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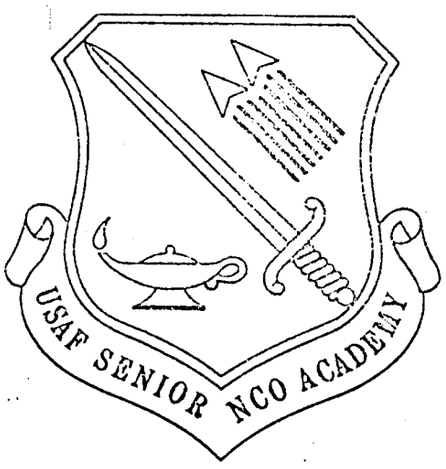

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ABSTRACT

This study addresses the Maintenance Management Information and Control System (MMICS). It begins with background information on the current maintenance management system, namely AFM 66-1, and its supportive information system known as MMIS. The study describes the need for Air Force standardization, followed by a comprehensive discussion of the objectives and subsystems of MMICS. The conclusions and recommendations address the need for personal integrity and the realization that the computer is a machine, dependent on people for efficient and effective use.

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CHAPTER I

INTRODUCTION

This paper will focus on the Maintenance Management Information and Control System (MMICS) currently being developed and tested by the USAF Data Systems Design Center. However, in order to provide an understanding of the need for such a system, background information on the current Air Force maintenance management system will be included. No attempt will be made to explain the detailed procedures of MMICS because time does not permit. In fact, this paper will begin with a short discussion and some observations about Air Force Manual 66-1, "Maintenance Management" and the current maintenance management information system (MMIS). Next, a comprehensive discussion of the objectives of MMICS and, in a general manner, the benefits to be derived from the system will be included. This will be followed by a few deficiencies in the system and some concluding remarks.

CHAPTER II

MAINTENANCE MANAGEMENT INFORMATION AND CONTROL SYSTEM (MMICS)

The subject of maintenance management and particularly Air Force Manual 66-1 has stirred controversy and widespread discussion for the past fourteen years. (1:15) (3:129) At least two major commands published their own maintenance management manual (MACM 66-3 and SACM 66-12) in an attempt to tailor the basic guidance of AFM 66-1 to their own peculiar needs. Other commands supplemented AFM 66-1 and in some cases the supplemental pages nearly outnumbered the basic manual (PACAF, USAFE).

The information system required to support a maintenance management system is known as "The Maintenance Management Information System (MMIS)". This is nothing more than an automated (computerized) method of providing detailed information to maintenance managers at all levels. Although it is intended to serve base-level managers, it all too frequently becomes a system of evaluation by headquarters-level managers and commanders.

The problem arising from this is that "once people have been evaluated by what they report, they begin to report only information that puts them in a favorable light". (2:15)

For many years attempts to standardize and modernize maintenance management have met with varying amounts of success. As an example, the complete rewrite of AFM 66-1 in 1972 and implementation in October 1972 (Project Rivet Rally, Phase 1) began the Air Force wide maintenance management standardization process. No longer could major commands publish their own separate manuals. However, supplements to the basic manual were allowed, provided they dealt with truly command "peculiar" situations. (6: para 1-25)

Maintenance management and the contents of AFM 66-1 were again reviewed beginning in July 1973 (Project Rivet Rally, Phase 4). Major Command supplements, coupled with recommended changes submitted by virtually all factions involved in Air Force maintenance management, served as the basis for the review. This latest review revealed that not all organizations could operate under the same conditions and that options had to be provided. The results were a maintenance management manual that opted some procedures but at the same time standardized those options throughout the Air Force.

Just as maintenance management concepts and procedures

were being standardized and modernized, so too was the information system required by maintenance managers undergoing an exhaustive study. Technological advances in computer and data processing hardware "made a re-evaluation and redesign of the total maintenance system necessary". (5:1-2) The more standardized maintenance management procedures required by AFM 66-1 enabled development of the system because it must be applied and used Air Force wide in order to be economically feasible.

The Maintenance Management Information and Control System (MMICS) evolved from this study. The Air Force Data Systems Design Center, after consultation and discussion with the members of Project Rivet Rally and major command representatives, developed MMICS, which "is a technically complex computer application to meet maintenance requirements. It is complex internally in order to simplify the man-machine relationship". (4: Forward) That is to say, the computer programs are designed to provide information that requires complex computer action. However, the operations performed by the individual to gain this information are very simple and require minimum training.

MMICS is a "real time" computer system. This simply means that access to information stored in the computer is

available as it occurs to all base level managers through use of remote devices. This is in contrast to the present maintenance management information system which requires voluminous reports processed periodically and after the fact, from which each maintenance manager must extract the data applicable to his particular needs. MMICS proposes the hardware and software necessary for real time usage. Maintenance staff functions and production work centers will all have remote devices that enable "inputing" of information as soon as an event occurs as well as "outputing" of information whenever requested. The output information can be displayed on a visual screen or printed on paper, depending upon the user's need. Some of the information available will be weapon system records, status, configuration, personnel by skill and work center, plans and schedules, delayed maintenance, critical AGE, operational requirements, training requirements, and a limited amount of supply status.

Thus far, only the "information" portion of MMICS has been discussed. What about the word "control" in MMICS? Once the computer has been given the approved schedule with all related events, such as departure time, job starts, job stops, and training course start times, it will begin to tract these events and print unsolicited notices to the proper agencies if the events are not occurring as scheduled.

Such things as the failure of an individual to report information promptly or a schedule slippage will immediately cause the proper notice. In other words, the computer will act as an alarm, thereby informing managers that certain events are not occurring. The manager then is able to take the appropriate action.

MMICS is divided into functionally organized subsystems, which are training, job control, planning and scheduling, materiel control, analysis, quality control, and administration. Each of these functions will now be discussed so that the current method of operation can be compared with what MMICS will do.

Management of a maintenance training program currently requires a substantial number of people to determine training requirements, schedule courses, evaluate training results, and generally administer and document the program. The computer can absorb virtually all of the administration and documentation workload, thereby reducing the number of people needed and allow those remaining to expend their efforts in evaluating the quality of training being conducted. To do this, the computer is first loaded with all training courses available. Next, each individual's training accomplishments are inputed, thus automatically producing training requirements. Since this can be done by organizations or

even a work center, the supervisor can easily determine training needs without screening the individual's records. Training forecasts and schedules are then automatically produced and monitored.

Job control is the nerve center of any maintenance activity; they direct, control, and monitor all maintenance activity. To do this, they must know such things as; current weapon system status, status and priority of each job, location of each aircraft and equipment item, and location and availability of the labor force. These factors are now manually dealt with through use of multiple status boards, and various communications networks that tax the mental and physical capability of the controller to a degree approaching impossibility. MMICS will use the computer to assume a large part of the recording functions, serve as an information source available on demand, and act as a monitor to help preclude unwarranted or unnoticed schedule deviations. Instead of information flowing to the control room via radio, telephone, or teletype for manual recording on a status board, the individual technician will input the information into the computer via a remote device in his work area. The controller need become involved only if the technician fails to accomplish a programmed event promptly and the

computer system notifies him of the deviation. Historical data, job progress, and aircraft or equipment status are available at anytime.

Plans and scheduling merges operations and maintenance requirements with maintenance resources into a schedule that will best meet mission requirements. This requires a staff of personnel constantly reviewing and updating equipment records, personnel availability, and supply status. The two most important items in this area are recurring inspections and time change items. In MMICS, the computer will be used to track these events; it will forecast, schedule, and monitor each event.

Materiel control provides the link between supply and maintenance. Since supply already makes much use of a computer, the Univac 1050-II, most of the data required by materiel control is already available. MMICS does not have the impact on materiel control that it does on other functions. One highly useful tool though is a listing of all open discrepancies on an equipment item or weapon system that requires supply action. This enables materiel control to confirm supply action and perform any follow-up that may be required. A time change listing also enables materiel control to insure that needed parts are available at specified times.

The primary responsibility of quality control is to insure that all maintenance performed meets required standards. Other responsibilities include materiel deficiency reporting and time compliance technical order (TCTO) monitoring. It is in these last two areas that MMICS is an effective system and significantly reduces the administrative workload, thus allowing quality control personnel to perform their primary duties. Since MMICS is a real time system, deficiencies and possible undesirable trends can be recognized earlier than in the present system. They therefore can be dealt with earlier and preclude possible major problem areas. The current TCTO monitoring system requires laborious manual records keeping. Reports are received periodically and changes posted manually. In MMICS, all actions are updated immediately and available at anytime. TCTO scheduling can be accomplished whenever an aircraft is not committed to a mission because the TCTO status is readily available.

Along with training, administration offers perhaps the most fruitful area for automation. One of the major workload tasks is the typing, reproduction, and distribution of various maintenance plans, schedules, and analysis summaries. In MMICS, the computer performs these tasks not only much faster but also with less chance for error.

Another major job of administration is the upkeep of current manning information. Currently this information must flow to administration for manual updating. MMICS will enable the individual supervisor to input changes to the computer, thus maintaining a current file on the situation and also making the data available to anyone who requires it.

The analysis function of maintenance already makes much use of the computer. The main advantage in MMICS is that the information required for analysis is more current and readily available. Problem detection and isolation become easier because the products available are narrowed to specific areas. Currently, general summary reports are used which must be closely screened and interpreted.

MMICS, then, is a computer system designed to absorb many of the manual and time consuming functions of management, provides a current, reliable information source readily available at a moment's notice, and provides a system of automatically serving notice of scheduled events and deviations to those events through an alarm device.

CHAPTER III

DEFICIENCIES, RECOMMENDATIONS AND CONCLUSIONS

As in any other system, MMICS has deficiencies. The primary problem area, inherent in its objectives and necessary procedures, is the easy accessibility to all personnel for inputing information. Individual integrity will dictate to a large degree, the reliability of information stored in the computer.

A more specific area is the method of individual identification. Currently, completed maintenance actions are identified to an individual by using his last name first initial and last four numbers of his social security account number. This is obviously a permanent number and remains with the individual throughout his career. In MMICS, an automatically sequential five digit number will be assigned and will change whenever an individual is re-assigned to another base or maintenance activity. This will create temporary error generations and cause data rejection.

Two other deficiencies stem from inadequate finances. They are the implementing of MMICS incrementally and the

limiting of the amount of hardware. Initially, only training, administration, TCTO status, and a small part of job control known as "estimated time in commission" will be implemented. This will have the opposite effect of the objectives of MMICS. Instead of decreasing administrative workload, it will in many instances increase workload because manual operations will have to continue in order to reflect the total operation. Initial loading of personnel and equipment historical data into the computer is a monumental task. Additionally, the error rate can be expected to be abnormally high due to unfamiliarization with system components and procedures. A lack of funds has caused the delay in purchasing a high speed printer for the maintenance complex. This means that data cards will be inputed into the computer at the data processing installation and output received there. The delay in availability of the products caused by distribution lag time will negate "real time" accurate information because errors cannot be immediately corrected.

In spite of these deficiencies, MMICS appears to be the long term answer to the needs of maintenance management. It has absorbed the time consuming, routine administrative chores, provided maintenance and personnel forecasts and schedules, and provided a system to warn of

impending problems and deviations. The maintenance manager will be able to concentrate on solving problems, and because of the information so readily available, even preclude many problems from ever arising.

In conclusion, it must be recognized that the computer is only a machine. Therefore, people will ultimately determine it's effectiveness. This will require extensive training and education of all maintenance personnel so that maximum benefits may be derived and the system serve the purpose for which it was developed. That is, a system to be "used by base level managers to more effectively utilize their assets (personnel, equipment, facilities and material) to accomplish the mission and increase their capability". (5:1-2)

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