-895 FW	896-900 FX	901-905 FY	906-910 FZ	911-915 GA	916-920 GB	921-925 GC	926-930 GD	931-935 GE	936-940 GF	941-945 GG	946-950 GH	951-955 GI	956-960 GJ	961-965 GK	966-970 GL	971-975 GM	976-980 GN	981-985 GO	986-990 GP	991-995 GQ	996-1000 GR	1001-1005 GS	1006-1010 GT	1011-1015 GU	1016-1020 GV	1021-1025 GW	1026-1030 GX	1031-1035 GY	1036-1040 GZ	1041-1045 HA	1046-1050 HB	1051-1055 HC	1056-1060 HD	1061-1065 HE	1066-1070 HF	1071-1075 HG	1076-1080 HH	1081-1085 HI	1086-1090 HJ	1091-1095 HK	1096-1100 HL	1101-1105 HM	1106-1110 HN	1111-1115 HO	1116-1120 HP	1121-1125 HQ	1126-1130 HR	1131-1135 HS	1136-1140 HT	1141-1145 HU	1146-1150 HV	1151-1155 HW	1156-1160 HX	1161-1165 HY	1166-1170 HZ	1171-1175 IA	1176-1180 IB	1181-1185 IC	1186-1190 ID	1191-1195 IE	1196-1200 IF	1201-1205 IG	1206-1210 IH	1211-1215 II	1216-1220 IJ	1221-1225 IK	1226-1230 IL	1231-1235 IM	1236-1240 IN	1241-1245 IO	1246-1250 IP	1251-1255 IQ	1256-1260 IR	1261-1265 IS	1266-1270 IT	1271-1275 IU	1276-1280 IV	1281-1285 IW	1286-1290 IX	1291-1295 IY	1296-1300 IZ	1301-1305 JA	1306-1310 JB	1311-1315 JC	1316-1320 JD	1321-1325 JE	1326-1330 JF	1331-1335 JG	1336-1340 JH	1341-1345 JI	1346-1350 JJ	1351-1355 JK	1356-1360 JL	1361-1365 JM	1366-1370 JN	1371-1375 JO	1376-1380 JP	1381-1385 JQ	1386-1390 JR	1391-1395 JS	1396-1400 JT	1401-1405 JU	1406-1410 JV	1411-1415 JW	1416-1420 JX	1421-1425 JY	1426-1430 JZ	1431-1435 KA	1436-1440 KB	1441-1445 KC	1446-1450 KD	1451-1455 KE	1456-1460 KF	1461-1465 KG	1466-1470 KH	1471-1475 KI	1476-1480 KJ	1481-1485 KK	1486-1490 KL	1491-1495 KM	1496-1500 KN	1501-1505 KO	1506-1510 KP	1511-1515 KQ	1516-1520 KR	1521-1525 KS	1526-1530 KT	1531-1535 KU	1536-1540 KV	1541-1545 KW	1546-1550 KX	1551-1555 KY	1556-1560 KZ	1561-1565 LA	1566-1570 LB	1571-1575 LC	1576-1580 LD	1581-1585 LE	1586-1590 LF	1591-1595 LG	1596-1600 LH	1601-1605 LI	1606-1610 LJ	1611-1615 LK	1616-1620 LH	1621-1625 LM	1626-1630 LN	1631-1635 LO	1636-1640 LP	1641-1645 LQ	1646-1650 LR	1651-1655 LS	1656-1660 LT	1661-1665 LU	1666-1670 LV	1671-1675 LW	1676-1680 LX	1681-1685 LY	1686-1690 LZ	1691-1695 MA	1696-1700 MB	1701-1705 MC	1706-1710 MD	1711-1715 ME	1716-1720 MF	1721-1725 MG	1726-1730 MH	1731-1735 MI	1736-1740 MJ	1741-1745 MK	1746-1750 ML	1751-1755 MN	1756-1760 MO	1761-1765 MP	1766-1770 MQ	1771-1775 MR	1776-1780 MS	1781-1785 MT	1786-1790 MU	1791-1795 MV	1796-1800 MW	1801-1805 MX	1806-1810 MY	1811-1815 MZ	1816-1820 NA	1821-1825 NB	1826-1830 NC	1831-1835 ND	1836-1840 NE	1841-1845 NF	1846-1850 NG	1851-1855 NH	1856-1860 NI	1861-1865 NJ	1866-1870 NK	1871-1875 NL	1876-1880 NM	1881-1885 NO	1886-1890 NP	1891-1895 NQ	1896-1900 NR	1901-1905 NS	1906-1910 NT	1911-1915 NU	1916-1920 NV	1921-1925 NW	1926-1930 NX	1931-1935 NY	1936-1940 NZ	1941-1945 OA	1946-1950 OB	1951-1955 OC	1956-1960 OD	1961-1965 OE	1966-1970 OF	1971-1975 OG	1976-1980 OH	1981-1985 OI	1986-1990 OJ	1991-1995 OK	1996-2000 OL	2001-2005 OM	2006-2010 ON	2011-2015 OO	2016-2020 OP	2021-2025 OQ	2026-2030 OR	2031-2035 OS	2036-2040 OT	2041-2045 OU	2046-2050 OV	2051-2055 OW	2056-2060 OX	2061-2065 OY	2066-2070 OZ	2071-2075 PA	2076-2080 PB	2081-2085 PC	2086-2090 PD	2091-2095 PE	2096-2100 PF	2101-2105 PG	2106-2110 PH	2111-2115 PI	2116-2120 PJ	2121-2125 PK	2126-2130 PL	2131-2135 PM	2136-2140 PN	2141-2145 PO	2146-2150 PP	2151-2155 PQ	2156-2160 PR	2161-2165 PS	2166-2170 PT	2171-2175 PU	2176-2180 PV	2181-2185 PW	2186-2190 PX	2191-2195 PY	2196-2200 PZ	2201-2205 QA	2206-2210 QB	2211-2215 QC	2216-2220 QD	2221-2225 QE	2226-2230 QF	2231-2235 QG	2236-2240 QH	2241-2245 QI	2246-2250 QJ	2251-2255 QK	2256-2260 QL	2261-2265 QM	2266-2270 QN	2271-2275 QO	2276-2280 QP	2281-2285 QQ	2286-2290 QR	2291-2295 QS	2296-2300 QT	2301-2305 QU	2306-2310 QV	2311-2315 QW	2316-2320 QX	2321-2325 QY	2326-2330 QZ	2331-2335 RA	2336-2340 RB	2341-2345 RC	2346-2350 RD	2351-2355 RE	2356-2360 RF	2361-2365 RG	2366-2370 RH	2371-2375 RI	2376-2380 RJ	2381-2385 RK	2386-2390 RL	2391-2395 RM	2396-2400 RN	2401-2405 RO	2406-2410 RP	2411-2415 RQ	2416-2420 RR	2421-2425 RS	2426-2430 RT	2431-2435 RU	2436-2440 RV	2441-2445 RW	2446-2450 RX	2451-2455 RY	2456-2460 RZ	2461-2465 SA	2466-2470 SB	2471-2475 SC	2476-2480 SD	2481-2485 SE	2486-2490 SF	2491-2495 SG	2496-2500 SH	2501-2505 SI	2506-2510 SJ	2511-2515 SK	2516-2520 SL	2521-2525 SM	2526-2530 SN	2531-2535 SO	2536-2540 SP	2541-2545 SQ	2546-2550 SR	2551-2555 SS	2556-2560 ST	2561-2565 SU	2566-2570 SV	2571-2575 SW	2576-2580 SX	2581-2585 SY	2586-2590 SZ	2591-2595 TA	2596-2600 TB	2601-2605 TC	2606-2610 TD	2611-2615 TE	2616-2620 TF	2621-2625 TG	2626-2630 TH	2631-2635 TI	2636-2640 TJ	2641-2645 TK	2646-2650 TL	2651-2655 TM	2656-2660 TN	2661-2665 TO	2666-2670 TP	2671-2675 TQ	2676-2680 TR	2681-2685 TS	2686-2690 TT	2691-2695 TU	2696-2700 TV	2701-2705 TW	2706-2710 TX	2711-2715 TY	2716-2720 TZ	2721-2725 UA	2726-2730 UB	2731-2735 UC	2736-2740 UD	2741-2745 UE	2746-2750 UF	2751-2755 UG	2756-2760 UH	2761-2765 UI	2766-2770 UJ	2771-2775 UK	2776-2780 UL	2781-2785 UM	2786-2790 UN	2791-2795 UO	2796-2800 UP	2801-2805 UQ	2806-2810 UR	2811-2815 US	2816-2820 UT	2821-2825 UU	2826-2830 UV	2831-2835 UW	2836-2840 UX	2841-2845 UY	2846-2850 UZ	2851-2855 VA	2856-2860 VB	2861-2865 VC	2866-2870 VD	2871-2875 VE	2876-2880 VF	2881-2885 VG	2886-2890 VH	2891-2895 VI	2896-2900 VJ	2901-2905 VK	2906-2910 VL	2911-2915 VM	2916-2920 VN	2921-2925 VO	2926-2930 VP	2931-2935 VQ	2936-2940 VR	2941-2945 VS	2946-2950 VT	2951-2955 VU	2956-2960 VV	2961-2965 VW	2966-2970 VX	2971-2975 VY	2976-2980 VZ	2981-2985 WA	2986-2990 WB	2991-2995 WC	2996-3000 WD	3001-3005 WE	3006-3010 WF	3011-3015 WG	3016-3020 WH	3021-3025 WI	3026-3030 WJ	3031-3035 WK	3036-3040 WL	3041-3045 WM	3046-3050 WN	3051-3055 WO	3056-3060 WP	3061-3065 WQ	3066-3070 WR	3071-3075 WS	3076-3080 WT	3081-3085 WU	3086-3090 WV	3091-3095 WW	3096-3100 WX	3101-3105 WY	3106-3110 WZ	3111-3115 XA	3116-3120 XB	3121-3125 XC	3126-3130 XD	3131-3135 XE	3136-3140 XF	3141-3145 XG	3146-3150 XH	3151-3155 XI	3156-3160 XJ	3161-3165 XK	3166-3170 XL	3171-3175 XM	3176-3180 XN	3181-3185 XO	3186-3190 XP	3191-3195 XQ	3196-3200 XR	3201-3205 XS	3206-3210 XT	3211-3215 XU	3216-3220 XV	3221-3225 XW	3226-3230 XX	3231-3235 XY	3236-3240 XZ	3241-3245 YA	3246-3250 YB	3251-3255 YC	3256-3260 YD	3261-3265 YE	3266-3270 YF	3271-3275 YG	3276-3280 YH	3281-3285 YI	3286-3290 YJ	3291-3295 YK	3296-3300 YL	3301-3305 YM	3306-3310 YN	3311-3315 YO	3316-3320 YP	3321-3325 YQ	3326-3330 YR	3331-3335 YS	3336-3340 YT	3341-3345 YU	3346-3350 YV	3351-3355 YW	3356-3360 YX	3361-3365 YY	3366-3370 YZ	3371-3375 ZA	3376-3380 ZB	3381-3385 ZC	3386-3390 ZD	3391-3395 ZE	3396-3400 ZF	3401-3405 ZG	3406-3410 ZH	3411-3415 ZI	3416-3420 ZJ	3421-3425 ZK	3426-3430 ZL	3431-3435 ZM	3436-3440 ZN	3441-3445 ZO	3446-3450 ZP	3451-345
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Part A

NAME OF THE PARTY

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Part B

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[illegible]

Figure 1

FORM 300 MANUAL ERROR EDIT PROCEDURES

1. When all RR 300 forms are picked up from the flight line, the heading information is screened before keypunching the forms to ensure that the computer will accept it. Data elements screened are:
 - a. Aircraft tail number--ensure a valid 4-digit number.
 - b. Suffix--ensure it is a printed F P.
 - c. Day and month--must be a 4-digit number.
 - d. Basic work center--ensure that the work center number is proper for that aircraft.
 - e. Original report number--ensure that there is a 5-digit number in the original report number block.
2. After keypunch of the information on all RR Form 300 entries, the Data Processing Branch produces a preliminary Tail Number Summary as an aid to manual editing of the information. This display is reviewed for errors both in keypunch and documentation.
 - a. The display for each tail number is checked for the correct date. Forms or additions that are submitted to keypunch too late to appear on the tail number summary the previous day will appear on the current tail number summary. This must be taken into account and the current tail number summary and the previous tail number summary examined whenever the date of the individual display and the date of the summary do not match. The display is also examined for maintenance performed while the aircraft was flying or for a status report indicating that the aircraft was not flyable.
 - b. Each job on the summary is reviewed for irregularities in job length, the number of men from each work center who worked at one time, and suspected double documentation (different jobs from the same work center, which start and stop at the same time). Each line is also examined for erroneous or missing work unit, action taken or when discovered codes and discrepancies between action taken and how mal codes. The machine edit will not reject missing work unit codes for delays.
 - c. Lack of documentation is also looked for on obvious jobs such as basic post-flight, pre-flight blank spaces before an aircraft takes off or immediately after it lands, munitions loading before each flight, and tank changes whenever a configuration change is shown by maintenance control.
 - d. Each report number is checked against the report numbers on the RR 300 forms to ensure that no lines were omitted during keypunch and processing. Lines rejected during the error edit will not appear on the tail number summary or the input listing but will be on the error listing.

- e. Each error detected on the tail number display is marked with a red marker so it will be easily noticed when referring back to it. The errors were checked against the original form to discover whether the error was made in keypunch or in documentation. Key punch errors are corrected immediately by making the correct entry above the corresponding column number on the input listing or on the error listing, depending on which listing the line was printed on. Entries that have errors in documentation are taken back to the source of the documentations, and the person who made the entry or his representative is contacted for the correct data. In cases where the person who made the error is not available, his supervisor is contacted. To determine who made the error, the work center and the employee number are used. If the work center and employee number are missing, the work center can usually be determined by the system part of the work unit code. The individual can usually be determined from the filed copy of the Specialist Job Record (AF Form 992) or, in the case of the basic work center, by going directly to the aircraft.
- f. The advantage of contacting the individual and the supervisor is to make them aware of the errors and to instill more caution and care in making future entries on the forms. In some instances a little counseling on the proper procedure for filling out the forms prevents the same error from appearing on later forms.
- g. In cases where the summary shows that the aircraft was flying or that the wrong aircraft status was reflected, the source document for the input is checked to see if there was an error in keypunching the information. If no keypunch error is found, the aircraft forms are compared with information from other sources, and a satisfactory answer is determined. This is especially true of conflicting maintenance and flying. The time on the AFTO 781, Part I, is compared with information from debriefing and operations.
- h. When the correct information is compiled, corrections are made by entering the correct data above the corresponding column number for each line in error. Corrections are made to the 80/80 listing or to the error edit, depending upon which listing contained the error.
- i. When the final tail number summary is received, it is checked against the preliminary tail number summary to ensure that all errors marked on the latter are corrected and that the final tail number summary is properly purified.

COMBAT DRAGON FORM 300
INTRODUCTION AND PROCEDURES

1. CD Form 300 "Maintenance Data Collection Record"

a. The 300 is designed to reduce paperwork in documenting on-equipment aircraft actions, to firmly establish the AFTO Form 781 as the primary document for servicing actions and for narrative descriptions of both discrepancies and corrective action, to increase the accuracy of data collected, to collect several new data elements, and to do it easier by using the capabilities of a computer to eliminate repetitious data.

b. One 300 (normally) is used for each possessed aircraft each day, retained in the front of the AFTO Form 781 Binder. As on-equipment actions occur, they are documented in the 781A and the data resulting is collected on successive line entries on the 300. This procedure, in conjunction with using the computer capability to eliminate repetitive information, reduces documentation drastically; for example, elements of data to be recorded, excluding any narrative information and signatures. The same data can be collected on a 300 with 4 data elements. To capture time-oriented data, 8 digits are required, still far fewer than current AFTO 210 usage. Many transportation errors (such as entering a WUC of 01300 instead of 03100) are prevented as are similar errors of documentation.

c. To produce the new Daily Reports with all information, and, on a timely basis, it is mandatory that all CD Forms 300 be turned in when all line entries are filled; when work is completed on the aircraft; or closed out at 2400 hours and turned in not later than 0030 hours. All work in progress at 2400 hours will be carried forward to a new CD Form 300.

(1) Unit count will be documented as presently outlined in 07-20 Series Tech Orders. If the work documented on a line entry is completed, take appropriate unit count; if not, enter zero units.

(2) The Basic Work Center is responsible for the turn-in of forms.

(3) AFM 66-1 states that document accuracy is the responsibility of the basic work center supervisor. The supervisor will indicate his acceptance of the job and document coding by his release signature of assisting personnel on the AF Form 992. The crew chief will validate entries on his 300 forms. He must be knowledgeable on 300 procedures.

2. As there are no longer mandatory goals expressed or implied for the compatibility of MDC and ETA listings, there is no need for maintenance "cheater sheets." Report and record all events accurately as they occur.

3. Explanation of entries to be on CD Form 300 (PART A). The block numbers represent the card column numbers that appear on the IBM punch card.

a. Block 1. Enter the last four digits of the tail number, not the serial number of the aircraft. This entry will be converted by the computer to the full serial number, TMS, the work order number and aircraft suffix.

b. Block 5. Enter the suffix code for the A-37A aircraft (TL).

c. Block 7. Enter the date (day-mo) in numerics.

d. Block 11. Work Center. Enter the work center to which the aircraft is assigned. If the aircraft moves to another work center which will assume responsibility for the aircraft, close out the 300 and initiate a new one for the new work center. Example: Moving an aircraft from the flight-line to periodic or aero repair for extensive maintenance.

e. Block 16. Original Report Number. The CD Form 300 original report number will be used for entry in the report number block immediately above the corrective action block of the AFTO 781A. This report number will also be transferred to Block F of AFTO Form 211 when reparable/recoverable items are removed from aircraft and processed to and through the shops. The line number, A, B, C, etc, will become the sixth digit of the report number.

f. Crew Chief Name. Enter first name initial, last name, and grade of Crew Chief.

4. Individual line entries on CD Form 300. There are fifteen lines lettered A through Q. This means that one (1) CD Form 300 replaces fifteen (15) AFTO Forms 210; thus, the entries on top of page, Blocks 1 through 11, are entered only once, whereas it would have been entered fifteen (15) times previously on AFTO Forms 210.

a. Block 21. Line number A thru Q. This letter becomes the sixth digit of the original report number.

b. Block 22. Work Order Prefix. The CD Form 300 is presently used only on aircraft. The first digit of the W/O prefix for aircraft "A" will be automatically entered by the computer. The second digit will be selected by the mechanic by placing a check mark in appropriate box. This system also provides automatic entries for certain support general work unit codes. These codes are: 01300 (AA) servicing; 03100 (AD) preflight insp; 03200 (AC) basic post-flight insp; 03300 (AE) hourly post-flight insp; 03400 (AP) periodic insp.

(1) If a service is to be credited to the aircraft, an "X" will be placed in Block 22-1 A. When this box is checked the computer will automatically print "AA" in the work order prefix; 01300 for the

work unit code; and will zero out the action taken, when discovered, and how malfunctioned entries. However, Blocks 23, 27, 31, 42, 43 and 48 must be completed manually by the mechanic.

(2) A preflight will be indicated by placing an "X" in Block 22-4 **D**. When this box is checked, the computer will automatically print "AD" in the work order prefix; 03100 for the work unit code; and, will zero out Blocks 37, 38 and 39. The remaining line entries must be entered manually by the mechanic.

(3) A basic postflight will be indicated by placing an "X" in Block 22-3 **C**. When this box is checked, the computer will automatically print "AC" in the work order prefix; 03200 for the work unit code; and will zero out Blocks 37, 38 and 39. The remaining line entries must be entered manually by the mechanic.

(4) An hourly postflight will be indicated by placing an "X" in Block 22-5 **E**. When this box is checked, the computer will automatically print "AE" in the work order prefix; 03300 for the work unit code; and zero out Blocks 37, 38 and 39. The remaining line entries must be entered manually by the mechanic.

(5) A periodic inspection will be indicated by placing an "X" in Block 22-6 **P**. When this box is checked, the computer will automatically print "AP" in the work order prefix; 03400 for the work unit code; and zero out Blocks 37, 38 and 39. The remaining line entries must be entered by the mechanic.

(6) A special inspection will be indicated by placing an "X" in Block 22-7 **S**. When this box is checked, the computer will automatically print "AS" in the work order prefix. All special inspection work unit codes must be entered manually by the mechanic. The computer will add zeros in Blocks 37, 38 and 39. The remaining line entries must be entered by the mechanic.

(7) In the case of the "FIX" phase of the preflight, basic postflight, hourly postflight and periodic/phase inspections, Block 32 (WUC), 37 (Action), 38 (When) and 39 (How Mal) must be completed by the mechanic with accurate, valid codes. When there are entries in Blocks 32, 37, 38 and 39, the automatic features of the machine are overridden and the entered codes will be placed into the data collection. Remember that the box checked in Block 22 is merely to make the work order prefix. In the case of the inspection, when the fix phase is part of the inspection, the prefix will identify it as an inspection.

(8) The unmarked circle in Block 22 is used as directed locally.

c. Block 32. Work Unit Code. The work unit code will be that code listed in the appropriate work unit code manual. Each aircraft will have a code manual available for the mechanic's use.

(1) Only those codes listed in the -06 code manual will be used.

(2) Code manuals are published for different type aircraft; make sure that the code used is for the type aircraft indicated by the work order suffix.

(3) Work unit codes ending in two or three zeros will not normally be used in maintenance data collection. The only exceptions to this will be trouble shooting an entire system or documenting a work stoppage (delay).

(4) Each section of the work unit code manual has a work unit code ending in a 9 and is listed as "not otherwise coded". This is also a limited entry and should be used very sparingly. Action taken, "G", Repair and/or Replacement of Minor Parts, cannot be used with this work unit code. If action taken code "G" is used, it will be coded to the next higher assembly.

d. Block 37. Action Taken Code:

(1) The action taken codes are listed in the front of the work unit code book and in Attachment 3 to AFM 66-1. For CD Form 300, action taken codes F through Z may be used.

(2) The action taken code will be that code that best describes the type of work being done on the item identified in the work unit code block.

(3) Action taken code "F", Repair, can and should be used for on-equipment work if no other code describes the work being accomplished. The only other rule is that if a particular repair type action is not properly described by codes "G" through "Z", then "F" should be used.

(4) Action taken code "G", Repair and/or Replacement of Minor Parts, is really self-explanatory, but many errors are generated because of the wording. Minor Parts are the key words. All work involving minor parts--bolts, nuts, screws, DZUS fasteners, safety wire, mounts, knobs, brackets, clamps, non-coded hose, cannon plugs, etc.--are to be covered under this code.*

(5) Action taken code "H" is to be used as stated in paragraph 34, T.O. 00-20-2-1. Only two How Mal codes may be used with "H" action taken code: "799" and "812".

(6) Action taken "J", "K" and "L". The difference between calibrate and adjust can be defined as: calibrate is that action that requires a piece of test equipment, and adjust is that action that can be accomplished with hand tools only.

*When this code is used, remember that it is to be coded to the work unit code of the assembly to which the minor parts are connected. The HOW MALFUNCTION code also refers to the work unit code; therefore, "105", "106", "108" missing bolts, nuts, screws, safety wire, etc, is to be used rather than "750" missing, as 750 applies to major components.

(7) Action taken "M" and "N". Desassemble-Assemble is very limited and would not normally be used on work that is being documented on CD Form 300.

(8) Action taken codes "P" and "Q" will be used when a reparable/recoverable item is removed or installed. Action taken codes "R" and "S" will not be used on the 300 form.

(9) Action taken codes "T", "U" and "V" are self-explanatory but before using "V", make sure that the work doesn't fall into a support general code in the 02000 group work unit codes.

(10) Action taken code "W", deferred, will be used whenever an item is transferred into the deferred discrepancy section of 781B. No unit of work will be taken.

(11) Action taken code "X", Test and Inspect. This code may be used for operational checks, inspections, and minor servicing (oil, grease, air in radio and radar sets) that are not chargeable to support general codes.

(12) Action taken "Y", Troubleshoot. Self-explanatory, but "fix" phase must be a separate entry.

(13) Action taken "Z", Corrosion Treatment. Must be used with How Malfunction "170", corroded, and the work unit code will identify the item that is corroded.

e. Block 38. When Discovered. Enter the when discovered code listed in the code manual.

f. Block 39. How Mal:

(1) Enter the How Malfunction code that best describes the malfunction against the item indicated in the work unit code block.

(2) This code must be compatible with the action taken code

(3) You cannot use a no defect code when the action taken code shows a repair action.

(4) "797", "798", "801", "802" and "811" are for use on AFTO Form 212 only. Do not use on CD Form 300.

(5) How Mal code "800", removed or installed to facilitate other maintenance, may be entered on CD Form 300. When this How Mal code is used, an "X" will be placed in the "NO" box in Block 48.

(6) An item being installed, "Q", does not normally have a defect (799).

(7) In AFM 66-1 Attachment 3, Page A3-7, two groups of How Mal codes are identified for use with (1) computer and program type work; (2) high power tubes. For example, (970) coolant leak cannot be used for a radiator leak on AGE equipment; (957) "No Display" cannot be used for a navigation lamp not working, etc.

(8) The 300 is also used to collect information on delays or work stoppages that affect getting aircraft "ready." Delay information can be extremely valuable, such as when attempting to improve a situation costing many valuable out-of-commission hours or manhours of labor. Delay information is documented by using a descriptive delay code in the "How Mal" block. Delays should be recorded when they affect your job, causing a work stoppage.

- (a) A three-letter code is entered in Block 39 to identify the type of stoppage. These codes are listed on an insert in the 781G.
- (b) When a work stoppage occurs, the original line entry will be closed out with zero units and a new entry opened after the stoppage.
- (c) The work stoppage (delay code) will require a line entry containing the following

1 Check type of maintenance box in Block 22,
(B) Unscheduled Maint, (P) Periodic Maint, etc.

2 Enter the work unit code in Block 32 of the general system or if desired, the WUC of the component the stoppage affects. Do not code out Block 37 and 38.

3 The appropriate delay code entered in Block 39 (How Mal):

AWP--awaiting part	POL=awaiting fuel
	MDM=awaiting munitions
AGE--no AGE available	WSC=work stoppage, conflicting maintenance
MEN--no personnel available	ETR=equipment temporarily removed
	RTF=ready to fly (no delay)*
	WEA=weather delay
	FFR=frag fuel requirements

4 The start and stop time of the work stoppage (Blocks 23 and 27).

5 Crew size (block 31).

g. Block 42. Units as required. If no units are completed, a zero must be entered. This does not apply to a work stoppage entry.

h. Block 43. Assisting Work Center as required.

i. Blocks 23 and 27. Start Time - Stop Time. Start time will be entered when job begins or when a work stoppage begins. Start time will never be 2400 hours. At midnight (2400 hours), if a job is not completed, the line entry will be closed out with "0" units and a

* This code is used only to fill in the white spaces on the Tail Number.

stop time of 2400 hours. A new 300 form will be initiated with a new date and start time of 0001 hours will be entered if job immediately continues. Start and stop time will never be carried through midnight (2400 hours).

j. Block 31. Enter the number of people required to perform the maintenance task. To insure accuracy in computer conversion of start time, stop time and crew size to labor hours, care must be exercised when crew size changes during a job. Adding to crew size during a job may be resolved by simply initiating a new entry on the 300. Decreasing crew size (such as happens in the case of a specialist diverted to another higher priority job) would require closing out the current entry and initiating a new line entry for the reduced crew size. Good judgment should be used if only a few minutes are involved; it would not substantially affect the computed labor hours if no changes were made.

k. Block 48. This block is provided to indicate an AFTO Form 210 or AFTO Form 211 action. Each time a Repairable/Recoverable Item is removed for shop action, an "X" will be placed in the box marked "1 ☐ YES". This results in a Copy 1, AFTO 211 action. An AFTO Form 211 will be attached to the part with required data entered on the form. The Copy 1 will be destroyed except for time change items. For a time change item the Copy 1 will be forwarded to the Aircraft Records Section with a large notation, "DO NOT KEYPUNCH- RECORDS ACTION ONLY". For all other on-aircraft actions, an "X" will be placed in the box marked "0 ☐ NO". This results in an AFTO Form 210.

l. Block 49. Aircraft Hours. The aircraft hours will only be required to be entered in line A and H unless airframe time changes. If the aircraft flies a sortie, the new aircraft time will be entered in the next open line. Carry new time to back of form. Aircraft time entries will be made by flight-line personnel.

m. Block 54. Symbol. The status symbol (Red X or Red /) will be entered in this block. The symbol will be the same as in the symbol box of the corresponding entry in the 781A. Do not enter an initial.

n. Block 55. Day. The day (2-digit numeric) on which the discrepancy occurred will be entered in this block. This entry will be transcribed from the date box of the discrepancy block of the 781A.

o. Block 57. COMBAT DRAGON Mission Number (CDM). The 2-digit (numeric) mission number will be entered in this block by the Crew Chief. A CDM number will appear in each line entry.

p. Block 59. Local Use. This block will be used for the mechanic's employee number. The employee number consists of the mechanic's last name, first initial and the last 3 digits of this serial number, i.e., F094, A397, J462, etc.

5. Explanation of entries to be on CD Form 300 (Part B):

a. The Part B section is used to enter flight-line parts replaced during repair of a system, subsystem and/or component on the aircraft. These entries correspond to the Block 20 entries on the AFTO 200 series forms.

b. The line number (A, B, C) will be the corresponding line number of the fix in Part A. The reference symbol will be the name of the part (noun) used in the fix. AFLC reference symbols may be used if available; limit noun to six digits and abbreviate if necessary. The "How Mal" code will describe the malfunction of the part used in the repair.

c. All parts that do not have a work unit code, but have a class code and part number will be entered. It is important that all identifiable parts be reported during the COMBAT DRAGON test.

Part A

1-4 TAN NUMBER (4-4)	5-8 SUPPLIS	9-10 DAY	11-15 MONTH	16-20 BASIC W/C	21-25 ORIGINAL REPORT NUMBER	26-30 CREW CHIEF
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LINE & WORK ORDER PREFIX

LINE	WORK ORDER PREFIX	27-30 HOURS	31-32 START	33-34 STOP	35-36 W/C	37-38 A	39-40 W	41-42 MAL	43-44 U	45-46 ASSIST W/C	47-48 ACTION	49-50 A/C HOURS	51-52 SYM	53-54 DAY	55-56 CDM	57-58 LOCAL USE
A	(A)(B)(C)(D)(E)(P)(S)															
B	(A)(B)(C)(D)(E)(P)(S)															
C	(A)(B)(C)(D)(E)(P)(S)															
D	(A)(B)(C)(D)(E)(P)(S)															
E	(A)(B)(C)(D)(E)(P)(S)															
F	(A)(B)(C)(D)(E)(P)(S)															
G	(A)(B)(C)(D)(E)(P)(S)															

Part B

FLIGHT LINE PARTS REPLACED

LINE	27-30 HOURS	31-32 START	33-34 STOP	35-36 W/C	37-38 A	39-40 W	41-42 MAL	43-44 U	45-46 ASSIST W/C	47-48 ACTION	49-50 A/C HOURS	51-52 SYM	53-54 DAY	55-56 CDM	57-58 LOCAL USE

NOTE CARD COL. 80 0

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MAINTENANCE DATA COLLECTION RECORD

The remaining maintenance forms (forms 302-30D) are self-explanatory. The following comments describe how they can be quickly adapted to meet the particular needs of an exercise.

Form 302--Sorties Flown. Most often we have used block 9-11 to record the load configuration. It can also be used to record the type of sortie. Block 27-30 (Chock Time) is the time entered in the 781 jacket. This is often called engine shut-down time.

If additional coding is desired, the Comments block can be used. The Edit program reproduces all entries keypunched in Cols. 31-79. This may be either verbal description or coded information. Pips have been provided to facilitate the recording and keypunching of the latter. For example, the first block (separated by pips on the form 302) might be used to identify the flight crew. No changes are required other than informing the data recorders and keypunch.

Form 303--Aircraft Status. This form is adapted directly from Air Force Form 359. Either form can be used. Our experience has been that some Job Control Centers find it easier to use the RAND form 303. Let Job Control make the choice. Our preference is to use the NORS-G data provided by supply, rather than that provided by maintenance because of the peculiar rules used by maintenance for recording NORS-G.

Form 305--Manpower Availability. The idea of using the computer to produce the forms was suggested first by CWO William Guilfoyle. The idea has real merit, particularly when a new form is being tried out; changes can be made by keypunching a few cards. This is always much quicker than going through Graphic Arts which is inevitably over-burdened. The program for producing the 305 form is included in Vol. IV. Minor modifications of this program can be used to adapt it quickly for other uses.

Form 306--AGE Utilization. Columns 5-6 are used to record the type of AGE; Cols. 7-8 are used to record the "tail number" of the AGE. Spot time is the time the equipment was spotted beside the aircraft. Start and stop time shows when the equipment was being used. If the number of items being used is required (which has not been our experience), use the Comments section.

Form 307--Mission Go. This form is not critical. It should not be used unless the information is required. This would only be true with exercises involving accelerated turnaround schedules. Combat Dragon eliminated the form, but recorded the information by using a special delay code on the form 300.

Form 308--Deviations and Degradations. The deviation codes shown at the top of the form are not sacred. They are those most frequently used. As with the Form 302, pips have been provided to adapt the collection of additional information quickly. This is provided by the fact that the computer reproduces the information keypunched in the Comments block. Encourage Comments detail about all deviations. The output of program DEVDEG (which processes these records) is very useful in helping maintenance management keep deviations within acceptable bounds.

Form 309--Information Records. This form is immediately adaptable to all sorts of uses. For example, assume that we wish to detail the uploading and reconfiguration problems. Instruct the load crews to enter start time in blocks 13-16, stop times in the first comments block (separated by pips on the form), and types of actions in the second comments block. If desired, the travel time from the bomb dump could be similarly recorded, etc. This form is also used to record actions that affect the entire unit by using a dummy tail number. For example, dummy tail number 0000 is entered with the comments: RUNWAY CLOSED FROM 0500-0730---BARRIER OUT.

Form 30D--Debrief. This form is a direct adaptation of the SAC maintenance debriefing form. Its principal use is for getting correct break-rates on aircraft systems that are not used on all sorties (inertial navigation, toss-bomb computer, and so on). This form is illustrative. It is taken directly from the F-4C-06 manual. Because the Edit program tests Cols. 17-47 of the keypunched record for "blanks" "1's" and "2's", only a minor change in the system codes is required to adapt it to any type of aircraft.

[illegible]

AIRCRAFT STATUS SUMMARY

STATUS CODES:	1. Unsched	6. TCIO	If NORS Status (Code 7) is entered in block 56, put work unit code in block 70-74 and G (Grounding) or N (Non-Grounding) in block 75.
	2. Periodic or Phase	7. NORS	
	3. Hourly P/F	8. Test Flt Stdbby	
	4. Basic	9. Crash-Calib	
	5. Await Maint	10. Mod Instr	

[illegible]

DAY- MONTH-	MANPOWER AVAILABILITY	ON	DAY SHIFT	ON	NIGHT SHIFT	ON	GRAVE-YARD						
			OFF		OFF		OFF						
			SKILL LEVEL		SKILL LEVEL		SKILL LEVEL						
		9	7	9	7	9	7						
		10-11	12-13	14-15	16-17	18-19	20-21	22-23	24-25	26-27	28-29	30-31	32-33
32 13410 FM REPAIR AGE	-	-	-	-	-	-	-	-	-	-	-	-	-
61 13411 FM MINOR MAINTENANCE	-	-	-	-	-	-	-	-	-	-	-	-	-
33 13420 FM INSPECTION/SERVICE AGE	-	-	-	-	-	-	-	-	-	-	-	-	-
62 13421 FM DAILY INSPECTION	-	-	-	-	-	-	-	-	-	-	-	-	-
16 13430 FM PICK-UP/DELIVERY AGE	-	-	-	-	-	-	-	-	-	-	-	-	-
13500 FM BASE FLT AND TRANSIENT ALERT SUPV	-	-	-	-	-	-	-	-	-	-	-	-	-
13510 FM BASE FLIGHT	-	-	-	-	-	-	-	-	-	-	-	-	-
13520 FM TRANSIENT MAINTENANCE	-	-	-	-	-	-	-	-	-	-	-	-	-
14000 CAE COMMANDER	-	-	-	-	-	-	-	-	-	-	-	-	-
14010 CAE SQUADRON ADMINISTRATION	-	-	-	-	-	-	-	-	-	-	-	-	-
14020 CAE MAINTENANCE SUPERVISION	-	-	-	-	-	-	-	-	-	-	-	-	-
63 14029 CAE DIAGNOSTICS	-	-	-	-	-	-	-	-	-	-	-	-	-
17 14100 CAE COMMUNICATION/NAVIGATION BRANCH	-	-	-	-	-	-	-	-	-	-	-	-	-
14 14110 CAE RADIO	-	-	-	-	-	-	-	-	-	-	-	-	-
64 14120 CAE RADAR	-	-	-	-	-	-	-	-	-	-	-	-	-
22 14130 CAE INERTIAL NAVIGATION	-	-	-	-	-	-	-	-	-	-	-	-	-
14300 CAE ELECTRONICS BRANCH	-	-	-	-	-	-	-	-	-	-	-	-	-
20 14320 CAE WEAPONS CONTROL	-	-	-	-	-	-	-	-	-	-	-	-	-
21 14330 CAE GUIDANCE/AUTO PILOT	-	-	-	-	-	-	-	-	-	-	-	-	-
14340 CAE ECM	-	-	-	-	-	-	-	-	-	-	-	-	-
08 14350 CAE INSTRUMENT SHOP	-	-	-	-	-	-	-	-	-	-	-	-	-
14400 CAE PHOTO MAINTENANCE	-	-	-	-	-	-	-	-	-	-	-	-	-
14520 CAE PMEL	-	-	-	-	-	-	-	-	-	-	-	-	-
15000 MUNITIONS MAINTENANCE SUPERVISION	-	-	-	-	-	-	-	-	-	-	-	-	-
15010 MUNITIONS MAINTENANCE ADMINISTRATION	-	-	-	-	-	-	-	-	-	-	-	-	-
15030 MUNITIONS QUALITY CONTROL	-	-	-	-	-	-	-	-	-	-	-	-	-
15050 MUNITIONS WEAPONS STANDARDIZATION	-	-	-	-	-	-	-	-	-	-	-	-	-

[illegible]

[illegible]

[illegible]

[illegible]

1-4	N	5-8	N	9-12	AN	13-16	N	BLANK = Used and okay 1 = Used and malfunctioned 2 = Not used
Day	Month	A/C Tail No.	Mission No.	Chock Time				
SYSTEM			CODE	COMMENTS				
			N					
11	AIRFRAME		17					
12	COCKPIT & FUSELAGE		18					
13	LANDING GEAR		19					
14	FLIGHT CONTROLS		20					
23	PROPULSION		21					
41	AIR CONDITIONING		22					
42	ELECTRICAL		23					
44	LIGHTING		24					
45	HYDRAULIC & PNEUD		25					
46	FUEL		26					
47	OXYGEN		27					
49	MISC UTILITIES		28					
51	INSTRUMENTS		29					
52	AUTOPILOT		30					
61	H-F COMMUNICATIONS		31					
69	MISC COMMUNICATIONS		32					
71	RADIO NAV		33					
72	RADAR NAV		34					
73	BOMB NAV		35					
74	FIRE CONTROL		36					
75	WEAPONS DELIVERY		37					
76	ECM		38					
77	RECONN		39					
91-97	MISC		40					

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F-4C

cc 80 - D

Appendix D

SUPPLY PROCEDURES AND FORMS

This appendix describes a manual system used during the Combat Dragon project to process supply data. The manual system provides information that can be used to relate demands to specific sorties, to measure the response time to demands for spare parts, and to trace the consequences of nonfills of demands for spare parts. This information is not available from the standard base supply system (1050-II).

This appendix contains the four supply forms and instructions for their use. Form 401 is for the demand data, form 402 is for receipt or cancellation data, form 303 is for cannibalization data, and form 403 is for the NORS data. Three keypunch formats result from these forms: the U/80 cards contain the demand and receipt or cancellation data from forms 401 and 402; the W/80 cards contain the cannibalization data from form 303; and the X/80 cards contain the NORS data from form 403.

For Combat Dragon, data were recorded for spare parts for the A37A aircraft, the J85 engines used in the A37A aircraft, and the associated AGE. The listing that follows gives the AGE units that data were collected for. Then the data collection procedures for each of the four forms are described separately. See Volume IV for computer procedures.

Equipment	Type Code	Work Unit Code
	Cols. 43-47=U, X cards	Cols. 54-58=U, X cards
	Cols. 75-79=W, cards	Cols. 20-24=W, cards
A-3 air conditioner	A3AC	AF3 --
MC-2A air compressor	MC2A	AG1 --
BT-400 heater	Heat	AF1 --
MJ-1 bomb lift	MJ1	AE1 --
D-5 hydraulic test stand	D5	AT1 --
MB-8 air compressor	MB8	AG1 --
M24T load bank gen analyzer	M24T1	ABC2 --
MC1A air compressor	MC1AC	AG1 --
Jack-hydraulic, hand, 5-ton	Jack	AU1 --
Truck assembly nitrogen recharger	TRUAS	-- -- --
Welder, type AW-300	AW300	AA1 --
Cleaver, spray MA-1	MA1	AR2 --
Degreaser, portable liquid type	DEGRE	ZZ36 --
Sander, polisher pneumatic	SAND	-- -- --
Junction box SE-1076	SE	AA1 --
Generator set MD-3A	MD3A	AA1 --
Motor generator MC-1A	MD1AG	AA1 --
Flood light set NF-2	NF2	ZZ35 --
Multi-meter type AN/PSM6	PSM6	ZZ999

FORM 401

Form 401 is in parts A and B in order to allow the test force to have them duplicated on standard size paper. The two forms are taped together prior to use. When a part is demanded, the appropriate information is called in to the materiel control section, where the data are entered on these forms. Materiel control section then phones in the necessary information to Base Supply. Part A is not keypunched; the stock clerk uses it for cross-referencing supply requests and actions. When in use, it is taped to the demand register. The recording instructions for form 401 B are as follows:

- | | |
|------------------|---|
| Blocks 1-17 | Federal Stock Number of the item requested. |
| 1. Blocks 1-4. | Enter the Federal Stock Class of the item being demanded. |
| Blocks 5-6. | Enter the stock number prefix when appropriate. If the prefix is one character, enter it in block 5 and leave block 6 blank. If there is no prefix, leave the block blank. Where there is no good Federal Stock Number or it is not known, enter the part number. Enter a P in block 5 and follow with the rest of the part number. Omit all dashes (-) and slashes (/) from the part number. |
| Blocks 7-13. | Enter the Federal Item Identification Number if it is available for this item. |
| Blocks 14-17. | Should be used if needed as additional space for the part number. Also, enter suffix starting immediately after the FIIN or part number as appropriate. |
| 2. Blocks 18-20. | Quantity. Record the quantity of the item demanded. |
| 3. Blocks 21-22. | Unit of Issue. Specify unit of issue. |
| Blocks 23-36. | Supply Document Number. |
| 4. Block 23. | Enter either X or R to indicate whether the request is expedite or routine. |
| Blocks 24-26. | Enter the unit account code assigned the 604th ACS. This will be 465. |
| Blocks 27-28. | Enter the 2-digit shop code assigned by Base Supply. |
| Blocks 29-32. | Enter the Julian date the document number was assigned. |
| Blocks 33-36. | Enter the serial number assigned to this document by Base Supply. |
| 5. Blocks 37-38. | Delivery Priority. Enter the delivery priority. |

6. Blocks 39-42. Tail Number. Enter the last four digits of the serial number of the equipment listed in blocks 43-47.
7. Blocks 43-47. Equipment Type. Enter the type of equipment for which the part is needed (e.g., A37 or J85 or AGE). If AGE, use the above listing of AGE codes.
8. Blocks 48-53. Maintenance Document Number. Enter the form 300 original report number of the maintenance action that required the part. For in-shop action, AFTO form 211 contains this report number.
9. Blocks 54-58. Work Unit Code. Enter WUC for item being demanded. In case of AGE, the WUC should be the one listed for that equipment type.
10. Blocks 59-64. Mission Number. Enter the mission number of the sortie that preceded the demand. This information will be taken from form 300. If a demand is for an in-shop action, this block cannot be completed because the information does not appear on the AFTO form 211.
 - Blocks 59-60. Enter the day of the mission.
 - Blocks 61-62. Enter the month, expressed numerically, of the mission
 - Blocks 63-64. Enter the Combat Dragon Mission Number assigned to that mission.
11. Block 65. Fill or Kill. Enter an X if the demand is made on a fill or kill basis. Leave this block blank if it is not a fill or kill request.
12. Blocks 66-69. Time of Demand. Enter the time the request was called into Materiel Control.
13. Block 70. Availability. Enter either an F for fills, a B for backorders or a C for cancellations or kills.
14. Block 80. U. Enter a U to identify this deck of cards.

Recording the mission data in Cols. 59-64 allows an analysis of mission sensitivity to demands. As mentioned above, it is not possible for shop personnel to provide the mission data. This data can be obtained, however, by sorting the form 300 and the form 401 on the original report number and copying off the mission data from the form 300 for the form 401s that are blank in Cols. 59-64. This should be done periodically--perhaps once a month.

Recording the maintenance document number in Cols. 48-53 does not completely tie the maintenance and supply actions together, because

the maintenance document number recorded in Cols. 48-53 of the form 401 is the number used by the man who ordered the part. The time to order a part is during an inspection. The part could be installed under a different maintenance document number, and there is no practical way to record this other number on the form 401 because this installation action takes place after the part has been ordered and received.

New forms are started daily, and the old forms are picked up daily for keypunching in the U format shown on Part B. Columns 71-79 are blank at this time, and will be completed upon receipt of the demanded part. When keypunching is completed, the cards are edited and placed in serial number order (Cols. 29-36) in a demand card file. When a part is received or when a demand is cancelled, a line entry on form 402 is completed by Materiel Control.

FORM 402

The recording instructions for form 402 are as follows:

1. Blocks 1-17 Stock Number. Enter the Federal Stock Number of the item received. This number may be taken directly from the FSN block on the supply document.
2. Blocks 23-36 Supply Document Number. Enter the complete supply document number. This information may be taken directly from the supply document.
3. Blocks 71-74 Julian Date. Enter the Julian date that the item was received.
4. Blocks 75-78 Time, using a 24-hour clock. Enter the time the item was received.
5. Block 79 Receipt or Cancellation. Enter an F for a receipt, a C if the document was cancelled, and an X if the Base Supply had no record of the document or showed a completed issue when the part had not been received by the squadron. The X code is to label transactions that Base Supply may mix.

New forms are started daily and the old forms are picked up daily. The U cards with the same supply document numbers in Cols. 29-36 (on which the demand data are keypunched from form 401) are pulled from the demand card file, and the appropriate data are keypunched into Cols.

71-79. The stock number entry in Cols. 1-17 of the U card is also changed to agree with the stock number shown in Cols. 1-17 of form 402, if necessary, because the stock number on that form is more likely to be correct. The stock numbers on receipt documents, from which data on form 402 are obtained, have been processed by Base Supply, and at a 1050-II base the stock numbers have been pretty well checked out in the Base Supply data system. Upon completion of keypunching, the cards are edited and placed in a demand-completed card file.

FORM 303

Before a part can be cannibalized for or from a 604th ACS aircraft, a form 303 must be initiated. With a few exceptions, the information on this form is the same as that on AF form 991; the 303 replaced the 991 during the Combat Dragon test. The new form presents the data in a format that makes keypunching easier. The procedures for form 991, as contained in AFM 66-1, apply to form 303, except for Cols. 59-70. Columns 59-64 are for recording the maintenance document number (form 300, Cols. 16-21) under which the cannibalized part was installed on the receiving aircraft. Cols. 65-70 are for recording the maintenance document number (form 300, Cols. 16-21) under which the cannibalized part was removed from the cannibalized aircraft. The entries in Cols. 59-70 were added in hopes that they would force maintenance personnel to make the appropriate form 300 entries to record the maintenance actions.

FORM 403

When a nonfill of a demand causes the item to be declared NORS, a line entry is made on form 403. The recording instructions for the form are as follows:

1. Blocks 1-17 Stock Number. Enter the Federal Stock Number for the item causing the NORS condition. This entry is to be made in the same manner as shown on form 401.
2. Blocks 18-20 Quantity. Record the number of units of the item causing a NORS condition.

3. Blocks 23-36 Supply Document Number. Enter the full document number assigned to Base Supply. This entry is to be made in the same manner as shown on form 401.
4. Blocks 39-42 Tail number. Enter the last four digits of the serial number of the equipment listed in Blocks 43-47.
5. Blocks 43-47 Equipment Type. Enter the type of equipment for which the part is needed (e.g., A37, J85, or AGE). If AGE, use the codes in the listing given above.
6. Blocks 54-58 Work Unit Code. Enter WUC for item causing the NORS condition.
7. Blocks 62-69 On-NORS. Enter the Julian date and time on the 24-hour clock when the NORS condition was verified.
8. Blocks 71-78 Off-NORS. Enter the Julian date and time the item causing the NORS was delivered.
9. Block 79 Type of NORS. Enter the type of NORS using the following codes:
 - A = anticipated NORS
 - E = engine out-of-commission for parts (EOCP)
 - G = grounded NORS
 - N = nongrounded NORS
 - W = AGE out-of-commission for parts (AGEOCP).*
 - X = aircraft declared NORS and was later fire without supply action.

When an item becomes NORS, an entry is made with Cols. 71-78 blank. These cards are then edited and placed in an on-NORS deck. If a part is cannibalized to satisfy the NORS condition, a line entry is made on form 403, which includes the NORS stop time information in Cols. 71-78. If the cannibalization results in a NORS condition on the cannibalized aircraft, a new line entry will be made on form 403 for the cannibalized aircraft. In case of cannibalization, both entries will have the same supply document number in Cols. 23-36. Whenever a NORS condition against an aircraft is cleared, a line entry will be made in form 403, which includes the data in Cols. 71-78.

* W code will be used only during the AGE survey periods. The evaluation team will give Materiel Control advance warning of the start and stop data of the AGE survey period. Items already in AGE OCP status at the start date will be initially reported with the date and time it was verified OCP. AGE out-of-commission at the close of the survey period will not be reported "off-NORS" until it is in-commission again.

Form 403 is collected daily, and should contain entries for all items that have started NORS and all items that have stopped NORS on that date. When items have stopped NORS, the appropriate cards are removed from the on-NORS deck; the off-NORS data in Cols. 71-78 are added to the card, and the cards are then edited and filed in a completed NORS file. The data on form 403 are in the X/80 format shown on form 403. These data follow the definitions used for AF form 360, rather than the definitions for the AF form 359--the main differences between the X/80 data and the AF form 360 data are the inclusion of start and stop times in the X/80 data and the fact that an X/80 card does not have to be submitted daily.

RECEIPT OR CANCELLATION REGISTER

[illegible]

CD Form 402 June 1947

CARD OOL. 80 - U

RECORD OF CANNIBALIZATION

FSC				PREFIX		FIIN								ADDITIONAL			
01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	

DATE _____

STICK NUMBER _____

NOMENCLATURE _____

18	19

QUANTITY _____

MATERIEL CONTROL

20	21	22	23	24

WORK UNIT CODE PART REQUIRED FOR _____

25	26	27	28	29	30

AIRCRAFT SERIAL NUMBER, A37A, 604th ACS, PART REQUIRED FOR _____

REQUESTED BY _____

31	32	33	34	35	36	37	38	39	40	41	42	43	44

SUPPLY DOCUMENT NUMBER _____

SIGNED BY MATERIEL CONTROL OFFICER _____

MAINTENANCE CONTROL

SERVICEABLE PART REQUIRED NOT LATER THAN _____

REMOVAL & REINSTALLATION OF PART WILL REQUIRE _____ MANHOURS, _____ CLOCKHOURS

45	46	47	48	49	50

AIRCRAFT SERIAL NUMBER, A37A, 604th ACS, PART CANNIBALIZED FROM _____

SIGNED BY MAINTENANCE CONTROL OFFICER _____

AUTHORIZATION

SIGNED BY CHIEF OF MAINTENANCE _____

SIGNED BY SUPPLY OFFICER _____

ACTION COMPLETED

51	52	53	54	55	56	57	58

TIME OF MAINTENANCE CONTROL ACTION _____

59	60	61	62	63	64

MAINTENANCE ORIGINAL REPORT NO. FOR REQUIRING AIRCRAFT _____

65	66	67	68	69	70

MAINTENANCE ORIGINAL REPORT NO. FOR CANNIBALIZED AIRCRAFT _____

71	72	73

CANNIBALIZATION SERIAL NUMBER _____

AIRCRAFT RECORDS SECTION TIME AND DATE _____

AIRCRAFT RECORDS SECTION SIGNATURE _____

MATERIEL CONTROL TIME AND DATE _____

MATERIEL CONTROL SIGNATURE _____

75	76	77	78	79	80
A	3	7			W

Appendix E

PERSONNEL FORMS

This appendix contains the personnel information forms 200, 201, 202 and 204. All are self-explanatory.

PERSONNEL INFORMATION DATA

1. Name:
2. Work Center:
3. Duty AFS and AFSC:
4. Career AFS and AFSC:
5. Position Title:
6. Previous AFS(s) held:
7. Maintenance Experience:

	<u>Type Aircraft</u>	<u>No. Months</u>
a. Total Experience	A-37	_____
	T-37	_____
	_____	_____
	_____	_____
	_____	_____
b. Experience with your current subsystem.	A-37	_____
	T-37	_____
	All Others	_____
8. Maintenance Training:

a. Total Training	A-37	_____
	T-37	_____
	All Others	_____
b. Training on your current subsystem.	A-37	_____
	T-37	_____
	All Others	_____
9. Brief statement on the extent of your A-37 training and experience.
(Continue on the reverse side, if necessary.)
10. What service schools have you attended (give year)?
11. What other maintenance schools/courses have you attended?

SUPERVISOR'S INFORMATION DATA

1. Work Center:
2. Supervisor's Name and Grade:
3. Position Title:
4. UMD Analysis
 - a. List on a separate sheet of paper your authorized and assigned personnel by name, grade, and AFSC.
 - b. On a second sheet of paper analyze the following:
 - (1) Are the number of personnel adequate to accomplish your mission"
 - (2) Are the AFSCs authorized appropriate?
 - (3) Are the skill levels appropriate?
 - (4) Are the assigned AFSCs and personnel adequate?
 - (5) What do you believe your overseas UMD should be.
 - (6) Do you have any personnel on a borrowed or loaned status? Where to?
5. Are your personnel adequately trained to work on this aircraft?
Comment.
6. What problems are you facing in meeting your mission?

AIRCREW EXPERIENCE RECORD

1. (Name: Last First MI) (Rank) (CD No.)

2. Last command assigned to prior to COMBAT DRAGON (Command)

3. Total time rated

Years		Mos.	
1	2	3	4

4. Total jet time

Hours			
5	6	7	8

5. Total fighter time

Hours			
9	10	11	12

6. Total airborne combat time

Hours			
13	14	15	16

7. Flight examiner experience

Yes	No
17	

8. Instructor pilot experience

Yes	No
18	

9. Aircraft qualified in the last five years:

INSTRUCTIONS: Enter the required data in the applicable blocks.

Write values from 1 to 9 as 01, 02, 03, etc. For example: would be 2 years, 6 months. For Yes/No, check a block.

0	2	0	6
---	---	---	---

Appendix F

FACILITIES SURVEY

This appendix contains forms that can serve as a set of topics to consider in collecting data about air base operations. Our experience has been that adequacy of facilities has little or no impact on the mission. Accordingly, the recording of facility information should be minimized. Most exercises collect far more facilities data than needed. And because the information is collected, there is an urge to "do something" with it. The result is that the final report contains many oblique facts which, without exception, the reader skips. For instance, no one is interested in the length of the runway (or the square feet of shop space, or the number of fire trucks) except as it appears in a description such as "because of the short runway (3800 feet), takeoff gross weights were limited to ..." Someone can ferret out this type of information on a part-time basis. The forms in this appendix suggest the more relevant data to collect on conditions of the airfield; the maintenance, supply and POL facilities; the weather for airfield operations; the motor pool; and the electrical power generation. As indicated, we suggest collecting data only in those areas that have caused a problem.

AIRFIELD FACILITIES SURVEY - MONTHLY

1. Date _____
2. Combat Dragon Representative: _____
3. Control Tower:
 - a. Adequate structure: Yes _____ No _____
 - b. Average Flights Daily: _____
4. Flight and Navigation Aids
 - a. CCA Minimums ASR _____ PAR _____
 - b. ILS Yes _____ No _____
 - c. VOR Yes _____ No _____
 - d. TACAN Yes _____ No _____
 - e. ADF Yes _____ No _____
 - f. DF Capability Yes _____ No _____
 - g. RAPCON/GCI Yes _____ No _____
5. Weather Station:
 - a. Radar Available Yes _____ No _____
 - b. Pilot to Forecaster Yes _____ No _____
 - c. Changes made to cover test period _____
 - d. Potential or actual limiting factors _____
6. Fire Station:
 - a. Number and type of fire engines _____
 - b. Potential or actual limiting factors _____
7. Air Rescue and Recovery:
 - a. Type and number of helicopters _____
 - b. Potential or actual limiting factors _____
 - c. Changes made to cover test period _____
8. Personal Equipment:
 - a. Facility size _____ Type _____
 - b. Adequate Yes _____ No _____
 - c. Changes made to cover test period _____
 - d. Potential or actual limiting factors _____
9. Airfield Information:
 - a. Runway
 - (1) Length _____ (2) Width _____ (3) Elevation _____
 - (4) Slope (Gradients) _____
 - (5) Surface and Condition _____
 - (6) Headings _____ (7) Overruns _____
 - (8) Type and location of barriers _____

Airfield Facilities Survey - Monthly

- b. Taxiways:
- (1) Width _____
 - (2) Surface and Condition _____
 - (3) Potential or actual limiting factors _____
- c. Parking Aprons:
- (1) Size _____
 - (2) Surface _____
 - (3) Potential or actual limiting factors _____
- d. General airfield information:
- (1) Number and type equipment available to sweep pavements _____
 - (2) No. and type of equipment for mowing grass _____
 - (3) Adequate runway distance markers Yes _____ No _____
 - (4) Potential or actual limiting factors (shoulders, drainage, etc) _____
- e. Electrical:
- (1) Type runway lights: _____
 - (2) Type approach lights _____
 - (3) Type taxiway lights _____
 - (4) Describe ramp lighting _____
 - (5) Potential or actual limiting factors _____

AIRFIELD OPERATIONS, SAFETY AND WEATHER SURVEY - DAILY

Record below any operations, safety, or weather event or activity which did or might have affected the Combat Dragon test results, as follows:

OPERATIONS (FROM TOC): Nav Aids - Out, Runway/Taxiway - Closed,
Runway lights - Out, RAPCON/GCI - Out,
CCA - Out, Barrier - Out

SAFETY (From Safety Offices): Accidents or Incidents in Flying, Ground
and Munitions

WEATHER (From Base Weather Station): Significant Base Weather, i.e.,
fog, wet runway, rain, hail, ceilings below
TACAN minimums, visibilities below TACAN
minimums, high winds, etc.

Date	Combat Dragon Rep	Time Event Started or Occurred	Time Event Ended	Event/Activity

MOTOR POOL SURVEY - WEEKLY

Combat Dragon Representative _____ Date _____

Type Vehicle	In Commission	Out of Commission	Potential or Actual Limiting Factors Including Weather
a. Staff cars			
b. Station wagons			
c. Econolines			
d. Pickup 1/2 T			
e. Truck 1-1/2 T			
f. Jeeps			
g. MJ-1			
h. Equipment tugs			
i. Leased vehicles			
j. Fuel servicing vehicles			
k. Oil servicing vehicles			

ELECTRICAL POWER GENERATION SURVEY - MONTHLY

1. Date _____
2. Combat Dragon Representative _____
3. Electrical Power Generation Information:
 - a. Commercial Source:
 - (1) Is commercial source available? Yes _____ No _____
 - (2) If available, what are limiting factors? _____
 - b. Base Prime Power Plants:
 - (1) Rating, type and number _____
 - (2) Potential or actual limiting factors _____
 - c. Individual Power Plants:
 - (1) Rating, type and location _____
 - (2) Potential and actual limiting factors _____
 - d. Emergency Generating Units:
 - (1) Rating, type and location _____

POL FACILITIES SURVEY - MONTHLY

1. Date _____
2. COMBAT DRAGON Representative _____
3. POL Information (JP-4 only):
 - a. Storage:
 - (1) Contract bulk tanks -- Total usable _____gals, on hand _____gals
 - (2) USAF bulk tanks -- Total usable _____gals, on hand _____gals
 - b. Truck fill stands:
 - (1) Location _____
 - (2) Number and capacity of pumps _____
 - (3) Number of refuelers which can be filled simultaneously _____

 - (4) Number of refuelers which can be filled per 24 hours _____

 - (5) Defueling capabilities or limitations _____

 - (6) Potential or actual limiting factors _____

MUNITIONS FACILITIES SURVEY - MONTHLY

Combat Dragon Representative: _____ Date _____

Munitions Function	Adequate Capacity	Percentage Utilized	Potential or Actual Limiting Factors Including Weather
Off Base Storage Dump			
Forward Munitions Transfer Area			
Flare Build-up Area			
Missile Repair Storage Area			
720 Equip Storage (Guns, Pylons, etc)			

SUPPLY FACILITIES SURVEY - MONTHLY

Com at Dragon Representative _____ Date _____

Supply Function	Type Facility	Square Feet	Adequate	Potential or Actual Limiting Factors including Weather
Management and Procedures Division				
Property Accounting Division				
Materials Facilities Division				
Maintenance Support Division				
BEMO				
Base Fuel Supply				
Oxygen				

MAINTENANCE FACILITIES SURVEY - WEEKLY

COMBAT DRAGON Representative _____

Date _____

SHOP	SQ FEET	TYPE	ADE- QUATE	EQUIPMENT SHORTAGES CONDITION	POTENTIAL OR ACTUAL LIMITING FACTORS, INCLUDING WEATHER
Chief of Maintenance					
Maintenance Control					
Quality Control					
Material Control					
Records, Reports & Analysis					
Organizational Maint- enance Branch					
Periodic Maintenance Section					
Flightline Maint.					
Field Maint Branch					
Machine Shop					
Metal Processing					
Structural Repair					
Engine Test Cell					
Engine Shop					
Fuel Systems					
Electric					
Pneudraulics					
Mechanical Accessories					
Egress Systems					
AGE Inspection & ser- vicing					
AGE Dispatch					
Com/Nav					
Fire Control					
Munitions Maintenance Branch					
Weapons Loading					
Weapons Release					
Gun Services					
Instruments					
AGE Repair					

F-8 Form

Appendix G

KEYPUNCH INSTRUCTIONS AND FORMATS

This appendix contains the keypunch instructions and three separate kinds of formats: the keypunch formats; the edit output formats (these are not always identical to the keypunched input); and the table and control card formats used by the computer programs.

The blocks of all keypunched data are identified by the keypunch locations. Thus an entry "50-56" identifies not only the block on the manuscript, but also where it is to be keypunched. This accomplishes two things: it eliminates most keypunch instructions and, at the same time, greatly facilitates the manual editing process by giving the location of the entry on the resulting punched card and 80-80 listing. A number of the forms could be improved by including the mode (e.g., "50-56A" would indicate that the entries are all alpha format). The sortie debriefing record, CD form 101, could be improved by including the code definitions in the right margins.

For most data, keypunch needs only two instructions--the columns the field is to be punched into and the information mode, i.e., A=alpha, N=numeric, or AN=alpha-numeric. There are instances when special instructions are necessary--whether to right- or left-justify and, if so, what to do with the unused columns (generally left blank or filled with numeric zero). It is possible to eliminate almost all keypunch instructions by including them on the forms, where the operator can constantly refer to them. This allows the keypunching to proceed faster.

The following, except those cases requiring special treatment, are the only keypunch instructions required.*

1. The recording form gives the keypunch columns and modes for each field. For example, 5-8N indicates that numeric entries are punched in Cols. 5 through 8.
2. All entries are right-justified. Precede all alpha entries with blanks and numeric entries with zeros. The following codes will indicate any exceptions:

*Standard AF forms are punched using AFM 171-14 procedures.

RPZ = right-justified precede with zeros.
RPB = right-justified precede with blanks.
LFZ = left-justified follow with zeros.
LFB = left-justified follow with blanks.

3. Card code locations and entries are shown on the lower margin of the form; punch or duplicate as indicated (e.g., CC 80=2 indicates that the card code for Col. 80 is a "2").
4. Data in the top block of all forms are duplicated on all subsequent records using program control drum cards.
5. On the form 300, punch the number to the left of the circle checked in block 22 and the number to the left of the square checked in block 48. Zero is the card code in Col. 80 for both parts A and B. Aircraft hours (block 49-53) is duplicated until a change is entered on the form.

EDIT PROGRAM INPUT

DEBRIEF SUMMARY

DATE		AIRCRAFT TAIL NUMBER		MISSION NUMBER		CHECK TIME		SYSTEM FUNCTIONING:		COMMENTS OR ADDITIONAL NOTES	
DAY	MO.	DAY	MO.	DAY	MO.	HR.	MIN.	1 = USED	2 = NOT USED		
01	02	03	04	05	06	07	08	09	10	11	12
13	14	15	16	17	18	19	20	21	22	23	24
25	26	27	28	29	30	31	32	33	34	35	36
37	38	39	40	41	42	43	44	45	46	47	48
49	50	51	52	53	54	55	56	57	58	59	60

FORMAT A

FORM 300 (ON-AIRCRAFT MAINTENANCE)

AIRCRAFT TAIL NUMBER		DATE		BASIC WORK CENTER		REPORT NUMBER		START TIME		STOP TIME		WORK UNIT CODE		ACTION TAKEN		HOW MALFUNCTION		UNITS PRODUCED		ASSISTING WORK CENTER		AFTO 211 ACTION		AIRCRAFT HOURS		SYMBOL		MISSION DAY		MISSION NUMBER		LOCAL USE	
SUFFIX	DAY	MO.	DAY	MO.	DAY	MO.	DAY	MO.	HR.	MIN.	HR.	MIN.	HR.	MIN.	HR.	MIN.	HR.	MIN.	HR.	MIN.	HR.	MIN.	HR.	MIN.	HR.	MIN.	HR.	MIN.	HR.	MIN.	HR.	MIN.	
01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68

FORMAT B

SORTIE -- SCHEDULED AND/OR FLOWN

DATE		MISSION NUMBER		LOAD CONFIGURATION		SCHED. TAKEOFF		SCHED. DURATION		ACTUAL TAKEOFF		ACTUAL CHECK TIME		COMMENTS	
DAY	MO.	DAY	MO.	DAY	MO.	DAY	MO.	DAY	MO.	DAY	MO.	DAY	MO.	DAY	MO.
01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64

FORMAT C

116-

STATUS CARD						FORMAT D							
AIRCRAFT TAIL NUMBER	INTO STATUS		OUT OF STATUS		NORMS WORK UNIT CODE	JULIAN DATE		LAND CODE					
	HRS.	TENTHS	HRS.	TENTHS		YEAR	DAY						
05060700	04	5	08	09	10	1	2	3	4	5	6	7	8

[illegible]

DATE		EQUIP- MENT	AIRCRAFT TAIL NUMBER	USING WORK CENTER	SPOT TIME		START TIME		STOP TIME		REMOVE TIME																				
DAY	MO.				TYPE	NUM- BER	HR.	MIN.	HR.	MIN.	HR.	MIN.	HR.	MIN.																	
01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	10

MISSION GO

FORMAT G

DATE		AIRCRAFT TAIL NUMBER	TIME	
DAY	MO.		HR.	MIN.
01	02	00	00	00
02	03	01	01	01
03	04	02	02	02
04	05	03	03	03
05	06	04	04	04
06	07	05	05	05
07	08	06	06	06
08	09	07	07	07
09	10	08	08	08
10	11	09	09	09
11	12	10	10	10
12	13	11	11	11
13	14	12	12	12
14	15	13	13	13
15	16	14	14	14
16	17	15	15	15
17	18	16	16	16
18	19	17	17	17
19	20	18	18	18
20	21	19	19	19
21	22	20	20	20
22	23	21	21	21
23	24	22	22	22
24	25	23	23	23
25	26	24	24	24
26	27	25	25	25
27	28	26	26	26
28	29	27	27	27
29	30	28	28	28
30	31	29	29	29
31	32	30	30	30
32	33	31	31	31
33	34	32	32	32
34	35	33	33	33
35	36	34	34	34
36	37	35	35	35
37	38	36	36	36
38	39	37	37	37
39	40	38	38	38
40	41	39	39	39
41	42	40	40	40
42	43	41	41	41
43	44	42	42	42
44	45	43	43	43
45	46	44	44	44
46	47	45	45	45
47	48	46	46	46
48	49	47	47	47
49	50	48	48	48
50	51	49	49	49
51	52	50	50	50
52	53	51	51	51
53	54	52	52	52
54	55	53	53	53
55	56	54	54	54
56	57	55	55	55
57	58	56	56	56
58	59	57	57	57
59	60	58	58	58
60	61	59	59	59
61	62	60	60	60
62	63	61	61	61
63	64	62	62	62
64	65	63	63	63
65	66	64	64	64
66	67	65	65	65
67	68	66	66	66
68	69	67	67	67
69	70	68	68	68
70	71	69	69	69
71	72	70	70	70
72	73	71	71	71
73	74	72	72	72
74	75	73	73	73
75	76	74	74	74
76	77	75	75	75
77	78	76	76	76
78	79	77	77	77
79	80	78	78	78
80	81	79	79	79
81	82	80	80	80
82	83	81	81	81
83	84	82	82	82
84	85	83	83	83
85	86	84	84	84

DEVIATION/DEGRADATION

FORMAT H

[illegible]

GENERAL PURPOSE COMMENT

FORMAT !

[illegible]

ED T PROGRAM OUTPUT

DEBRIEF SUMMARY

INERTIAL NAV		TIME		TAIL NUMBER	SCHEMATIC
DAY	MO.	HR.	MIN.		
01	07	03	03	35-55-17-48	
UNF-ADV					
LIGHT					
GUNPOD					
AU/COMBAT					
WCI					

FORMAT J

ON-AIRCRAFT MAINTENANCE

START TIME		STOP TIME		CITY SIZE	BASIC WORK CENTER	WORK ORDER PREFIX	TAIL NUMBER	WORK ORDER SUFFIX	MAN NUMBER	WORK UNIT CODE	ACTION TAKEN	WHEN DISCOVERED	HOW MAINT FUNCTION	UNITS	LABOR HOURS	ASSISTING WORK CENTER	REPORT NUMBER	SCHEMATIC	
DAY	MO.	HR.	MIN.																DAY
09	10	11	02	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28

FORMAT K

ON-AIRCRAFT WORK DELAY

START TIME		STOP TIME		BASIC WORK CENTER	WORK ORDER PREFIX	TAIL NUMBER	WORK ORDER SUFFIX	WORK UNIT CODE	WHEN DISCOVERED	DELAY CODE	ASSISTING WORK CENTER	REPORT NUMBER	SCHEMATIC						
DAY	MO.	HR.	MIN.											DAY	MO.	HR.	MIN.		
09	10	11	02	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28

FORMAT L

- 24 -

FORMAT M

[illegible]

FORMAT N

[illegible]

FORMAT P

[illegible]

EDITOR PROGRAM OUTPUT

ANALYST STATUS

FORMAT Q

INTO STATUS				OUT OF STATUS				N OF C	MORS WORK UNIT CODE	TAIL NUMBER	46, 47, 48, 49, 50, 51
DAY	MO.	HR.	MIN.	DAY	MO.	HR.	MIN.				
27	10	11	47	13	12	13	40	10	23	45	17
STATUS CODE								76			

MANPOWER AVAILABLE

FORMAT R

WORK CENTER	DATE		MANPOWER AVAILABLE BY HOUR																									
	DAY	MO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
01.02.03.04.05.06.07.08.09			11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36

AGE UTILIZATION

FORMAT S

SPOT TIME				START TIME				STOP TIME				REMOVE TIME		AGE TAIL NUMBER	T.S. NUMBER	SUFFIX	NOUN	WORK CENTER	NOUN (cont.)	AGE CODE	NOUN (cont.)	AGE																																					
DAY	MO.	HR.	MIN.	DAY	MO.	HR.	MIN.	DAY	MO.	HR.	MIN.	HR.	MIN.																																														
11	07	03	04	33	04	27	00	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60

MISSION GO

FORMAT T

MISSION GO TIME			TAIL NUMBER	C	U
DAY	MO.	HR. MIN.			
05	05	04	02		

DEVIATION/DEGRADATION COMMENT

FORMAT U

MISSION CODE	TIME			Day, Code last digit	COMMENTS (1)	TAIL NUMBER	COMMENTS (cont.)	WORK UNIT CODE	COMMENTS (cont.)
	First 2 digits of Revision Code	DAY	MO.						
0001	01	01	01	01					
0002	02	02	02	02					
0003	03	03	03	03					
0004	04	04	04	04					
0005	05	05	05	05					
0006	06	06	06	06					
0007	07	07	07	07					
0008	08	08	08	08					
0009	09	09	09	09					
0010	10	10	10	10					
0011	11	11	11	11					
0012	12	12	12	12					
0013	13	13	13	13					
0014	14	14	14	14					
0015	15	15	15	15					
0016	16	16	16	16					
0017	17	17	17	17					
0018	18	18	18	18					
0019	19	19	19	19					
0020	20	20	20	20					
0021	21	21	21	21					
0022	22	22	22	22					
0023	23	23	23	23					
0024	24	24	24	24					
0025	25	25	25	25					
0026	26	26	26	26					
0027	27	27	27	27					
0028	28	28	28	28					
0029	29	29	29	29					
0030	30	30	30	30					
0031	31	31	31	31					
0032	32	32	32	32					
0033	33	33	33	33					
0034	34	34	34	34					
0035	35	35	35	35					
0036	36	36	36	36					
0037	37	37	37	37					
0038	38	38	38	38					
0039	39	39	39	39					
0040	40	40	40	40					
0041	41	41	41	41					
0042	42	42	42	42					
0043	43	43	43	43					
0044	44	44	44	44					
0045	45	45	45	45					
0046	46	46	46	46					
0047	47	47	47	47					
0048	48	48	48	48					
0049	49	49	49	49					
0050	50	50	50	50					
0051	51	51	51	51					
0052	52	52	52	52					
0053	53	53	53	53					

GENERAL PURPOSE COMMENT

FORMAT V

[illegible]

24-HOUR SPREAD SUMMARY CARD

[illegible]

ANALYSIS OF VARIANCE OUTPUT SUMMARY

SERIES COUNT	PAGE QUANTITY COUNT	MEDIA COM TOL CODE
06-0728	290(1)7	01010105
		MAJOR CONTROL CODE
		06-0728

RESUME PROGRAM SUMMARY

FORMAT Y														
MAJOR CODE	MINOR CODE	CLAMT (ALL RECORDS)	CLAMT (2ND DATA OMITTED)	LAC	DELAY	NET FIX	GROSS FIX	MANHOURS	NOVS	NORM	FLYING HOURS	UNITS	BREAKS	WRITE-UPS
2	2	1	1	0	0	4	56	20	4	4	2	2	1	1
2	2	2	2	0	0	4	56	20	4	4	2	2	1	1
2	2	3	3	0	0	4	56	20	4	4	2	2	1	1
2	2	4	4	0	0	4	56	20	4	4	2	2	1	1
2	2	5	5	0	0	4	56	20	4	4	2	2	1	1
2	2	6	6	0	0	4	56	20	4	4	2	2	1	1
2	2	7	7	0	0	4	56	20	4	4	2	2	1	1
2	2	8	8	0	0	4	56	20	4	4	2	2	1	1
2	2	9	9	0	0	4	56	20	4	4	2	2	1	1
2	2	10	10	0	0	4	56	20	4	4	2	2	1	1
2	2	11	11	0	0	4	56	20	4	4	2	2	1	1
2	2	12	12	0	0	4	56	20	4	4	2	2	1	1
2	2	13	13	0	0	4	56	20	4	4	2	2	1	1
2	2	14	14	0	0	4	56	20	4	4	2	2	1	1
2	2	15	15	0	0	4	56	20	4	4	2	2	1	1
2	2	16	16	0	0	4	56	20	4	4	2	2	1	1
2	2	17	17	0	0	4	56	20	4	4	2	2	1	1
2	2	18	18	0	0	4	56	20	4	4	2	2	1	1
2	2	19	19	0	0	4	56	20	4	4	2	2	1	1
2	2	20	20	0	0	4	56	20	4	4	2	2	1	1
2	2	21	21	0	0	4	56	20	4	4	2	2	1	1
2	2	22	22	0	0	4	56	20	4	4	2	2	1	1
2	2	23	23	0	0	4	56	20	4	4	2	2	1	1
2	2	24	24	0	0	4	56	20	4	4	2	2	1	1
2	2	25	25	0	0	4	56	20	4	4	2	2	1	1
2	2	26	26	0	0	4	56	20	4	4	2	2	1	1
2	2	27	27	0	0	4	56	20	4	4	2	2	1	1
2	2	28	28	0	0	4	56	20	4	4	2	2	1	1
2	2	29	29	0	0	4	56	20	4	4	2	2	1	1
2	2	30	30	0	0	4	56	20	4	4	2	2	1	1
2	2	31	31	0	0	4	56	20	4	4	2	2	1	1
2	2	32	32	0	0	4	56	20	4	4	2	2	1	1
2	2	33	33	0	0	4	56	20	4	4	2	2	1	1
2	2	34	34	0	0	4	56	20	4	4	2	2	1	1
2	2	35	35	0	0	4	56	20	4	4	2	2	1	1
2	2	36	36	0	0	4	56	20	4	4	2	2	1	1
2	2	37	37	0	0	4	56	20	4	4	2	2	1	1
2	2	38	38	0	0	4	56	20	4	4	2	2	1	1
2	2	39	39	0	0	4	56	20	4	4	2	2	1	1
2	2	40	40	0	0	4	56	20	4	4	2	2	1	1

PROGRAM CONTROL CARDS

LAG/DELAY CONTROL CARD

LAG/DELAY CONTROL CARD		FILE IDENTIFICATION	
LAG CONSTANT	DELAY CONSTANT		
HOURS	HOURS		
TENTHS	TENTHS		
01 02 03 04 05 06 07 08 09 10 11 12	13 14 15 16 17 18 19 20		

FORMAT C1

CARD CODE

11 PUNCH

ANALYSIS OF VARIANCE CONTROL CARD

ANALYSIS OF VARIANCE CONTROL CARD		MAJOR CONTROL		MINOR CONTROL		DATA	
SORTIE COUNT	PAGE COUNT	HIGH ORDER	LOW ORDER	HIGH ORDER	LOW ORDER	HIGH ORDER	LOW ORDER
01 02 03 04 05 06 07 08 09 10 11 12 13 14	15 16 17 18 19 20 21 22 23 24						

FORMAT C2

ANY CHARACTER

WHOLE NUMBER DECIMAL SHIFT

AIRCRAFT HISTOGRAM CONTROL CARD

AIRCRAFT HISTOGRAM CONTROL CARD		MAJOR CONTROL		MINOR CONTROL		LEFT HISTOGRAM		RIGHT HISTOGRAM		VARIABLE POSITION		PRINT POSITION		INPUT REELS	
HIGH ORDER	LOW ORDER	HIGH ORDER	LOW ORDER	HIGH ORDER	LOW ORDER	HIGH ORDER	LOW ORDER	HIGH ORDER	LOW ORDER	HIGH ORDER	LOW ORDER	HIGH ORDER	LOW ORDER	HIGH ORDER	LOW ORDER
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26	27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56														

FORMAT C3

CARD CODE

11 PUNCH

PROGRAM CONTROL CARDS

TAPE LOADING STOPPER

FORMAT C4

CARD CODE

11-4-8 PUNCH

MANPOWER UTILIZATION TITLE CARD

FORMAT C5

TITLE

CARD CODE

11-3-8 PUNCH

EDIT PROGRAM GANGPUNCH MASTER CARD

FORMAT C6

CARD CODE

YEAR

COMMAND CODE

3-8- PUNCH

PROGRAM CONTROL CARDS

DISPLAY PROGRAM DATE SELECT CONTROL CARD

DATE		DAY MO.		CARD CODE	
01	02	03	04	05	06

11-4-8 PUNCH

FORMAT C7

DISPLAY PROGRAM TAPE OUTPUT CONTROL CARD

CARD CODE	
01	02

5-8 PUNCH

FORMAT C8

TAPE INPUT CONTROL CARD

INPUT TAPE COUNT	
01	02

FORMAT C9

PROGRAM CONTROL CARDS

GENERAL TITLE CARD

FORMAT C10

TITLE CARD (80-COLUMN DESCRIPTION)																																																																															
01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80

HISTOGRAM TITLE CARD

FORMAT C11

TITLE CARD (RIGHT OR LEFT HISTOGRAM)																																																																															
01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80

FIELD SELECTOR CONTROL CARD

FORMAT C12

MEMOR CONTROL FIELD		FIELD TO ACCUMULATE									
HIGH ORDER	LOW ORDER	HIGH ORDER	LOW ORDER								
01	02	03	04	05	06	07	08	09	10	11	12

COMPUTE ELAPSED TIME PROGRAM - CODE SELECTOR

FORM : C13

FORM : C13

01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00
INPUT TAPE COUNT																																																												CODE TO INPUT																																							

FORM 1 C13

FREQUENCY COUNT (FREQ) FIELD LOCATOR CARD

FORMAT C14																																																																															
LOCATION FIELD 1		LOCATION FIELD 2		LOCATION FIELD 3		TITLE				CODE IDENT																																																																					
HIGH ORDER	LOW ORDER	HIGH ORDER	LOW ORDER	HIGH ORDER	LOW ORDER																																																																										
01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80

- 128 -

CHI-SQUARE TITLE CARD

FORMAT C15		TITLE (1-79)		C1500 C000		12 PUNCH																																																																									
01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80

PROGRAM CONTROL CARDS

CH-3 SQUARE FIELD CONTROL CARD

FORMAT C16

LOCATION OF BASE-LINE COUNT		LOCATION OF OBSERVED FREQUENCY COUNT		LOCATION OF CATEGORY IDENTIFICATION		LOCATION OF MAJOR CONTROL		INPUT TAPE COUNT
HIGH ORDER	LOW ORDER	HIGH ORDER	LOW ORDER	HIGH ORDER	LOW ORDER	HIGH ORDER	LOW ORDER	
01	07	03	04	10	11	12	13	14
02	08	05	06	15	16	17	18	19
03	09	07	08	20	21	22	23	24
04	10	09	10	25	26	27	28	29
05	11	11	12	30	31	32	33	34
06	12	13	14	35	36	37	38	39
07	13	15	16	40	41	42	43	44
08	14	17	18	45	46	47	48	49
09	15	19	20	50	51	52	53	54
10	16	21	22	55	56	57	58	59
11	17	23	24	60	61	62	63	64
12	18	25	26	65	66	67	68	69
13	19	27	28	70	71	72	73	74
14	20	29	30	75	76	77	78	79
15	21	31	32	80	81	82	83	84
16	22	33	34	85	86	87	88	89
17	23	35	36	90	91	92	93	94
18	24	37	38	95	96	97	98	99
19	25	39	40					
20	26	41	42					
21	27	43	44					
22	28	45	46					
23	29	47	48					
24	30	49	50					
25	31	51	52					
26	32	53	54					
27	33	55	56					
28	34	57	58					
29	35	59	60					
30	36	61	62					
31	37	63	64					
32	38	65	66					
33	39	67	68					
34	40	69	70					
35	41	71	72					
36	42	73	74					
37	43	75	76					
38	44	77	78					
39	45	79	80					
40	46	81	82					
41	47	83	84					
42	48	85	86					
43	49	87	88					
44	50	89	90					
45	51	91	92					
46	52	93	94					
47	53	95	96					
48	54	97	98					
49	55	99						

CARD CODE 80

11 PUNCH

CORRELATION FIELD DESIGNATION CONTROL CARD

FORMAT C17

MATRIX COLUMN HEADING		FIELD POSITION		ANT CHAINING	
HIGH ORDER	LOW ORDER	HIGH ORDER	LOW ORDER	HIGH ORDER	LOW ORDER
01	02	03	04	05	06
07	08	09	10	11	12
13	14	15	16	17	18
19	20	21	22	23	24
25	26	27	28	29	30
31	32	33	34	35	36
37	38	39	40	41	42
43	44	45	46	47	48
49	50	51	52	53	54
55	56	57	58	59	60
61	62	63	64	65	66
67	68	69	70	71	72
73	74	75	76	77	78
79	80	81	82	83	84
85	86	87	88	89	90
91	92	93	94	95	96
97	98	99			

WHOLE NUMBER DECIMAL SHEET

CORRELATION GENERAL TITLE CARD

FORMAT C19

TITLE	
01	02
03	04
05	06
07	08
09	10
11	12
13	14
15	16
17	18
19	20
21	22
23	24
25	26
27	28
29	30
31	32
33	34
35	36
37	38
39	40
41	42
43	44
45	46
47	48
49	50
51	52
53	54
55	56
57	58
59	60
61	62
63	64
65	66
67	68
69	70
71	72
73	74
75	76
77	78
79	80

CARD CODE 80

11 PUNCH

PROGRAM CONTROL CARDS

CORRELATION FIELD DESIGNATION TABLE STOPPER CARD

FORMAT C19

CARD CODE

11-4-8 PUNCH

CORRELATION INDEPENDENT VARIABLE TEST CONTROL CARD

FORMAT C20

DEPENDENT VARIABLE TESTED

CARD CODE	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
-----------	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

3-8 PUNCH

ANALYSIS OF VARIANCE HEADER CARD

FORMAT C21

TITLE

CARD CODE

01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

MASTER TABLES

WORK CENTER MASTER		FORMAT M1	
2-DIGIT WORK CENTER CODE	5-DIGIT WORK CENTER CODE	WORK CENTER NAME	
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60	01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60	★ 10 PUNCH	

TAIL NUMBER MASTER		FORMAT M2	
AIRCRAFT TYPE/MODEL/SERIES	AIRCRAFT SERIAL NUMBER	ORGANIZATION (SQUADRON)	SQUADRON or TYPE
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60	01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60	01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60	01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60
★ 11 PUNCH		★ 11 PUNCH	

2-DIGIT SYSTEM TABLE		FORMAT M3	
2-DIGIT SYSTEM CODE	SYSTEM CONTROL	NOUN	
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60	01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60	★ 11-2-8 PUNCH	

EDIT PROGRAM AGE TABLE		FORMAT M4	
AGE CODE	NOUN	01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60	
★ 0-1 PUNCH		★ 0-1 PUNCH	

CLINT PROGRAM SUMMARY RECORDS

AIRCRAFT		FORMAT R1																												
SQUADRON & TYPE	TAIL NUMBER	SORTIE TOUCHDOWN TIME			LOAD CONFIGURATION	SHEET	LAG HOURS	DELAY HOURS	FIX HOURS	RECOVERY HOURS	NORM HOURS	UNITS	MANHOURS	FLY TIME HRS.	RUN IDENTIFICATION															
		YEAR	MO.	DAY																										
7	02 03 04 05 06	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

2-DIGIT SYSTEM		FORMAT R2																												
SQUADRON & TYPE	TAIL NUMBER	SORTIE TOUCHDOWN TIME			LOAD CONFIGURATION	SHEET	LAG HOURS	DELAY HOURS	FIX HOURS	RECOVERY HOURS	UNITS	MANHOURS	FLY TIME HRS.	RUN IDENTIFICATION																
		YEAR	MO.	DAY																										
8	02 03 04 05 06	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

WORK CENTER		FORMAT R3																												
SQUADRON & TYPE	TAIL NUMBER	SORTIE TOUCHDOWN TIME			LOAD CONFIGURATION	SHEET	LAG HOURS	DELAY HOURS	FIX HOURS	RECOVERY HOURS	UNITS	MANHOURS	FLY TIME HRS.	RUN IDENTIFICATION																
		YEAR	MO.	DAY																										
9	02 03 04 05 06	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

COMBAT DRAGON CARD FORM 101 OPERATIONS CARDS

SOURCE DEBRIEFING		FORMAT CDI																																																																																																																																																																																																																																																																																																																																																																																																																																																										
CDI	TAIL NUMBER	DATE		FLAG NUMBER	CALL SIGN	PILOT	ABORT TYPE	ABORT REASON		TIME OF ABORT		RECOVERY		DIVISION		TIME OF DIVERSION		INVERTED LOCATION	NAV TO TARGET		COMM RETURN		OPERATION SUPPORTED		GUN CAMERA		STRIP CAMERA		ORDNANCE JETTISONED										R	Z																																																																																																																																																																																																																																																																																																																																																																																																																				
		DAY	MO.					HR.	MIN.	HR.	MIN.	HR.	MIN.	HR.	MIN.	HR.	MIN.		HR.	MIN.	HR.	MIN.	HR.	MIN.	HR.	MIN.	HR.	MIN.	HR.	MIN.	HR.	MIN.	HR.	MIN.	HR.	MIN.	HR.	MIN.																																																																																																																																																																																																																																																																																																																																																																																																																						
02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46

[illegible][illegible]

COMBAT DRAGON SUPPLY EDIT OUTPUT CARDS

DEMANDS, RECEIPTS, AND CANCELLATIONS: CO Forms 401, 402, June 1967

STOCK NUMBER										QUANTITY		SUPPLY DOCUMENT NUMBER						ALPHANUMERIC ABSTRACT		TAIL NUMBER		EQUIPMENT TYPE		MAINTENANCE DOCUMENT NUMBER		ADDRESS		MISSION NUMBER		THREAT DEMAND		AVAILABILITY		EQUIPMENT NAME		TIME																																											
750		760		770		780		790		800		810		820		830		840		850		860		870		880		890		900		910		920		930		940		950		960		970		980		990																															
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80

CANNIBALIZATION TAPE FORMAT

ACCORD NUMBER										CLASSIFICATION										SUPPLY DOCUMENT NUMBER										TAIL NUMBER PART FOR		DOCUMENT TYPE		TAIL NUMBER PART FROM		WORK UNIT CODE		MAINTENANCE REQUIREMENT NUMBER FOR		MAINTENANCE REQUIREMENT FROM AIRCRAFT		TIME IN MAINTENANCE CONTROL ACTION																																					
PVS					PUSH					ADDITIONAL					CLASSIFICATION					ACCIDENT		DATE		SERIAL NUMBER		PART FOR		PART FROM		CODE		FOR		FROM AIRCRAFT		ACTION																																											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80

NOES: CD Form 403, June 1967

[illegible]

COMBAT DRAGON SUPPLY EDIT INPUT CARDS

DEMANDS, RECEIPTS, AND CANCELLATIONS: CD Form 401, 402, June 1967

STOCK NUMBER										SUPPLY DOCUMENT NUMBER										DELIVERY PRIORITY										MISSION										TIME OF DEMAND										RECEIPT OR CANCEL																																																											
FSC					PREFIX					FIDN					ADDITIONAL					QUANTITY					UNIT OR ISSUE					SERVICE					ACCOUNT					SHOP					JULIAN DATE					SERIAL NUMBER					TAIL NUMBER					EQUIPMENT TYPE					MAINTENANCE DOCUMENT NUMBER					WORK UNIT CODE					MISSION NUMBER					FILE OR KILL					TIME OF DEMAND					AVAILABILITY					JULIAN DATE					CLINP TIME					ROAD				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80																														

FORMAT CD11

CANIBALIZATION CARD FORMAT

STOCK NUMBER										WORK UNIT CODE										SERIAL NUMBER										SUPPLY DOCUMENT NUMBER										TIME OF MAINTENANCE										MAINTENANCE REPORT NUMBER										CANIBALIZATION																			
FSC					PREFIX					FIDN					ADDITIONAL					QUANTITY					UNIT CODE					PART FOR					SERIAL NUMBER					JULIAN DATE					SERIAL NUMBER					CLOCK TIME					FOR TO AIRCRAFT					FROM AIRCRAFT					EQUIPMENT TYPE														
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80

FORMAT CD12

NOMS: C Form 403, June 1967

STOCK NUMBER										QUANTITY										SUPPLY DOCUMENT NUMBER										EQUIPMENT TYPE										WORK UNIT CODE										JULIAN DATE										CLINP TIME										ROAD									
FSC					PREFIX					FIDN					ADDITIONAL					QUANTITY					UNIT CODE					PART FOR					SERIAL NUMBER					JULIAN DATE					SERIAL NUMBER					CLOCK TIME					FOR TO AIRCRAFT					FROM AIRCRAFT					EQUIPMENT TYPE														
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80

FORMAT CD13

DOCUMENT CONTROL DATA

1. ORIGINATING ACTIVITY THE RAND CORPORATION		2a. REPORT SECURITY CLASSIFICATION UNCLASSIFIED	
		2b. GROUP	
3. REPORT TITLE THE RAND/TAC INFORMATION AND ANALYSIS SYSTEM: VOLUME I--DATA COLLECTING AND EDITING			
4. AUTHOR(S) (Last name, first name, initial) Finnegan, Fred and Anders Sweetland			
5. REPORT DATE January 1969		6a. TOTAL No OF PAGES 152	6b. No. OF REFS. ---
7. CONTRACT OR GRANT No. F44620-67-C-0045		8. ORIGINATOR'S REPORT No. RM-5666-PR	
9a. AVAILABILITY/LIMITATION NOTICES DDC-1		9b. SPONSORING AGENCY United States Air Force Project RAND	
10. ABSTRACT A description of the Rand/Tactical Air Command system for the collection, processing, and analysis of data, as implemented on an IBM 1401 computer, in the management and evaluation of aircraft operations and support at base level. The first volume in the series documenting the system presents forms, procedures, and program operating instructions in the collection of operations, maintenance, and supply data. The discussion is directed to data collectors and editors responsible for providing the data bank to be used in subsequent analyses. Companion volumes in the series are Vol. II: <u>The Analysis Programs and Procedures</u> (RM-5667-PR); Vol. III: <u>The Analysis Design and Methods</u> (RM-5668-PR); and Vol. IV: <u>The System Software</u> (RM-5669-PR).		11. KEY WORDS Aircraft Tactical Air Command (TAC) Operations analysis Maintenance Materials Information systems Information processing Evaluation methods Rand/TAC Information and Analysis System	