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A Preliminary Study of the
NPIC Management Information System (MIS)
and Management Information Needs

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Main Report

The tasks to which this study is addressed are the definition of management information needs, reassessment of the current Management Information System (MIS), and consideration of alternatives. The intent is to view the MIS and management information needs, and their relationships to Center activities, in general, in broad perspective so as not to obscure the issues with unnecessary detail. No attempt will be made to fully summarize the appendices, since that information speaks for itself. However, the appendices will be liberally referred to and significant points noted.

It is extremely difficult to place a specific value upon management information, particularly in a non-profit environment. About all that can be said is that Center management (and other appropriate authority) should have available, by one means or another, that information which it must have to accomplish its objectives and fulfill its missions and that the associated costs should not be excessive. Certainly this information requirement can be met at a cost commensurate with the importance of the NPIC product and with fulfillment of the national role in the intelligence community.

The problem then is briefly one of, firstly, defining the objectives and missions and, secondly, defining the information which is essential to accomplish these in order to assess the assets and liabilities of the MIS and consider alternatives. The importance of objectives, goals, etc., has been discussed elsewhere a number of times, so the focus of this study will be upon the second item. This deceptively complex subject, the information necessary to manage, nothing more and nothing less, is the legitimate concern; that is, a management information system, not a strategic planning tool, not an operations research technique, and definitely not just an operational control device for monitoring specific tasks, although this latter activity is certainly related to a management information system and may indeed be a subset of such a system.

There is much confusion about management information systems in general and the MIS in particular; this is the root cause of many of the problems besetting the current MIS. Questions such as "What do I want it to do and why?" "What should it do?" "What can it do?" "What can't it do?" need answers. Stated bluntly, it is quite clear that many persons do not either understand or agree, or perhaps both, upon the purposes and capabilities of the MIS, or any management information system for that matter. This is evident from the responses obtained from the Groups and Staff, and from discussions with IAS, to certain questions posed to them on the MIS and management information needs (see Appendices B, Questions on Definition of Management Information Needs and Reassessment of the MIS, and E, which summarizes responses to the questions.) Perhaps, too, it is naive and unrealistic to expect full understanding and agreement, and it should not be inferred that any one answer to a question posed is necessarily correct. The answer to a question such as "What are your

Review for MIS

Objective & info

Need answers to these questions

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management information needs?" will depend upon, among other things, such variables as what the person is supposed to do, what he actually does, how he does it, the particular problems he has encountered in the past, the requests he has had and anticipates for information about his areas of responsibility, and even personal biases.

When trying to categorize and analyze the substance and validity of responses stating information needs, plus opinions as to what is wrong with or lacking in an ongoing system, which also reflect the variables mentioned above, it is next to impossible to classify, much less reach conclusions about, the responses unless some sort of framework is provided upon which to "hang" the information; that is, to relate its parts and make it a cohesive picture, so as to furnish a perspective which is valid and can be of some use in making the appropriate decisions.

Such a framework is provided in Appendix D, Management Information and Planning and Control. Although some might consider such an approach "too theoretical" and a "waste of time," it is hoped that the point has been made, and it will be reinforced below, that this is absolutely essential. All too often, there is a tendency to go charging off in all directions with solutions to the problems before the problems are really defined or understood. The intent herein is to derive the right solution for the real problem, not what someone thinks it is but what it actually is. (For example, would it not be rather foolish to make the MIS real time when there is almost unanimous agreement that the MIS information content is inadequate?) And it does not matter so much whether or not there is agreement upon the conceptual framework (there probably won't be since there are almost as many views of the management process as there are managers); what is important is that the classification scheme is understood so that there is communication using a language meaning the same things to all involved. For example, it is hoped that, when operational control decisions are referred to, all are thinking about roughly the same type of decisions with respect to time span, organizational level, importance, amount of judgment involved, and so forth, no matter what others might have preferred or even what might have been preferable to term that class of decisions. The main definitions derived in Appendix D are repeated here for convenience.

Strategic Planning: the process of deciding on objectives of the organization, on changes in the objectives, on the gross resources used to attain these objectives, and on policies that are to govern the acquisition and use of these resources.

Management Control: the process by which managers assure that resources are obtained and used effectively and

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efficiently in the accomplishment of the organization's objectives. It combines both planning and control within the context of objectives and policies determined in the strategic planning process; effectiveness and efficiency are the criteria relevant for judging actions.

Operational Control: the process of assuring that specific tasks are carried out efficiently and effectively; emphasis is upon execution of tasks.

It was not possible to obtain the first or original cost of the current MIS, but a very conservative estimate of current annual costs to NPIC, more or less directly attributable to MIS operations is [redacted] or, looking at it another way, less hardware costs of about [redacted], this is the equivalent of about 12 [redacted]. It should be noted that hardware cost is essentially a sunk cost since NPIC owns its computers and contracts for regular maintenance, and those costs equivalent to the extent that MIS output obviates other systems probably should be subtracted from the annual cost figure if it is desired to arrive at an absolute cost figure.

Appendix C, Brief Description of the Current MIS, and Appendix F, Samples of MIS Standard Output, roughly sketch the operation of the System and indicate its capabilities. Briefly, the MIS can provide regular time hours, overtime hours, and dollar equivalents sorted in various ways according to organizational element (Group, Division, etc.), project block (major work effort, such as KH-4A processing, basic reporting, etc.), specific project number, and activity or skill code(s). It is capable of providing reports or listings showing active projects on record, active projects by responsible component, all projects on record, new projects established, projects completed during a period, projects cancelled, and projects and time recorded against cancelled and completed projects. These reports generally include project number, project title, organizational element responsible for the project, category or specific type of project, country or area of interest, requesting organization, project priority/weight, begin, deadline, and completion/cancellation dates, and security classification code of the requirement form. Also available is a report, Component Time Allocation, giving weekly information on each employee by component; it shows name, badge number, grade, component, week ending date, projects worked on, activities against projects, and regular time, overtime, and dollar equivalents. In addition, there is a MIS capability for specially formatted reports; that is, presentation of data in other than standard formats in answer to ad hoc requests but not necessarily in any format desired--there are constraints as to how the data may be aggregated and presented.

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In short, this is the current MIS capability, which does not mean the System cannot be improved, if desirable, in a number of ways, including perhaps reprogramming. The most serious constraints by far on improvement of the MIS are dictated by its record structure, which simply means that it is possible to input and store data only in certain rigid formats and amounts and to associate the data in only certain ways. In other words, there are some real constraints upon what may be done, within reason, with the current MIS. By "within reason" is meant that, if we are speaking of making the MIS into a real-time system, with near real-time input and output, then, for all intents and purposes, we are, or ought to be, speaking about a new system, one in which it would be worse than foolish to incorporate these serious constraints. This implies a very fundamental change, comprising redesign and at least major reprogramming. If, on the other hand, we are really considering only making the current MIS configuration real-time; that is, imagine that essentially the current output were available in real time, then we are no longer speaking of a management system with real applicability to management planning and control (exception reporting), but only of what would be basically an operational control mechanism.

The current MIS is mainly oriented toward project accounting, or the recording of data against discrete tasks. This has meant that, since all the time of every employee is recorded in the MIS, when utilizing the MIS all Center activity must be conceived of as being applied to discrete tasks, an obvious and serious error. The System tries to "hedge" against this misconception, which unfortunately has had certain ramifications in how some persons fundamentally view the activities of the Center, by setting up "open" project numbers and other devices which in fact obscure rather than aid assessment of accomplishments and often greatly frustrate management attempts to use the System. Perhaps it is of relatively minor importance, but this has also increased costs through undesirable redundancy between organizational element, activity code, and project number.

Not to belabor the point, but this essentially task-oriented approach is conceptually invalid and is the greatest single detriment to the System's imputed purpose, to provide management information. Although there is some legitimate management information "fallout" from the System, comprising certain aggregations of project oriented data, the System is by design basically an operational control mechanism which has been forced to masquerade as a management information system. And as a specific task-oriented system, by consensus it fails a most crucial test--it is not timely enough.

In managing specific tasks, it is important to know when, and also how far, something is deviating from plan or is out-of-control, so corrective action can be taken either by supervision or line management. It is, of course,

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a matter of judgment and a function of the particular activity being monitored just how timely information must be, but apparently the System is not timely enough because it rarely, if ever, is actually used for control purposes by line management and supervision; that is, either to ascertain if things are going according to plan or if things are out-of-control. The PMB is moving into the control area, monitoring projects using the MIS, but its position also is that the MIS is not timely enough for this purpose. And with respect to monitoring specific projects, upon which the PMB scheduling function is actually based, one could wonder if this line function, project scheduling and control, has not been relegated to what could be considered a rather high-level staff activity (even though the PMB is composed primarily of line representatives who meet daily) due in great part to the failure to provide line management with the data it needs in a timely fashion. Of course, the PMB has the additional responsibility of scrutinizing and validating requests for products or services.

As mentioned, it is the consensus of NPIC components that the MIS is not timely enough for those uses the components envisage for it. It is safe to say that IAS would prefer more timely output. As pointed out in Appendix C, output relating to time sheets is normally received about one week after the data is submitted to AID. This can mean that, for a specific project, since the time sheets cover a one-week period, it could be up to two weeks before information were available; for example, if the information pertained to time recorded against a project completed on a Monday. For other types of data, even though the data is often input daily to AID, the lag in time can be from about two days (as a best case for items such as products produced, changes in project status, picking up new projects, etc.) to about one full week. This is because updating is accomplished only once a week.

No system can be all things to all people, in spite of what some computer specialists will say, but this is the position in which the MIS has been placed. It is perhaps worthwhile to note that, while system's designers and operators may have many virtues, managerial insight and competence are not necessarily among them, but management is often afraid to challenge these specialists publically lest it display its ignorance. Such discussions usually get bogged down in detailed technical considerations, freely laced with confusing computer jargon, and the battle is fought on the computer specialist's own field, so to speak. This is unfortunate, and it should be just the reverse--the system exists to serve management and the computer center is a service organization which should be able to communicate with management in the language of management.

Because expectations and needs have not and can not be matched by performance, the MIS has failed to do any job as well as it should be done, either in the areas of strategic planning, management control, or operational control. It might be preferable to modify, as needed, and improve the MIS (incidentally

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also to rename it) and essentially assign to it the job for which it is best suited; that is, monitoring specific tasks in the operational control area. To expect it to function truly as a true management system, at least in its present configuration, is just unrealistic. Perhaps with modification, ultimately it could have real utility for those discrete activities which are amenable to establishment as specific projects. This does not mean, however, that the management information "fallout" mentioned earlier should be disregarded unless or until other provisions are made.

Interestingly, the MIS has found its greatest applicability in an area inconsistent with its design; that is, in the area of what is primarily management planning (a subset of what is called management control). This is exemplified by its use in the PPB process, including PPB documentation; for example, in the planning and programming of resources to accomplish approved program elements and sub-elements. And within this use, the non-financial accounting function is greatest; that is, keeping track of how manpower resources were applied to major work categories. Rough measures, based upon this historical data, are used mainly for projecting future manpower needs; those who use these measures are quite aware of the slack within the System. The total financial aspect, the touchstone of the PPB System, is essentially outside the MIS capability, as is any object class/program element crosswalking. In addition, certain other uses are made of MIS data, such as forecasting for the PMB, with the express knowledge that the figures are rough, overall planning inputs wherein the values of the real variables comprising the estimating statistics are not known.

Aside from the obvious deficiencies in capabilities and operation of the System, too much information needed by line management is not incorporated; i.e., financial, human resource, and supplies and materiel resource information, especially if film with all its attributes (footage, targets, schedules, etc.) is thought of as a materiel resource--perhaps an uncontrolled input, but nonetheless a materiel resource. In the future, electronic transmissions of a real-time collection system would be analogous to this primary materiel input. Appendix D makes a point of the primacy of the management decision process, whether it be for planning or controlling purposes, or any blend of these activities; this is the area toward which a management information system must be directed--it must provide comprehensive information on the ongoing operation. To be comprehensive, it must provide human resource, supplies and materiel resource, and internal and external financial information geared to the type of decisions which must be made and to external requirements for information, and all this must be accomplished in the proper time frame. Also, as was noted in Appendix D, the central function of a management control system is motivation, motivating management to make decisions and act in ways consistent with the overall organizational objectives. The relationship of the system to other systems must be recognized, but the system should filter and condense

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information, removing that which is irrelevant for management purposes.

While the MIS is used primarily as a historical record, often the basis for rough manpower projections, and relatively little for operational decision-making by line management, in those cases where MIS information conceivably could be used for decision-making, there is a great deal of hesitancy to do so because of deep suspicions concerning the accuracy of the information. (There are exceptions concerning accuracy in some components and the IAS.) The accuracy concern basically is a function of three things: (1) certain aspects of the System itself, not amenable to change; i.e., it is not sufficiently reflective of Center activities; (2) certain System mechanisms and procedures which frustrate accuracy of input and output but which are amenable to change, and (3) a lack of interest in the System resulting in little enforcement of the procedures, inadequate validation of input data, and inattention to potential uses and worthwhile improvements. Management at all levels must share the blame for the latter two problems; it generally does not "back the System" and turns a deaf ear even when real problems are surfaced. Of course, this is not true in every case, and those components in which it is not true are precisely the ones which derive the most benefit from the MIS.

Further, this lack of backing is not necessarily the fault of top management, as is so often charged, because it is the responsibility of the lowest level of management dealing with the MIS input data to insure that it is accurate and as timely as the System permits. The Executive Director, for example, neither can, should, nor will check all the time sheets for accuracy on Monday mornings; all he can say is that the input data must be accurate and the Group and Staff Chiefs must reflect this command and pass it on to the appropriate persons. If the MIS is retained for any period and in whatever form, Center personnel should be informed thoroughly of its accuracy requirements, its operation, capabilities, limitations, and basic purposes, perhaps through a "short course" as suggested by TSSG and PPBS/PPS.

A reasonable approach to design of a management information system (what it should do and why, what it can do, and what it cannot do) is to concentrate upon the decision process, identifying the decisions to be made and the information needed to make them. These decisions are both planning and control decisions, all of which vary in a number of parameters. The material in Appendix E will not be repeated here, but it is obvious that, to a very great extent, the MIS is conceived of as a gigantic data bank able to spew out specific answers on immediate demand to varieties of questions in usable form merely by pressing a button. For example, such capabilities as data for use in answering questions (unspecified), compiling papers and reports, yearly summations, etc., are called for. This completely misses the point, although in fairness decision information is implicit in much of what was asked for. But it is also obvious that merely asking managers for answers as to what is needed is not nearly as precise enough

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manner in which to determine management information needs. What must be done is to study the decision process in depth to identify the decision points, the types of decisions made, the frequency of these decisions, the relevant time frames in which they must be made, and the data and information needed. Then the system can be designed, with full consideration of both hardware and cost/effective questions, to meet as many of the requirements as possible and to incorporate legitimate external information requirements.

While the MIS is now adjudged inadequate in a number of respects, if all the information cited in Appendix E, along with the new needs that will crop up in the course of a redesign, were to be incorporated in a new system, we would be approximately back where we started, and rest assured that any system predicated upon such an approach would be a failure, in addition to being excessively expensive. If a new system is desired, an unhurried, in-depth study must be undertaken to determine what information and data are actually needed by management and a system designed to provide these. There is no other viable alternative to the successful design and institution of a worthwhile, new system.

This also implies taking a good look at what the Center is actually doing and what it will be doing in the future: that is, definition of current and projected outputs. (Some work has been accomplished in this direction recently which could be of use.) This also concerns inputs and is essential because it is the ultimate concern of management; that is, the process about which decisions must be made--what does and will the Center produce? Output is not necessarily a visible product which can be precisely measured, but explicit recognition of and understanding about Center output must be achieved. This has been a problem in the past, and not only with respect to the MIS. For example, first-phase mission exploitation means many different things to different people. To some it means the OAK, but obviously the hard copy OAK is only a part of the first-phase because other tangible and intangible products are forthcoming from the exercise; e.g., briefing boards, cables, information transfer from film to PI to analyst perhaps via telephone, enhancement of the PI's knowledge and expertise later reflected in a basic report or special study, etc. It should be clear that the hard copy OAK (it is possible that there may not even be such a report in the future) is not the only or even necessarily the best measure of first-phase processing, that it does not adequately define the output. Perhaps the Center should be viewed as an information processing and transfer link in a communications network with an output susceptible to some means of information flow measurement, rather than trying to assess output according to discrete, tangible products which really are only the media or vehicles for the information transfer. This does not mean that information on tangible output items may not be useful, but only that perhaps the emphasis is misplaced. What then are we really speaking about as initial output when a

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mission is received for exploitation? What is the most significant attribute of this process, and what should and can a management information system tell us about the process? This is the type of analysis required.

The PPB Staff was recently asked to give OAK unit costs; these cannot be derived objectively from the MIS for the reasons alluded to above. If hard copy OAK production were stopped tomorrow, but something analogous to first-phase processing continued, it is conceivable that there could be relatively insignificant savings, particularly in PI time, the point being that we do not have the information needed readily available in the MIS to make decisions in this area with any degree of assurance, nor do we know if it is possible to obtain such information in any quantifiable sense because the activity has not been explicitly and adequately defined. The gross figures available could be of some use, along with a healthy input of judgment, in assessing the problem, particularly if the question were directed toward the broad subject of all first-phase processing, but beyond that there are serious difficulties. Nor should be attempt to impute accuracy because we have some figures; attaching a number to something does not make it a fact!

In spite of the many problems attendant to the current MIS and its utilization, the System does have positive aspects which should not be overlooked or minimized. The MIS is used: to determine grossly how the Center uses its manpower, how and on what the components spend their time, and the costs of specific projects or categories of projects; for various planning purposes, and in the documentation for the PPB System. As was stated, it is mainly a historical record on which few current operating decisions are based; however, instances of decisions based primarily on MIS data can be cited; for example, by IAS. As PSG/RD pointed out, all of the MIS data can obviously be put to some use, although there is little evidence of a great deal of effort having been expended in this direction.

Perhaps the best way in which to look at the positive aspects of the MIS is to consider what the state of affairs would be if the MIS were suddenly discontinued. Obviously, Center management needs some data similar to that available in the MIS; in fact, the real problem is that more and also certain different types of information are needed and some of it in a more timely fashion. If the MIS were deleted, components would be forced to establish systems, manual and/or automated (in addition to those systems already existing outside the MIS), to fill the gap, and at the top management level at least, there would be a major problem of mutual reconciliation and interface of these systems. There is absolutely no assurance that this would be any less costly than retaining the current MIS.

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It must be remembered also that NPIC now has an ongoing, tested system whose capabilities--and deficiencies--are known quantities; to discontinue the MIS means moving into an area of which little is known and in which there undoubtedly would be many problems. Employees are now familiar with the MIS, and its particular demands upon them, and are used to the routine. Discontinuing the MIS would mean discarding the positive aspects, and any systems replacing the MIS will have real costs relative to indoctrination and re-establishment of a routine.

This leads to the conclusion that, until something better is available, the basic MIS should be retained--not necessarily in its current configuration--unless further study proves this to be a bad conclusion; that is, unless the valid information requirements now met by the MIS can be met through other decentralized and more efficient systems, probably basically manual and unit record or ADP, whose operations and costs present a more favorable alternative. However, before this can be determined, any and all other systems must be well defined in further study so they can be weighed against the MIS. In other words, it would be a mistake to announce discontinuance of the MIS and generate probably what would be a mad scramble to establish other systems; if it were decided to discontinue the MIS and not replace it with a more powerful centralized and automated system, the steps following the demise and any other systems to be operated in lieu of the MIS should be well planned, understood, and agreed to by all. There are positive improvements which could be made in the MIS, along with certain decrease in costs to be achieved, particularly with respect to manpower savings associated with data input and interpretation and manipulation of output. In effect, the System can be trimmed and tailored to better meet needs more efficiently, and perhaps its primary orientation redirected so that its potential can be better realized while, at the same time, not discarding the information useful to management; that is, the management information "fallout" from the System.

A new system, based upon in-depth study of Center input and output, the decision processes, and external information requirements, would be focused upon the management control area. However, the system should have the capability of drawing upon data stored and used for operational control and strategic planning purposes. The application would therefore be an integrated data processing system incorporating, firstly, pertinent human resource, materiel resource, and financial information used for management decision-making and external reporting, and, secondly, detailed operational control data, deemed necessary and feasible to include in the system, and certain strategic planning information. As pointed out in Appendix D, however, it is neither desirable nor feasible for the system to support routinely the strategic planning activity.

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Therefore, flexibility is of paramount importance; that is, the capability to add, delete, and alter both application programs and storage files, because management information needs, much less operational control systems, are not static over time and lead times are often such that a system can be outdated before it is operational. This approach is now within the state-of-the-art. For example, with such a system, it would be possible to add new types of information as needs change, to delete files no longer worthwhile to retain, and to change programs which assemble and manipulate data drawn from storage files. This capability, possibly along with real-time access and remote display devices, would be built into and be an integral part of the system, obviating the extensive and expensive reprogramming now attendant to any major changes to the MIS. Such a system is usually termed a computer-based, general purpose, information management system; private industry is now working on the concept.

Viable alternatives to the management information problem are:

1. Discontinue the present MIS; reject the centralized, automated system concept, and establish the appropriate decentralized systems.
2. Discontinue the present MIS; use other interim systems, and move toward a new, more powerful, centralized, automated system.
3. Continue the present MIS, improving it as much as possible, and do not consider other systems.
4. Continue the present MIS, improving it as much as possible, and move toward a new, more powerful, centralized, automated system.

Major factors, developed in the preceding discussion, bearing on the problem are:

1. As a management information system, the current MIS is conceptually invalid primarily because of its project account orientation and its narrow scope.
2. The MIS is now actually inadequate as a management information system, and for other purposes for that matter, in a number of respects, including timeliness, accuracy, output formats, and data content.
3. The full potential of the current MIS has not been realized.

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4. The current MIS is not excessively costly in view of its stated purpose, but it is costly in view of its actual performance.

5. The current MIS can be modified to make it more efficient.

6. If the MIS is discontinued certain benefits will be foregone.

7. There is no assurance that there will be any savings to accrue from discontinuance of the MIS.

8. Replacement of the MIS with decentralized systems is liable to be fraught with problems wherein significant information gaps could emerge.

9. It is doubtful that other than a centralized, automated system can meet the needs of Center management.

10. Except for one Group, there is unanimous interest in more timely information, particularly in real-time capability and remote output devices.

11. In certain cases, NPIC management conceives of a new system as a gigantic data bank able to respond rapidly to almost any question. This is not a practical concept.

12. There are two fundamental objectives for a management information system: to provide essential information needed for management decision-making and to provide information legitimately demanded by external authority. Any new system should be designed to achieve only these objectives. Extraneous and "nice-to-have" information should be excluded from the system.

13. The type of system able to achieve the objectives is within the state-of-the-art.

Matching the alternatives with the major factors bearing on the problem, the following conclusions and recommendations have been reached:

1. The Center should stick with the concept of a centralized, automated management information system; to reject this concept is a step backward. This is in line

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with the Executive Director's stated desire that the Center move toward automation and optimization of the exploitation process.

2. The current MIS should be retained and modified at a reasonable level-of-effort.

3. The modified MIS should be kept in operation while a study of management information needs, with emphasis on the decision processes and external information requirements, is performed.

4. As a result of the study, a new system concept should be developed.

5. Preliminary cost estimates for modification of the current MIS, if feasible, and new systems capable of fulfilling the needs stated in the systems concept should be generated.

6. Cost/effectiveness evaluation of the alternatives should be carried out and the results, along with the final systems concepts, presented for executive decision.

7. The decision reached in step 6 should be pursued vigorously and strongly backed by NPIC management through to and after implementation. It will be not only desirable, but necessary, to assign some of the best assets of the Center to this task.

8. Because development of a new systems concept will require an in-depth study of NPIC with respect to current and future input, output, decision processes, and external information requirements, there will be worthwhile side benefits from the study with applicability to other Center problems.

9. Such a study should be run primarily in-house, with contractual assistance as needed.

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MEMORANDUM FOR: Chief, Production Services Group
 Chief, Imagery Exploitation Group
 Chief, Technical Services & Support Group

SUBJECT : Terms of Reference: Review of Management Information System

1. At the direction of the Executive Director, NPIC, the PPB Staff has been tasked to "define management information needs, reassess the need for MIS, and consider alternatives". [redacted] would like to have a response to his request by 29 May 1969. 25X1

2. Our report to [redacted] should incorporate the needs, views, and best efforts of all Center components. The utility of the final product will depend in great part on your active participation. Thus, the cooperation and assistance of the Groups and Staff will be required to carry out this task. 25X1

3. The attached Questions Bearing on the Problem are forwarded for your information and review. We would like to meet with your representatives to discuss the Terms of Reference and the general approach to the task at 1000 hours, Monday, 28 April, in the Green Room.

4. Please telephone [redacted] giving the names of your representatives. We would ask you to insure that there is at least one representative from your Group, but feel free to include as many representatives as you wish. 25X1

[redacted]
 Chief
 Planning, Programming & Budgeting Staff

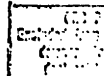
Attachment: a/s

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- 1 - NPIC/TSSG
- 1 - NPIC/PPBS

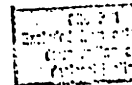
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Appendix A: Terms of
Reference QUESTIONS BEARING ON THE PROBLEM

- I. Definition of Management Information Needs
 - A. What levels of management should be included in view of the short deadline? Will restriction to these management levels be adequate in terms of producing a meaningful report?
 - B. What components should be involved?
 - C. What are the missions and functions of each management component? What is the actual management structure; that is, what plans are formulated and decisions made by the organizational components?
 - D. What information is now utilized at each management point? Why is it required? How is it obtained? How is it used?
 - E. What information, not now available, is needed? Why and for whom is it needed? Why can it not be obtained currently?
 - F. What information will be needed in the future? Why will it be needed? How will it be used?
- II. Reassess the Need for the MIS
 - A. What factors should be considered? Can data on these factors be gathered in the required detail and within the time frame?
 - B. Does a reasonable criteria for assessing the MIS exist? If not, can one be established?
 - C. How does the MIS operate?



Appendix A: Terms of Reference

- D. How is the MIS used by management? Is it deficient, and if so, in what respects? What are its strengths? Is any information collected not used?
- E. What are the costs of the MIS? In view of 1 and 2 above, does the payoff from the MIS in its current form justify its costs?

III. Consider Alternatives

- A. What level of detail can be incorporated within the time frame? Will this level be meaningful? If not, what must follow-on to make it meaningful?
- B. What components should participate in the generation of alternatives?

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Appendix B: Questions on Definition of
Management Information Needs
and Reassessment of the MIS

APPENDIX B

1. At this time, the areas of most concern to you are: defining your management information needs and your reassessment of the need for the MIS. The two areas are inextricably related. Although we can certainly say something about the MIS after looking at its costs and the uses to which it is now put, it is also necessary to evaluate how well it does or could meet the real needs of management.
2. In reassessing the MIS, certain questions must be answered by each component:
 - a. Estimate personnel costs
 - (1) How much time do employees spend filling in time sheets?
 - (2) Are they accurate? What problems frustrate accuracy?
 - (3) How many persons (organizational unit, grade) are specifically assigned MIS duties other than the filling out of personal time sheets? How much time per period (e.g., week) do they put on MIS activities? What are these duties (input, output, etc.)?
 - b. Equipment costs
 - (1) How much computer time does MIS use per period? Can this be translated into dollar costs (how much)?
 - (2) How much keypunch and other equipment time is tied up in the MIS (i.e., not available for other uses)?
 - c. Output
 - (1) What periodic output does each component get?
 - (2) What output does each component actually use? For what purposes? Is the information timely enough?

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- (3) What non-routine output has been requested and how or for what was it used?
 - (4) What additional periodic output would be desirable? Purpose?
 - (5) What output, periodic and/or non-routine, not now available in the MIS would be desired? For what?
3. With respect to management information needs, certain questions must be answered by each component (the below is not restricted to MIS information):
- a. Who are management? List the positions, duties (if not clear from position title).
 - b. What information does each now use? Break into routine and ad hoc.
 - c. Where and/or how is this information now obtained?
 - d. How is it used (purpose)?
 - e. What information does each manager now get which is of (1) little or (2) no use?
 - f. Assuming that the manager now gets no information, what information, including timeliness, does he feel is essential to have to perform his job. Why is it essential? In what form would it be preferred?
 - g. In addition to that essential information, what information would each manager like to have? Why, in what form, and when?
4. The answers to the above questions, and any other questions and comments which may be relevant to the contributions by the components should be submitted in writing according to the following schedule: (Partial submissions can be made prior to these dates).

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Appendix B: Questions on Definition of
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- a. MIS Costs and Current Uses to be completed by 7 May.
 - b. Definition of Needs to be completed by 16 May.
5. Meetings will be scheduled throughout the course of the effort.
[redacted] of the PPB Staff will
be available to provide guidance and lend any assistance they can
in the preparation of your contributions.

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Current MISAPPENDIX C

To place the MIS in perspective historically, the original published paper which came out in 1964 was entitled "Proposal for The Establishment of An Automated Time and Work Reporting System." In the early stages of development of the MIS, what was called the "total systems concept," at that time a very in-vogue buzz-phrase, was often invoked and unfortunately misinterpreted, at least within NPIC, to mean that all that had to be done was to file or computerize every bit of conceivably relevant information which, in turn, could be combined in any way in the output to satisfy all information needs. In certain cases, management was told and believed this tale which, needless to say, proved to be untrue. And when it proved to be untrue in practice, naturally there was a good deal of justified resentment, disappointment, and disenchantment with the MIS and computer-based information systems in general. These feelings have persisted and today detract from the potential utility of the MIS in a number of ways, running the gamut from affecting accuracy of input to unfounded criticism of the system and reluctance to use it. It is perhaps an understatement to say that there is a credibility gap with respect to the current MIS. Actually, in its current configuration, the system is very much in line with the title of the original paper--an automated time and work reporting system, nothing more, nothing less. It is indeed unfortunate that so much misunderstanding as to the system's purpose and capabilities was created in the past and so much harmful oversell promulgated not only internally but also externally to the Center; for example, at Headquarters, the Bureau of the Budget, and elsewhere.

The MIS records the time spent by personnel (and generates dollar equivalents) in satisfying external and internal requests for products or services or in performing the routine activities of their organizational unit. These distributions can be examined from various viewpoints, such as allocation of effort among the Center's major tasks, timeliness of project completion as compared with requested or "deadline" date, the expenditure of time against discrete projects, and so forth. In addition, since much information about a project is stored in the basic project "account"; e.g., requester, products, country or area, priority/weight, title, etc., the MIS also performs a project library function along with the basic time recording task.

The project request, once it has been accepted by the Requirements and Analysis Division and estimated and scheduled by the Production Management Board, becomes the basis for the establishment of a project

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Current MIS

"account" in the MIS. This unique account number, the project number, designates the major type of work being done, and the other descriptors (title, requester, etc.) indicate certain characteristics pertinent to the request. The final requirement is translated into a format compatible with the MIS and is prepared for keypunching by the Systems Integration Staff of AID. Each week the basic file is updated by adding new data to current projects, changing data on current projects as appropriate, adding new projects, and closing completed projects.

As the basic project account is being established in the computer system, xeroxed copies of the original requirements are disseminated to those components that will participate in the project; the project number is then transmitted to the individuals who will do the actual work. As employees work on the project, they record the specific activities undertaken against the project and the time expended for each activity. This recording mechanism is the weekly time sheet filled out by each employee; in addition to employee name, badge number, component, and grade, all projects worked on during the week are recorded, along with the specific activities and manhours for each project and certain other "overhead" activities, such as leave, training, etc.

On Monday mornings, the time sheets of all employees are collected by designated persons and delivered to the Systems Integration Staff. On the following Tuesday and Wednesday, the new data is edited, key-punched, and verified and corrected; normally on Thursday the magnetic tape containing the main file is updated. On Friday, when the updated file is ready to be queried, the regular and ad-hoc MIS reports are printed out. The PMB has an additional program that reads the updated file, performs some scheduling computations, and prints out the results.

In addition to the time sheet data, two other forms containing data elements are transmitted to AID as required, but usually daily. These are added to the main file during the weekly updates. One, the work phase notice, primarily signals the start and finish dates for a project in each component; the other is used to report product information against a specific project.

The major data elements comprising the current MIS are:

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Current MIS

1. Organizational Element -- Group, Staff, Division, Branch, Section.
2. Personnel -- Badge number, grade, name.
3. Project Time -- Regular time, overtime, and dollar equivalents.
4. Activity (Skill) Code
5. Project Title
6. Project Priority/Weight
7. Project Number
8. Project Country/Geographic Area
9. Project Category Code -- Indicator of specific type of project.
10. Project Requester -- Organization levying request.
11. Security Classification of Project Requirement Form
12. Project Begin Date (by Component)
13. Project Deadline (or Estimated Completion) Date (by Component)
14. Actual Completion/Cancellation Date (by Component)
15. Project Product Code -- Numbers of discrete output items produced under the project number.

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Planning and ControlAPPENDIX D

To address the NPIC management information problem in detail, it is essential to provide a practical framework comprising definitions of certain terms and pertinent concepts concerning the management process, management information systems, and planning and control or command and control. This appendix, which deals with these topics, is divided into four sections. The first, Definition of Planning, Control, and Management Information, is essential to the Main Report since the terms defined are used throughout. The second, third, and fourth sections, Strategic Planning versus Management Control, Management Control versus Operational Control, and Systems Design Implications, respectively, are presented, firstly, in amplification of the definitions and to show their inter-relationships and, secondly, to present pertinent generalizations about a management information system based upon the discussions in the first three sections.

Definition of Planning, Control,
and Management Information

The central function of management, its raison d'etre, is decision-making. Except for a relatively straightforward class of decisions readily amenable to operations research (OR) or purely mathematical solution, where enough of the decision variables can be rather explicitly quantified (e.g.; inventory control, resource allocation of the assignment and distribution type, replacement, maintenance, and reliability problems, sequencing and coordination problems--PERT and CPM, routing problems, etc.), decision-making not only involves but depends upon human judgment. Judgment can be enhanced by good information; this is the sole purpose of a management information system--to inform management of the facts available relevant to the decision at hand. Therefore, a management information system is not a substitute for, but only an aid to, management, as the name implies. As a corollary, the "perfect" information system would be of little overall value to the organization, if management were not competent.

These simple and what might appear to be quite obvious facts are often overlooked, consciously or unconsciously, by those involved with automated information systems, whether it be in their design, implementation, operation, or evaluation. That is, no matter how effective, an information system does not automatically produce good decisions. Unfortunately, automated information systems along with OR and systems

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analysis techniques, are often "sold," either openly or implicitly, as universal remedies for any and all management problems. Nothing could be further from the truth.

These facts are pointed out not in denigration of OR, systems analysis, or information specialists, or the usefulness of their skills and products. These disciplines are not only worthwhile, but are even essential, in today's environment; the intent is to put them in proper perspective, which often is not done. For example, an OR specialist worth his salt will openly state that OR techniques are applicable only to a certain class of problems and not necessarily to management problems in general; the good ones will not attempt to apply techniques where they do not belong--the "solution looking for a problem" approach with which many of us are all too familiar. (OR techniques are most applicable to that class of decisions which falls under the management function of operational control, as is discussed below.) Likewise, a competent systems analyst will stress emphatically that systems analysis is an aid to decision-making (generally at the other end of the management spectrum from OR-type problems); systems analysis does not make decisions. An analogous statement could be made concerning automated information systems and those specialists dealing with them.

Coupled with the pervasive lack of attention to the principal purpose of a management information system--an aid to management--often is the failure to provide a meaningful, practical framework for consideration of the information problem, both of which auger against worthwhile automated systems and often insure their failure. That is, not only is the basic purpose of the system not made explicit, but the very process which the system is intended to facilitate, the management process, is also neglected.

It is fine to talk of planning and control or command and control systems because conceptually these classifications have validity; however, under careful consideration and particularly when applied to real-world problems, such broad classifications of management activity are of little value. In fact, they often cloud rather than aid the issue. This is because planning or command (roughly, determining what is to be done) and control (roughly insuring that to be done is done) do not correspond to distinct, separable management activities either with respect to time, organizational position or authority, or various discrete issues or problems.

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For example, many persons in an organization engage in planning; but its basic purposes and nature vary so significantly that any generalizations valid to encompass all types of planning within an organization are so vague and broad that they are of little help in solutions of practical problems. A similar statement can be made for the control activity which involves, among other things, decision-making. The basic steps in the annual Congressional Budget, simplified for this example, illustrate these facts. The cycle starts with preparation and approval at the appropriate time of the Congressional Budget, which is clearly a planning activity. However, the budget is also used as a basis for control (many say budget preparation is the principal means of achieving control), and during the budget year, many activities occur that clearly pertain to control while, simultaneously and as part of the same process, there may be budget revision, which is a planning activity. In short, planning and control activities are so closely interwoven in the budgeting process that to describe each separately is not only difficult but also pointless, because those involved with the process are interested in both its planning aspect and its control aspect.

As with the budgetary example, planning or command and control in general are, in fact, so closely interwoven, especially outside the military, and so often occur simultaneously that there is nothing to be gained from such distinctions. A more realistic and useful framework for considering the NPIC management information problem, along with the necessary definitions, is given below.

Strategic Planning: the process of deciding on objectives of the organization, on changes in these objectives, on the gross resources used to attain these objectives, and on the policies that are to govern the acquisition and use of these resources. (Systems analysis is most applicable here.)

Management Control: the process by which managers assure that resources are obtained and used effectively and efficiently in the accomplishment of the organization's objectives. It combines both planning and control within the context of objectives and policies determined in the strategic planning process; effectiveness and efficiency are the criteria relevant for judging actions. Decisions in this process can

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be categorized as non-programmed; management decides what is to be done within the general constraints of the strategic plans. (Long-range planning, conceptually quite distinct from strategic planning, is applicable to this process.)

Operational Control: the process of assuring that specific tasks are carried out efficiently and effectively. Decisions in this process often can be categorized as programmed or structured, as opposed to management control decisions; emphasis is upon execution of tasks. (Operations research has its greatest utility in this process.)

Strategic Planning versus Management Control

Strategic planning highlights objectives, which are what the organization wishes to accomplish or its mission, and policies, which are guidelines to be used in the choice of the most appropriate courses of action to achieve the objectives. This type of planning is concerned with plans and policies which determine or change the character or direction of the organization; such decisions affect the physical, financial, and organizational framework within which operations are conducted.

Management control incorporates the concepts of effectiveness and efficiency, effectiveness referring to the accomplishment of the organization's objectives and efficiency referring to an optimum relationship between input and output. It should be noted that management control embraces both planning and control, and the usual connotation given control; that is, conformance to plan, is missing. This is intentional, because to the extent that middle management can make decisions better than those implied in a plan, it should do so. Therefore, top management should not necessarily want operations to conform to plans, and rigid conformance to plans is not the standard against which performance should be measured. However, plans should be followed in the absence of evidence to the contrary.

The management control process is carried on within the guidelines established by strategic planning; its intent is to make possible the attainment of planned objectives as effectively and efficiently as possible within given constraints. This process involves making decisions about what to do in the future (the usual interpretation of planning), but the

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planning decisions made in the management control process are of a somewhat different character from those made in the strategic planning process, although the dividing line may at times be fuzzy and certainly there are interactions between the two processes.

A main distinction lies in the fact that management control relates to current operations while strategic planning relates to objectives, policies, organizational structure, etc. Also, strategic planning involves a preponderance of value judgments while management control decisions involve a preponderance of facts. Management control is less complex than strategic planning, since it does not set but only works within precedents; that is, policies and plans already decided upon. In addition, it tends to be rhythmic; e.g., the budgeting process, while strategic planning is essentially irregular because problems, opportunities, good ideas, and technological breakthroughs do not occur according to a timetable and there is no essential condition to cumulate strategic plans and present them in a nice, neat package on a specific date.

Management control systems, with rare exceptions, have an underlying financial structure; that is, plans and results expressed in monetary units; for example, as in the PPB system. This does not mean that money is the only basis for measurement, however, or even that it is the most important measure; it does mean that money is a common denominator to relate various pieces to one another, although other measurements such as manpower, product output, timeliness, etc., may be essential, as well as certain non-qualitative attributes such as quality, ability, cooperation, etc.

Management control systems should be integrated, coordinated systems which means that, although data collected for one purpose may differ from that collected for other purposes, these data should all be reconcilable with one another, or equivalently that non-monetary information should be reconcilable with monetary information. For example, information or the number of personnel must be relatable to information or the cost of personnel. While strategic planning data often is "one-shot" and can rely heavily on external information, a good deal of which may be relatively imprecise, management control data have the same definitions and are put together in the same way time after time. These data are intended to influence line managers to take actions that will lead to desired results; management control decisions are made by the line, not the staff.

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In contrast, the data relevant for strategic planning purposes are put together specifically for decision concerning a particular plan. The estimates used in strategic planning are intended to show the expected results of the plan. This usually predominately staff function, carried on in consort with line management, can best be characterized as creative as opposed to management control which is exercising leadership, even though the organizational distinction may not be clear-cut. The only control aspects of strategic planning, if they may be called that, have to do with the top management need to check on the progress being made by the staff toward arriving at a decision on a problem being analyzed, to appraise the ability of those involved in the process, and to determine whether general policies are being followed in the implementation of procedures. And it should be pointed out that the PPB five-year plan, the PFP, is actually an exercise in management control because the plan itself is a projection of costs anticipated under policies and programs already approved, rather than a device for consideration of and decision on new policies and programs; this function is accomplished through the Program Memoranda. The PFP reflects strategic decisions already taken; it is not the essence of the process of making new decisions.

It is because of the varied and unpredictable nature of data required for strategic planning that an attempt to design an all-purpose, internal information system is probably hopeless. For the same reason, the dream of some computer specialists of a gigantic data bank, from which planners can obtain all the information they wish by flicking a switch, is probably no more than a dream. However, conceptually at least, a management control system should be a single system, or an integrated set of subsystems. In practice, attainment of this goal of "integrated data processing" is so fantastically complicated even for a moderate size organization that few, if any, organizations would even claim its achievement. Nevertheless, this is the goal, and those interested in improving management control systems will work toward it. The error arises in attempts to meet the needs for strategic planning data from the same system; the data needed to plan and control ongoing activities are quite different from those needed to analyze proposed major changes in operations. To ask that data be collected routinely in elemental building blocks that can be combined in various ways to answer all conceivable questions is a completely unrealistic request

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since no one can foresee the possible ways in which data might be used, and even if foreseen, some of the uses occur so infrequently that the routine collection of data for them is not economically justified.

Management Control versus Operational Control

As with strategic planning and management control, the distinction between management control and operational control is not always precise. Operational control takes place within the context of decisions made and rules formulated in the management control process and to some extent in the strategic planning process, and overall performance in activities where operational control is applicable is reviewed as part of the management control process. As indicated, the focus of operational control is upon specific tasks or transactions: scheduling and monitoring and not measuring overall performance; obtaining certain equipment and not managing inventory; personnel actions and not determining personnel policy, etc.

Outputs are the products, services, or other effects created by an organization; inputs are the resources the organization consumes. Outputs, in every case, many not being clearly definable or readily measurable. In addition to the overall organization's outputs, every unit within an organization has outputs, either products or services or combinations thereof, which again may be difficult to measure.

One of the important management tasks in an organization is to seek the optimum relationship between inputs and outputs; that is, either the best combination of outputs when inputs can be varied or the combination of resources that will produce the desired outputs at the lowest costs in an environment where the desired outputs are taken as given. Of course, there may be gradations of the above, wherein there are varying degrees of latitude between given outputs and variation of inputs; that is, each may be varied to a certain extent, but there are real constraints. When there is the option of varying inputs, it is rarely, if ever, possible to determine the optimum relationship between outputs and inputs objectively, in spite of many opinions to the contrary. This choice of a relationship is a matter of subjective judgment, and this is true because, generally, there is no scientific or objective way of determining how final output will be affected by changes in inputs or necessarily what is the "best" output mix, especially where it comprises services. However,

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if output is taken as given, then there is at least the possibility that an optimum relationship between outputs and inputs can be found, but perhaps not absolutely since new ways of doing things are continually being developed. Therefore, optimum in this case must mean that combination of resources, out of all known combinations, that will produce the desired output at the lowest cost. For some activities, the optimum relationship may be rather easy to determine; for others, there exists no way of establishing the relationship, and again, decisions as to what costs to incur depend upon human judgment. In the latter case, the term overhead roughly corresponds to this class of inputs or costs.

It should be noted that the importance of the input-output relationship can be overemphasized. Decisions in this area should be weighed very carefully. For example, conflicts between input-output objectives and organizational goals can arise; that is, large increases in economy, efficiency, or productivity may be possible only at the costs of dissatisfactions to some employees and even external groups, curtailments in output quality which may be very difficult to measure, dissipation of organizational assets, etc. However, with this caveat in mind, if the optimum input-output relationship can be determined for a given activity, the inputs that should be employed in a given set of circumstances can be described and reduced to rules; that is, they can be programmed. These are the activities for which programmed operational control is applicable, and as new techniques are developed, there is a tendency for more and more activities to be susceptible to programmed control. But operational control and programmed control are not synonymous, for there are many, in fact a preponderance of, specific tasks that cannot be explicitly programmed; for example, certain research tasks as might be undertaken by the PSG/R&RD, special studies performed by staff officers, analysis of new types of targets or very significant "finds" or changes in known targets, the entire class of activities often referred to as overhead, etc.

To make the distinction between management control and operational control clear, management control focuses upon the whole stream of on-going activities while operational control focuses upon individual tasks or transactions. Just as management control occurs within a set of policies derived from strategic planning, operational control occurs within a set of well-defined procedures and rules that are derived from both strategic planning and management control.

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An operational control system is a rational system; that is, in general, the action to be taken is decided by a set of logical rules, which may or may not cover all aspects of a given problem. Situations not covered by rules are exceptions and are handled by human judgment, but other than these exceptions, the rules are applied automatically. In management control psychological considerations are dominant. The management control system at most assists those who take action; it does not directly or by itself result in action without human intervention. A management control system is ordinarily built around a financial core; operational control data are often non-monetary. Data in an operational control system are in real-time and relate to individual events, whereas data in a management control system are either prospective or retrospective and summarize many separate events.

Computer specialists and even managers who do not make a proper distinction between management and operational control dream about a system that will display to management the current status of every project and activity within the organization. Although theoretically this could be done, it should not be done, because management does not want, or should not want, such detail. It does not need to know when project 112076NA was transferred from the PI to the editor; rather, it needs to know only that the process is, or is not, proceeding as planned. That is, information shows up in the management control system only when it is exceptional, when a situation arises that is not covered by the rules included in the operational control system or when there is a significant departure from those rules. Some means of calling these exceptional situations to management's attention are essential, and this is the interface between operational and management control.

Operational control uses exact data, whereas management control needs only approximations. The formal management control system is only one aspect of the management control process, actually a relatively unimportant aspect. The system can help motivate a manager to make decisions in the best interests of the organization and the system provides information that aids the manager in making these decisions. The success or failure of the management control process depends upon the personal characteristics of the manager: his judgment, his knowledge, his ability to influence others. The distinction between the system and the process is apparent in such comments as "We are bogged down in red tape" or "Paperwork keeps me from getting the job done." Such comments are symptoms that the system is impeding the proper

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functioning of the management control process. While in operational control, the system itself is a much more important aspect of the whole process, it is not the entire process unless the system is automated, but it ordinarily states what action should be taken. With a properly designed system, operational control will require a minimum of management intervention; the degree of management involvement in operational control will be small, directed toward exceptions.

Systems Design Implications

Some generalizations for systems design of what is often called a planning and control system, can be drawn from the preceding discussion. First, it seems clear that the starting point is construction of the overall system should be management control, as distinguished from strategic planning and operational control. The management control system deals with the ongoing operation of the entire organization. It must encompass all parts of the enterprise so as to assist management in determining that the parts are in balance with one another. The central function of a management control system is motivation; the system should be designed in such a way that it assists and guides operating management to make decisions and to act in ways that are consistent with the overall organizational objectives.

Strategic planning, management control, and operational control tend to correspond to a hierarchy in any of several dimensions: as to time-span of consequences (long range, medium range, day-to-day); as to level in the organization (top management, top and operating management, supervision); as to importance of a single action (major importance, medium importance, little importance); as to amount of judgment involved (great, some, none), and so on. Along each of these continuums, management control is in the middle.

Second, although the management control system is the logical starting point, its relationship to the other systems should be recognized. The management control system can be designed so as to take into account the more important needs of the strategic planners, for current and historical operating information, but it cannot possibly foresee all these needs, nor would it be worthwhile to supply routinely information that is needed only occasionally, even if the need could be foreseen.

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WORKING PAPERAPPENDIX EAppendix EResponses to Questions on Definition
of Management Information Needs and Reassessment of the MIS

This appendix essentially summarizes the responses, as received, to questions posed to the Groups and Staff and the results of discussions carried out during the course of the study.

The Groups, Staff, and PMB were asked to respond to two distinct sets of questions; the first dealt with the current MIS and the second with management information needs.¹ Unfortunately, the responses were in some cases not as specific as might have been desired, undoubtedly due in great part to the short deadline for the project, but it was felt that enough good information was provided and that a re-do for purposes of this study was not required. In addition, a survey on usage of the MIS, conducted by PSG/AID toward the end of the last calendar year, provided some added insights into the problem, as did discussions with IAS concerning its usage of, opinions about, and desires for the MIS. Although the problem must be viewed in its entirety and there is a certain amount of overlap in that which follows, for convenience this appendix is subdivided into four sections: Costs; MIS Input Accuracy; MIS Output, and Management Information Needs.

Costs

With respect to current costs, it was felt that dollar values provided the best, most comprehensive common denominator, although certainly man-hours and machine time are relevant statistics and have been included where feasible. Replies to specific questions about costs were received in most cases from the Groups and Staff; approximate costs were inferred where necessary and translated into dollar equivalents. For example, man-hour costs for time sheet preparation, input/output activities, and MIS coordination were converted using the dollar values found in the MIS Handbook; where specific grades were known the figures were converted directly and, in other cases, the average NPIC grade of was used.

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For this study, overly detailed costs are not necessary, nor were they feasible to obtain in the time period allotted. Such detailed costs would be required only in the highly unlikely event that two or more effective alternatives were so identical in all aspects that the

1. See Appendices A and B.

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ultimate decision would be based solely upon incremental dollar values. The premise is that management needs certain information, and there are a number of ways in which it can be provided. Once legitimate needs are established and prioritized or defined at a certain level, within the constraints of available and justifiable expenditures, only what amounts to an ordinal ranking of feasible alternatives, those which meet the requirements within the constraints, is needed. That is, the system objectives can be accomplished within the constraints with system alternatives A, B, and C and not D or E; therefore choose alternative B because it does the job and is less costly than A or C. It is not necessary to say how much less, that is, to know the precise costs, but only to say that the ranking according to costs from highest to lowest is A, C, and B. (Of course, at least conceptually alternative B might be a significantly or totally manual system.) Some other reasons, among many, for not including precise costs are that MIS costs can vary from period-to-period, that is, they are not standard so certain assumptions must be made; hardware costs are to a great extent sunk costs making the only relevant measures functions of available machine time and/or work precluded by the MIS or other systems; estimates of man-hour costs for a totally or significantly manual system would indeed be very rough estimates since they must be predicated upon the system configuration which, of course, does not now exist, and it is most difficult (again, particularly in view of the time frame for the study) to impute a dollar value to management information, particularly in this non-profit environment.

If purchased, computer time for the MIS would cost about [] per year at the current rate [] Kevrunch time is about 56 hours per week at an average salary of [] The AID functions of input/output/maintenance/dissemination cost about [] and the cost of filling out time sheets in AID is estimated to be about \$7,000. The PSG/R&RD annual costs are about [] for time sheets and [] for I/O. TSSG annual costs are estimated to be \$10,000 for time sheets and [] for I/O activities. TEG annual costs are about [] for time sheets (includes DIA) and [] for I/O activities. O/DIR and PPB Staff annual costs are about [] for both time sheets and I/O activities. The total annual cost more or less directly attributable to the MIS then is about [] it is felt that this is probably a very conservative estimate. For obvious reasons, IAS input time has not been included in this figure. Or looking at it in another way, less computer costs, the Center expends about 12 []

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Handwritten calculations:
51,000
9,000

60,000
7,000

8,000
2,000

17,000
17,000

34,000
25,000

60,000

Handwritten calculations:
7,000
10,000

17,000
24,000

41,000
6,000

51,000
26,000

77,000

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(NPIC average grade) man-years on the MIS. The original cost of analysis and programming, both in-house and contractual, was not available; however, the contractual effort by [redacted] amounted to at least six man-years and the total NPIC contribution was at least double that.

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MIS Input Accuracy

Concerning input accuracy, which is at least a function of the structure or procedures of the system, the emphasis placed by management upon the system, and the care with which input data is verified for accuracy, TSSG commented that time sheet accuracy for the Group ranged from "meticulous to meaningless." It further commented:

"The time of those employees primarily engaged in direct project work is fairly well recorded. But much of the Group's resources is expended against general overhead, and time is recorded rather casually. Probably the greatest detriments to accurate time charging, where accuracy is aspired to, are the practices of filling out time sheets weekly--so that many details are forgotten--and the complexities engendered by the multiplicity of project numbers and activity codes. Overall, the major factor behind poor reporting is lack of incentive. This is the same problem widely recognized and often discussed in terms of lack of understanding regarding the System's capability and utility."

PSG comments with respect to input accuracy can be summarized as follows: AID, estimates a 95% level of accuracy; R&RD, the physical recording of project numbers, activity codes, hours, component, name, etc., are entered with about 85% accuracy; RD, accuracy is as good as a quick check permits. R&RD elaborated upon the accuracy subject, saying essentially that, despite a conscientious effort, as a service organization many of its activities do not fit easily into the MIS format; for example, project numbers furnished to the Division must be verified for accuracy but project listings are usually out-of-date, the Division often supports very current projects or "pre-requirements" which are rejected by the computer, people often forget project numbers when requesting service and priority requests cannot be denied for lack of a number, etc. RD added that most inaccuracies occur as a

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result of transposed numbers; incorrect splits assigned by originating components; inadvertent dropping of legitimate splits; flagrant misuse of continuing project numbers, and a lack of understanding on the part of the individual employees of both the functioning of the System and its purposes.

The PPB Staff and the PMB expressed concern about the accuracy and, in certain cases, lack of input data, reflecting at perhaps a more aggregated level the concerns of the Groups as pointed out above. IEG categorized MIS input as "not accurate".

MIS Output

Questions were asked the Groups and Staff concerning MIS output, the uses to which it is put, its timeliness, and additional desired reports.

TSSG receives the following listings: active projects; component time allocation; cancelled projects; completed projects, and active projects by component. It commented that these are "...low-level management tools to keep track of active projects and employee activity." During the previous year, TSSG also requested two special listings for costing studies. It recommended that, if the MIS is retained, management be given instructions in its usage.

With respect to output, PSG/AID components receive the following listings: active projects (two copies); component time allocation (two copies); active projects by component (two copies); completed projects (two copies); cancelled projects (two copies); and incorrect input (one copy). It commented that actual usage of these listings varies by component; however, most components agreed that the information generally is not timely enough and that there are too many project numbers and activity codes. A certain amount of non-routine output has been requested by AID for special studies, and an additional regular report giving computer utilization time for peripheral equipment would be useful.

PSG/R&RD Branch Chiefs routinely receive the component time allocation and active project listings; the Division office receives the above plus Options 1, 3, 5, 7, and 10. Certain special requests for output have been levied by the Division in the past. The active project listing is used to monitor projects and check the validity of project numbers.

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Component time allocation is used to assess the activities of Division employees. The other options are used mainly to compile monthly running totals of regular and overtime activities by project block. These totals are portrayed graphically, hopefully to reveal significant trends showing production gaps, slippages, or deficient reporting methods. PSG/R&RD commented that statistical information derived from MIS output is used in the budget cycle and for special reports, but the inaccuracy of MIS information "...may lead to false conclusions, particularly regarding the various support activities of R&RD. This has occurred several times in the past because of the inability to relate, in any meaningful way, projects to activities to products and finally to man-hours consumed. Our records have been kept manually and are accurate, but they are not as acceptable to top management as an inaccurate machine run."

PSG/RD receives the following listings: active projects; component time by project and activity; incorrect input; completed projects, and PMB scheduling listings. Each RD component now uses these listings for various purposes, but with the exception of the active project listing and the PMB scheduling report, the information is mostly historical and is used only for predictive purposes. RD added, "The information never seems to be timely enough to answer questions regarding project costs, overhead, or activity breakdowns. This is not necessarily a fault of the MIS but rather the fact that the information seems always to be needed by top management before it is actually available. Cost data has been requested on an ad hoc basis in the past but could not be interpreted correctly because of insufficient information in the MIS record." RD feels that an additional, timely PMB listing for purposes of project estimating and scheduling is needed and that the value of the MIS could be enhanced if a "reorientation" of individual employees toward the MIS were made available.

IEG "conducted a thorough review" of the MIS and found "its use limited because of its very narrow reporting spectrum." The Group called for "an expanded MIS system," saying that "Whenever staff papers, budget reviews, yearly summations, etc., must be prepared, IEG must compile its statistics through manual methods and finds these methods leave much to be desired." The output desired by IEG is covered below under the discussion of management information needs.

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The PPB Staff has certain routine output requirements in order to accomplish its functions (e.g.; situation reporting, COMIREX quarterly report, budget cycle documentation, etc.), and it must answer a number of ad hoc requests based, at least in part, upon MIS data, ranging from in-depth analytic studies to brief responses to specific one-shot questions posed by the O/DIR. You are quite familiar with the scope and content of this work, so the details have not been included. Specifically with respect to MIS output, the PPB Staff feels the inaccuracies of input are also applicable to output, the levels of retrieval are clumsy, skill/activity codes are poor, weekly reports need revision, timeliness is not adequate, product reporting is next to worthless, the DIA/CIA time reporting problem needs resolution, the category codes are obsolete, there is useless information in the system while, on the other hand, there are very significant information gaps; in short, the entire system needs attention, including revision and/or eventual replacement and the solid backing of all levels of NPIC management and supervision.

The PMB finds the MIS impractical for its uses. A special report format incorporating the desires of the PMB was written by [redacted] of the PPBS; however, the PMB still finds its information requirements unsatisfied and now recommends one of two alternative reporting systems, one being a real-time reporting system and the other being a graphic approach to forecasting showing estimated and scheduled man-hours versus projected on-hand strengths.

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IAS makes positive use of the MIS and can cite examples of decisions based upon MIS data. Specifically, IAS uses MIS data in combination with a manual system, where applicable, to generate the following standard reports: Five-Year Plan of the Imagery Analysis Service; Summary of IAS Workload (Monthly); New Projects in Work for Period---(Weekly); and Charts (Quarterly and Yearly) showing IAS Division of Labor (PI time) by consumers, geographic area, and subject. IAS obviously has a good deal of confidence in the IAS portion of the MIS output, and it is used by IAS top management. However, this was not accomplished without effort; the Service spent considerable effort on tightening up the system, particularly the activity codes and project establishment, and conscientiously validates input. In IAS, the top management requirement that data input be accurate has been and is explicitly made known. (This is not universally true within the Center.)

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It was mentioned that, at the close of the last calendar year, PSG/AID ran a survey on the "Usefulness of Standard Management Information System (MIS) Reports." At the time, 17 standardized reports were available, 10 on a regular basis and seven on an ad hoc basis. Respondents were asked to categorize reports according to "Presently Useful, No Present Need, Would Like to Receive, and Did Not Know Report Existed." Replies were received from all the Groups, the PPB Staff, and IAS; specifically, of the 69 NPIC organizational elements listed in the MIS Handbook, 39 replied, including a significant portion of the substantive components. In this sample, of the 17 reports available to each of the 40 potential users, responses were received indicating that the reports were of use in 30.1% of the cases. That is, of the sample space of 680 (40 components X 17 reports = 680), only 30.1% of the replies indicated a report to be either "Presently Useful" or "Would Like to Receive"; 69.9% of the answers indicated the report to be of no use. Similarly, of those 10 reports regularly available, 35.8% of the responses indicated a use for the report, and 64.2% indicated no use, and of the seven ad hoc reports not regularly disseminated, 16.9% indicated a use for the report and 83.1% indicated no use.

Management Information Needs

With respect to management information needs, IEG expressed a desire that the following data elements be included in the MIS:

1. Target information -- Number by mission, collection system, and geographic area, completed weekly, monthly, and yearly; number added and deleted weekly; number by country, reporting phase, mission; number in each basic report category and completed quarterly and yearly; number of NAC and IDO by mission and system, monthly and yearly; on a real-time basis, number to be read out on each mission and IEG progress in completing readout.] IIS
2. Publications -- Number by type, monthly and yearly; number of pages by report type, monthly and yearly; number of graphics by type, monthly and yearly.] IIS
3. Briefing Boards -- Number by mission, system, and geographic area monthly and yearly; special boards by type, monthly and yearly.] PSG/PMB

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4. Monthly First- and Second-phase Statistical Report -- Number of targets by country and reporting phase, and target counts by mission as the exploitation and reporting are completed.

} IIS

5. Processing -- Weekly total of units received in PCS/IEG categorized by processed, forwarded, and pending; weekly total of briefings conducted with preparation and presentation time.

} IIS

6. Visitors -- Number of visitors and time spent on tours, briefings, etc., monthly and yearly.

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7. Scheduling -- Plan for a real-time system to show progress toward completion of estimated level-of-effort to complete a given project with daily output showing, for example, First-, Second-, and Third-phase project time, briefing time, leave, training, etc., by section, branch, division; that is, daily information available to managers and supervisors each morning to help them direct or reassess the effectiveness of their operation. The computer could provide machine runs to show, for example, a week or month ahead, the time needed to accomplish First-, Second-, and Third-phase reporting and other tasks, such as briefings.

} PNB

8. Aircraft Missions -- Number by type of mission, footage, and geographic area, received and completed daily, weekly, monthly and yearly.

} PNB

IEG added that, if current on a daily basis, the MIS would be a main production control tool and cited an existing example of such a system (ACIC, St.Louis). Such a capability would allow management to adjust schedules in time to avoid production problems. IEG concluded, "Until the system goes on a more real-time basis, the information that is entered is not accurate because the average NPIC employee only fills out his time sheet once a week and this creates errors, thereby making the system ineffective except for general studies to show trends or historical information."

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PSG/AID, in considering management information needs, cited that it now uses certain routine MIS outputs (active project list, component time use, active projects by component, projects completed, cancelled projects, and incorrect input notices) for the purpose of determining

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if the MIS is current and to verify projects/requests levied on the component. Three AID Branches were mentioned as having requested special runs for time studies on particular projects. The Division commented that, with the exception of the active project listings and certain ad hoc output, it feels the MIS information is not current enough. It concluded, "In the case of AID, it is essential that management knows at any given time its manpower and machine allocation. This is important in the scheduling of tasks according to priority with the capability of handling crisis-type projects upon demand."

PSG/RD regularly receives those reports listed previously, plus time reports on specific projects on an ad hoc basis and the PMB estimating and scheduling listings. These uses are chiefly as a historical record for project costing, as a basis for future personnel strength and/or overtime requests, and as a reference tool to maintain the accuracy of individual time sheets. The PMB runs are used to determine project status, to improve estimating and scheduling methods, and to provide a record of committed time by activity versus available time. The Division stated, "With the exception of the active project listing and ad hoc requests for total time to date for specific projects, the available MIS information is of little use to RD personnel. All of the MIS statistics can obviously be put to some use but, as far as the various options are concerned, one system of reporting time charged by project, component, and activity should be sufficient for all." RD expressed the hope that, through the PMB vehicle, eventually all of those projects that can be estimated and scheduled will be, so that "we can then deal with the ad hoc, non-scheduled, almost daily crash projects, such as PSG/RD support to the CIA budget and to NRO," the immediate goal being "...to have the capability to manage our seemingly endless crises more purposefully." RD closed by offering a concept of future operation of an MIS: "The ultimate in availability of MIS-type information should be built into the future IIS. A manager, sitting at a console, should be able to determine the status of any project at any time merely by flicking a switch. The idea, in any event, is to obtain essential information regarding production planning and management on a near real-time basis."

PSG/R&RD uses both manual systems and the MIS to compile statistics mainly relative to products and requests processed by month. The MIS has no capability for clocking processed requests or backlogged material,

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and certain statistical information is maintained manually for compilation of monthly reports. In view of the above and the MIS output utilized, as mentioned previously, R&RD comments, "Because of the basic structure of the MIS and the difficulty the Division has in participating in it, most of the information derived from the system is of little value. For our purposes, it is an inaccurate and inadequate picture of our activities because the basic data put into it is distorted in order to conform to the pattern set. We use time sheet data to match with statistical information kept manually in order to arrive at an average figure for processing materials or answering research and reference questions. But with the known inaccuracies of input, the resulting inaccuracies cannot be considered as anything more than an estimate. Much of the information contained in the various option runs reveals only that an individual is performing the duties for which he was hired." The Division stated that it needs basically the kind of data it now compiles manually, and often on an immediate basis, specifically, numbers and originators of requests for services; types and numbers of materials processed, on hand, and disseminated; regular and overtime allocations to these activities; a print format to relate time, product, activity, and requester, and information on the inter-relationships of projects among various responsible components. It would like to have the capability for on-line display or printed graphical forms of this information. R&RD summarized by saying that management information is needed by the Division to give an accurate picture of its overall services to the Center; to identify the chief users of Division facilities; to develop service time statistics; to develop trend information so appropriate actions can be taken; to plan for the future; to provide standards for comparison with similar facilities in other organizations, and to provide higher management with the information it needs for planning.

In responding to the questions on management information needs, TSSG noted that the Group, aside from SSD, has only a few formal systems for obtaining and maintaining information. This is a function perhaps of the facts that the Group is small in size, is charged with activities of a radically diverse nature, and has some strict compartmentalization because of security, all of which encourages many person-to-person information exchanges. Also, the Support Services is regulated by DDS procedures and has what is tantamount to a separate information system. Aside from records kept for DDS activities, the main TSSG information files concern personnel and project status. These files may be largely overlapping

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and redundant, but they are manual, rudimentary means of keeping managers aware of where their employees are and what they are doing, what tasks are pending, and whether deadlines and cost estimates are being met. TSSG commented that, for all intents and purposes, "...the people in this Group do not use the MIS. Furthermore, most managers have only vague notions about the System's capabilities." The Group suggested that a "NPIC Data Center," keeping both manual and machine records, might answer some Center problems and obviate duplicate files to a certain extent. The stated TSSG managerial information needs are:

1. New Collection System Data -- For Planning R&D Programs and Center operations.
2. Higher Management Policies and Objectives -- A self-evident need, but one which some managers feel is often overlooked.
3. Status of Projects -- In TSSG, emphasis is placed upon ascertaining and documenting the status of R&D projects. Each manager must have available certain project information; although some smaller components tend to rely on memory for the information, the most orderly and efficient keep some written records regardless of size.
4. Contractor Standards and Performance -- Currently, this need is met by information recorded mainly in individual project files; such a file should be part of the Agency-wide systems being developed by DD/S&T and O/L.
5. File of Technical Specifications -- A library of "boiler-plate" papers giving routine passages in development objectives and specifications.
6. NPIC Equipment Inventories -- An inventory with consistent terminology giving items on hand, age, condition, maintenance requirements, and technical specifications such as size, weight, and power needs.
7. Mission Schedules -- Size, type, and date of anticipated input.

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8. Personnel Locator and Attendance Records -- The need is well established, and being met, but not efficiently since many duplicative files exist.

The specific needs of the FMB were mentioned under the Output section; essentially, this comprises near real-time reporting of availability and utilization of resources versus on-hand and estimated requirements and other valid tasks. Obviously, this is both an accounting and forecasting function. PPB/RAD now accurately forecasts satellite mission processing man-hour requirements, based upon numbers of targets, for the FMB using MIS data. In addition, the FMB is moving toward better forecasting for the other NTP categories or whatever meaningful breakdown of Center activities is devised in the future. The FMB needs data in a timely fashion to greatly improve both the accounting and forecasting capabilities.

The needs of the PPB Staff can be divided into routine and special or non-routine. The routine needs are the data and properly formatted output relevant to the budgeting cycle and the five-year planning and programming effort and the data to keep the O/DIR and other legitimate authority adequately informed concerning operations, current and future. Although these may appear to be rather straightforward requirements, they are complex endeavors which require accurate measurement and reporting of resources and their uses, classified at least three ways (dollars, human resources, and materiel resources) with a crosswalk capability, meaningful assessments of the future environment and its demands upon and resource implications for the Center, and policy and plans to meet these future requirements, expressed in appropriate units of resources required. The non-routine or special needs are more difficult to assess, which implies a significant degree of flexibility in the data base and the system with respect to content and input and output. However, certain data needs can be foreseen and incorporated in the system with the assurance that the expense will be less than the benefits to be derived; other needs must be carefully weighed, cost versus benefit, before they are routinely incorporated. And one other capability, not now present in the MIS, is that the results of certain significant special studies, including the data generated, must be incorporated in the system.

It is also worth mention that, to a greater or lesser extent, within the Groups certain scheduling and production control mechanisms exist.

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APPENDIX F. Samples of MIS Standard Output

This appendix includes samples of the MIS Standard Output, except for Option 7, a copy of which was not available. Option 7 shows regular time, overtime, and equivalent dollars by Branch, Activity, and Project Number.

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