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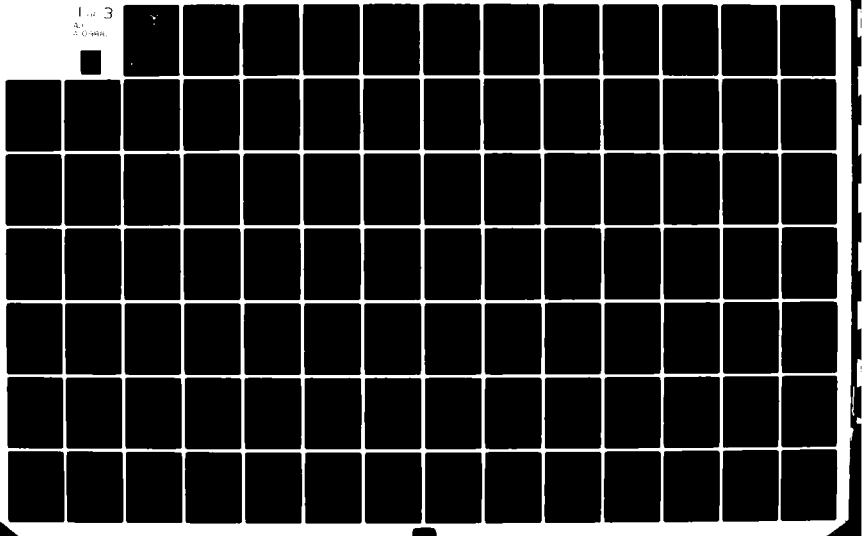

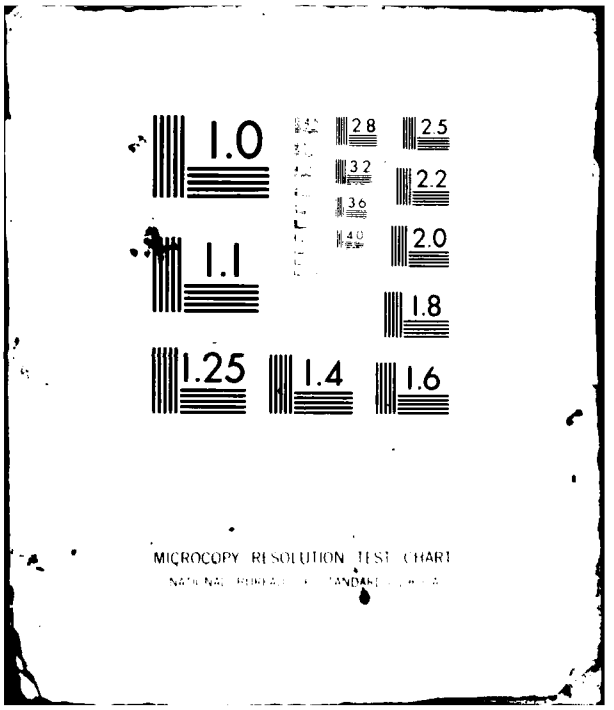
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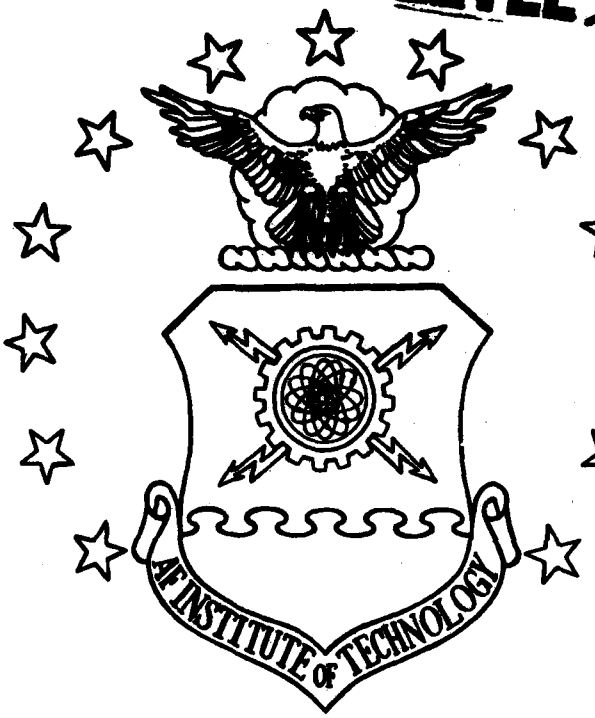

UNITED STATES AIR FORCE

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Wright-Patterson Air Force Base, Ohio

II

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THE PRESCRIBED INFORMATION SYSTEM OF PRODUCTION CONTROL UNITS IN BASE CIVIL ENGINEERING ORGANIZATIONS

Randie A. Strom, 1Lt, USAF

LSSR 69-81

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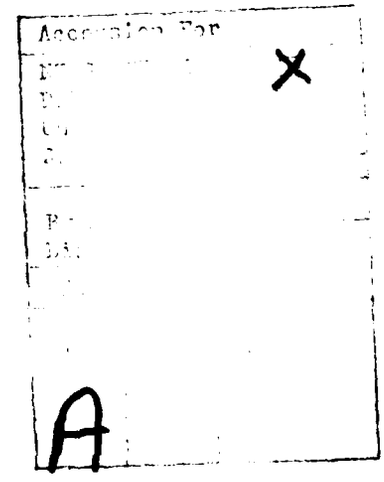

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When designing a new Management Information System/Decision Support System (MIS/DSS) for an organization, it is important to understand the existing MIS/DSS so the problems with it can be identified and corrected. This thesis identifies an approach for MIS/DSS design and accomplishes one step of the design process for production control units in base civil engineering organizations. The information system of production control is diagrammed according to the requirements stated in Air Force Regulation 85-1, Resources and Work Force Management. This lays the foundation for completing the MIS/DSS design for production control and for all of the base civil engineering organization. The diagrams developed in this thesis are useful as a training aid for production control specialists, as an illustrated method for simplifying regulation procedural requirements, for identifying the portions of the existing MIS/DSS that are automated processes, and for development of interactive computer programs for going through production control processes.

LSSR 69-81

THE PRESCRIBED INFORMATION SYSTEM OF PRODUCTION CONTROL UNITS IN BASE CIVIL ENGINEERING ORGANIZATIONS

A Thesis

Presented to the Faculty of the School of Systems and Logistics

of the Air Force Institute of Technology

Air University

In Partial Fulfillment of the Requirements for the

Degree of Master of Science in Engineering Management

By

Randie A. Strom, BSCE
First Lieutenant, USAF

September 1981

This thesis, written by

First Lieutenant Randie A. Strom

and approved in an oral examination, has been accepted by the undersigned on behalf of the faculty of the School of Systems and Logistics in partial fulfillment of the requirements for the degree of

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Date: 30 September 1981

COMMITTEE CHAIRMAN

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"All thy works shall give thanks to thee, O Lord..."

Psalms 145:10

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CHAPTER I

INTRODUCTION

Problem Statement

The purpose of this research was to initiate the process of studying and designing the Management Information System/Decision Support System (MIS/DSS) for the Production Control Unit (PCU) in Base Civil Engineering (BCE) organizations. The PCU is the nerve center of BCE and the decisions made in the PCU significantly affect the efficiency and effectiveness of the entire organization. The quality of the decisions are determined in part by the quality of the information provided to the decision-maker by the MIS/DSS. Since BCE typically consumes 40 to 60 percent of a base's budget, the decisions made in the PCU based on the information provided by the MIS/DSS is of great importance to all Air Force bases (6:13). The results of this research serve as:

1. a framework for continuing studies leading to improvements in the MIS/DSS in the PCU;

2. a training aid for Production Control specialists; and

3. an example of ways to make directives easier to understand.

Background to the Study

This research was necessary because:

1. a study now being conducted needs the type of objective systematic approach used in this project to properly assess the information needs of Air Force Civil Engineering; and

2. the way directives currently explain requirements makes it difficult to understand and comply with the directives.

The top level managers in the civil engineering career field perceive that there are problems with the current MIS/DSS. This prompted the instigation of an Information Requirements Study (IRS) now being conducted by the Air Force Engineering and Services Center (AFESC) through the Civil Engineering and Services components of the Major Commands (MAJCOM/DEs). The objectives of the IRS are:

> a. To determine the information required at all levels to manage resources and control processes required to perform the Engineering and Services mission.
>
> b. To determine the best way to gather the data and make it into usable management information through the proper mix of manual and automated processes /5:atch 1/.

The IRS assumes that problems exist with the MIS/DSS itself, not with the users. Instead of going through a systematic analysis to determine what and where the problems are (if any) with the present system, and then correct only those portions of the system that have problems, the IRS is attempting to design a completely new system. The design of

the new MIS/DSS is constrained by a requirement that the organizational structure not be changed. There is no comprehensive planning document available for the IRS, but various briefings and correspondence associated with the IRS indicate that the study will rely very heavily on subjective evaluations of "successful" managers (the meaning of "successful" is never defined) (5:atch 1; 1:1).

This research will accomplish one step, and discuss the method for accomplishment of subsequent steps, of a more systematic and objective approach to studying and designing a MIS/DSS for the PCU. The approach was developed during the coursework involved in LM 6.16, Engineering Management Information Systems, at the Air Force Institute of Technology (AFIT). This approach, based on the diagnostic approach to problem solving, generally (and very briefly) includes the following steps:

1. Determine and clarify the purpose and scope of the study.

2. Understand and describe the object system, i.e. the organization that is supported by the MIS/DSS.

3. Determine what the "ideal" MIS/DSS would do and set up the characteristics of this "ideal" system as standards and criteria for evaluating alternative systems.

4. Determine how the existing MIS/DSS actually works in the field.

5. Evaluate the existing MIS/DSS according to the standards and criteria established in step three.

6. For each weakness found in the existing MIS/DSS in step five, develop alternate solutions to correct the deficiencies.

7. Evaluate the alternate solutions using the criteria and standards developed in step three. Develop a decision rule to select the best alternative or range of alternatives.

8. Develop an appropriate implementation plan.

9. Execute the implementation plan being alert to changing conditions and/or previously unforeseen problems.

10. Evaluate results of the new MIS/DSS (i.e. go back to step five).

11. Institute procedures to periodically evaluate the new system.

Step four is actually a continuation of or, at least, greatly overlaps step two. To understand the object system (step two), it is necessary to determine its information system (step four). In other words, describing an organization's information system constitutes describing the organization itself (a discussion concerning description of an organization as an information system is presented on page seven). For the purpose of this study, step two is describing the organization (the PCU) as an information system as prescribed by Air Force regulations and manuals (AFRs/AFMs). Step three

then becomes describing the organization as an information system as it actually exists. Step four is then determining what the "ideal" information system would be, i.e. what the ideal MIS/DSS for the PCU would do. In other words, simply switch steps three and four in the diagnostic approach outlined on the previous page to read as shown in figure 1.

Given that the purpose for the IRS is to design a MIS/DSS for Air Force Civil Engineering and Services, this completes the first step in the diagnostic approach. The purpose of this research was to complete the second step for only the PCU within the BCE organization (see figure 1). Step three will require some type of field study to determine how PCU's actually function, i.e. their actual information systems. To illustrate step four, selected portions of processes in the PCU will be selected by the researcher and the "ideal" information system for these processes will be discussed based on the researcher's knowledge and experience. This last portion will be done only to introduce the process in step four. It will not be submitted as an ideal information system for the processes selected, but only to suggest this work for follow-on research efforts.

The reason for describing both the information system as prescribed in the AFRs/AFMs and the actual information system in the field is that valuable information regarding the problems with the current MIS/DSS and desirable characteristics for an improved MIS/DSS can be established.

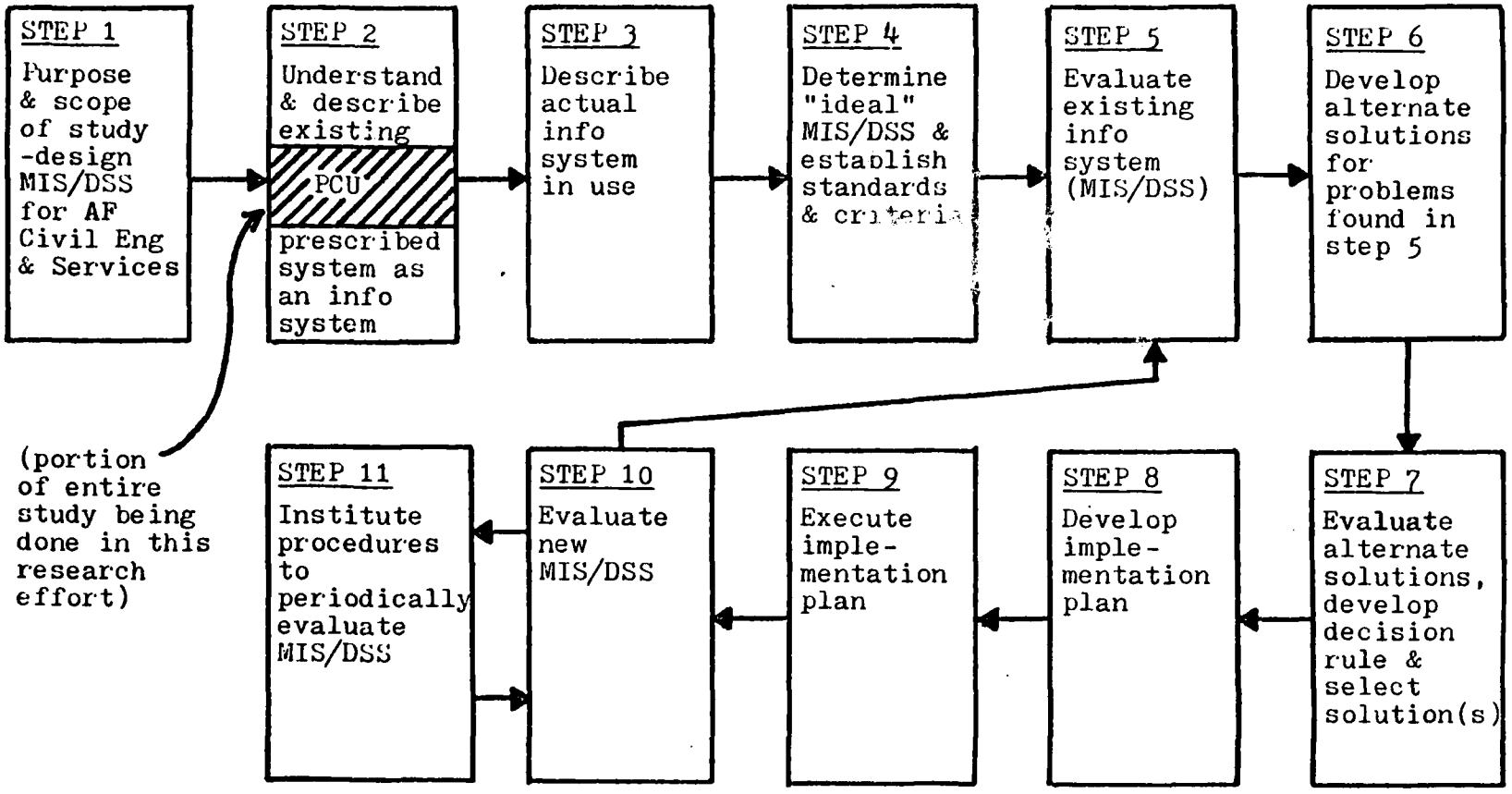


Fig 1. Diagnostic Approach to Studying and Designing a MIS/DSS for Air Force Civil Engineering and Services

For example, if the prescribed system makes it difficult for a decision-maker to obtain particular information, and the decision-maker finds an alternate source or method for obtaining the information that is more convenient but less reliable, then it can be concluded that the decision-maker values convenience over accuracy in the MIS/DSS. By describing the prescribed system, it is also possible to discover that the prescribed system is incomplete, vague, or was not designed to accomplish the current objectives of the organization. If the prescribed system appears to be well designed and complete, the possibility that the users simply lack training in the use of the system should be investigated. Clearly though, any study attempting to systematically design a MIS/DSS for any organization requires describing the current prescribed information system for that organization.

Describing an organization as an information system requires the determination of what the organization's informational outputs are, what processes produce these outputs, and what informational inputs are required for the processes. Informational inputs are any information provided to a decision-maker relevant to a particular decision. Information processing uses these informational inputs to make a decision. The results of the decision are information outputs which are either acted on, or become information inputs for other decisions (see figure 2).

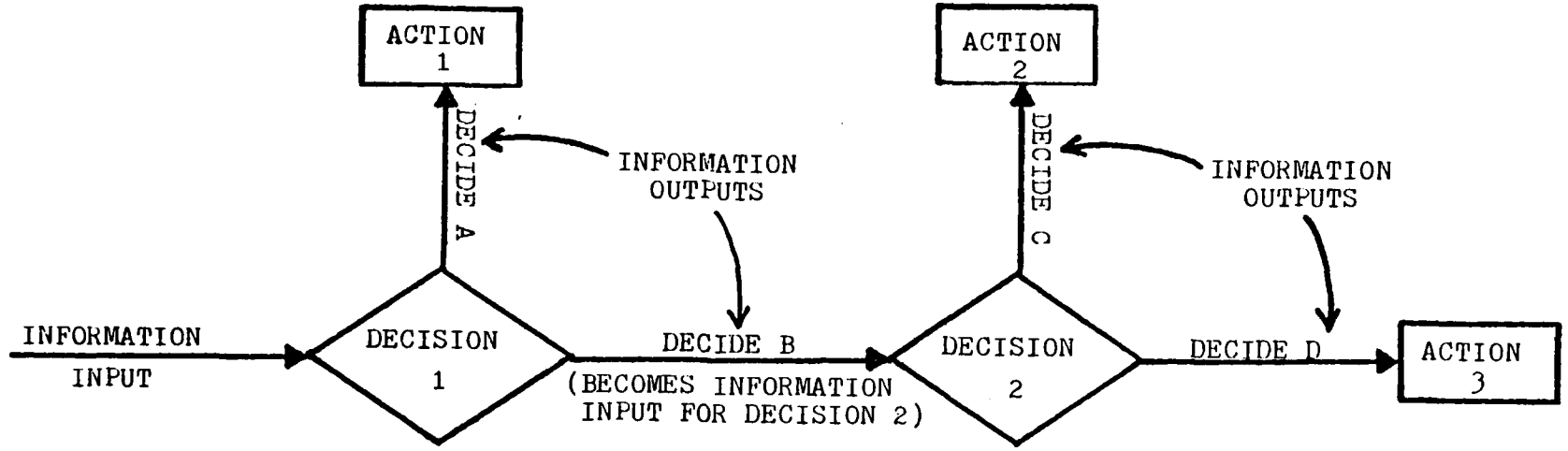


Fig 2. General Example of an Information System

Typical information inputs and outputs in Production Control are particular reports, forms, wall charts, briefings, and Base Engineer Automated Management System (BEAMS) products. This research effort determined from the current applicable AFRs/AFMs what the prescribed outputs of the PCU are, what decisions must be made to produce these outputs, and what inputs are provided according to the AFRs/AFMs to support these decisions. The result is a systematic (input-process-output) model similar to the one in figure 2 that shows the flow of reports, forms, wall charts, briefings, and BEAMS products, and decisions that eventually lead to the prescribed outputs of the PCU.

Compliance with AFRs/AFMs is a function of their understandability. AFRs/AFMs that are vague, ambiguous, or incomplete can cause misinterpretations and frustration on the part of the reader. This adversely affects the reader's motivation and ability to comply with the intent of the AFRs/AFMs. The use of diagrams showing prescribed procedures as information flows such as in figure 2, can greatly enhance the understandability of the AFRs/AFMs. Expecting individuals to comply with regulations without simplifying diagrams is analogous to expecting a contractor to construct a building, aircraft, or ship using only the technical specifications without construction drawings.

It is not the researcher's contention that a regulation must be all-inclusive, spelling out every detail of how work must be done. This is not only cumbersome for the authors of the regulation and the eventual readers, but it destroys the creativity of BCE organizations to develop new and better procedures. Because a system developed at a higher headquarters level could never account for unique conditions at individual bases, the prescribed procedure would also most likely make complying BCE organizations inefficient (7:2). However, the basis of a general system is needed to provide some degree of continuity, particularly with the large number of standard forms used throughout the Air Force and the large turnover of military personnel. This general system also provides a starting point for an organization that doesn't know where to start. With time, the organization can then discover ways to improve this basic system, and the diagrams of the basic system provides a skeleton and example for developing new personalized systems.

The main operating directive for the PCU and the main data source for this research was AFR 85-1, Resources and Work Force Management. The clarity of this regulation has been improved through the use of diagrams showing the proper sequence of actions for processing work requirements (see figures B-1 through B-6 in appendix B). These diagrams, however, can be improved, and there are not enough of them.

They constitute only a fraction of the processes included in the PCU, and they are not directly tied to the prescribed outputs of the PCU. A comprehensive model would greatly enhance the understanding of the processes in the PCU, could be used to train Production Control specialists, and could be used for reference. The comprehensive model could be broken down for inclusion in AFR 85-1 to improve its understandability.

The PCU was selected for this research effort because it is the focal point of BCE's work effort. Most of the key decisions regarding work approval, method of accomplishment (in-service or contract), work prioritization, and in-service work scheduling are made in the PCU. In addition, because of the complexity and centrality of the PCU, it will serve as a good example and starting point once it is modelled for modelling the other components of the BCE organization as information systems.

The PCU is part of the Resources and Requirements section in the Operations branch of the BCE organization (see figure 3). The responsibilities of the PCU according to AFR 85-10, Operations and Maintenance of Real Property, are as follows:

1. Receives all requests for work to be performed by the base civil engineering organization either with in-service forces or by contract.

2. Approves work requests or obtains approval by appropriate authority.

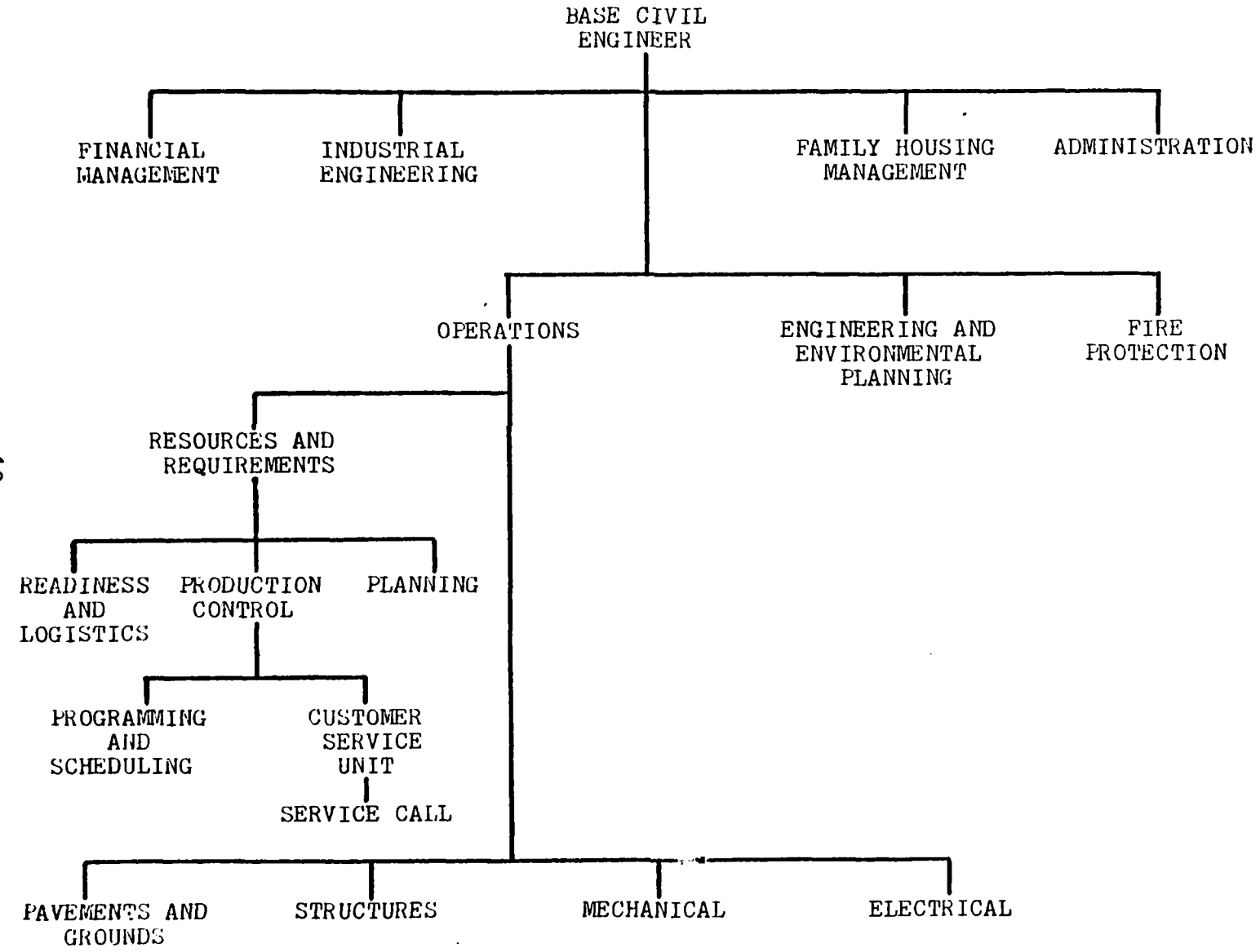


Fig 3. Base Civil Engineering Organization Chart (10:19)

3. Determines method of work accomplishment for in-service work. Refers requirements selected for facility project accomplishment to Engineering and Environmental Planning activity.

4. Prepares and maintains In-service Work Plan, weekly and daily schedules.

5. Processes in-service work orders and maintains the BEAMS work control subsystems.

6. Processes all job orders in a single functional activity.

7. Operates a service call unit within the Customer Service Unit to receive verbal requests for work and to control rapid response service Do-It-Now (DIN) vehicles.

8. Manages a Customer Service Unit to provide assistance to customers who need work done or who need status on work previously requested.

9. Operates a Production Control Center which serves as a communications center and unit command post for base civil engineering.

10. Maintains wall charts and maps.

11. Prepares and maintains SMART (Structural Maintenance And Repair Team) facility survey schedule.

12. Maintains facility files.

13. Manages the warranty/guarantee program.

14. Manages the taxi system [10:15].

From this list of responsibilities, it is clear that the PCU manages key functions in the BCE organization. Further evidence of the criticality of the PCU is seen in AFR 85-1 which describes the Production Control Center (PCC) which is operated by the PCU as

> ...the hub of the BCE activity. It is a nerve center where instructions and information pass to and from the work force. It provides, through the CSU, a single point of contact between BCE and its customers. It has a visible source of information vital to the BCE,

the BCE staff, and the commander [12:p.2-17].

Besides being the information and communications center of BCE, the PCU, through the Customer Service Unit (CSU), is vital to the BCE's image as the "city engineer." The CSU is the "BCE's face to the public" [12:p.1-27].

Decisions made in the PCU are of central and critical importance to BCE and the base. Providing information to support these decisions is an important consideration that requires careful study. Since the decisions typically affect 40 to 60 percent of the base's operations and maintenance allocation, the effort expended in studying and designing the PCU's MIS/DSS will profoundly affect the amount of direct mission support that can be bought with budget dollars.

Research Objectives

The main objective of this research was to lay the foundation for studying and designing the MIS/DSS in the PCU by modelling the prescribed information system according to the current applicable AFRs/AFMs. In seeking this objective, the following subobjectives were also accomplished:

1. Identification of the portions of the prescribed MIS/DSS that are manual and the portions that are automated.

2. Demonstration of the use of simplifying diagrams for illustrating requirements of AFRs/AFMs.

3. Construction of a model that illustrates AFR/AFM requirements for training Production Control specialists. Recommendations for further research were also a natural fallout of this research. Discussion of how continuing research is expected to be conducted is included, however, the proposed solutions will require testing before they can be considered valid.

Research Questions

1. What information inputs are provided to the PCU according to the AFRs/AFMs and from what source?

2. What are the information processes that are supposed to process these inputs according to the AFRs/AFMs?

3. What information outputs is the PCU responsible to produce, and for whom?

4. What portions of the system are manual operations and which portions are automated.

Assumptions and Limitations

This research applies only to those BCE organizations that use AFR 85-1 as their operating document for their in-service operations. Although AFR 85-1 is separated into compliance and optional sections, the optional section is mandatory unless an individual BCE organization documents an alternate local procedure (12:1-1). Compliance section requirements must be employed unless waivered in writing by the AFESC (12:1-1). Because the optional section is

mandatory unless there is a documented alternate method, this research will diagram the process included in the optional sections. These diagrams do reflect the prescribed system, and establish a framework that eases local changes and documentation of those changes.

The detail the diagrams will go in to is limited by the detail expressed in AFR 85-1.

CHAPTER II

METHODOLOGY

Data Collection

The data for this research was obtained primarily from AFR 85-1, Resources and Work Force Management as this is the operating document for the PCU. Inputs to the processes outlined in AFR 85-1 from other regulations were investigated as to the impact the inputs had on the process. All of the inputs provided guidelines for making judgemental decisions in the processes, so the inputs were noted as references from the appropriate directives. All data necessary for construction of the process diagrams in appendix D was available in AFR 85-1.

Model Development

The diagrams used in this thesis were developed by using "forward pass" and "backwards pass" techniques. The terms "forward pass" and "backwards pass" have been borrowed and modified from how earliest start times and latest finishing times are determined in the Program Evaluations and Review Technique (PERT) and the Critical Path Method (CPM) (3:540). Modifying these approaches to the development of the diagrams for this project eventually led to new descriptions of the approaches. A "forward pass"

is accomplished by:

1. Determining what information inputs are provided to the PCU by others, i.e. what reports, forms, wall charts, briefings, BEAMS products, or other inputs that are supposed to be provided to the PCU, and from what sources.

2. Determine how these inputs are used or processed by the PCU as a series of information subsystems eventually leading to some outputs.

3. Determine what the informational outputs of the processes in step 2 are, and identify the recipients of these outputs.

A "backwards pass" essentially reverses this approach. Outputs are identified first, the process that led up to the output identified, and then the inputs that are made available to the processes and their sources identified. The bulk of the process diagrams in appendix D were constructed using the "forward pass" approach. Any mention in AFR 85-1 of any kind of information going to the PCU from any outside source was identified as an input. The purpose for the PCU receiving the input was then investigated. This began the PCU process diagramming. How the initial input was synthesized through series of questions and actions was followed in the explanations in AFR 85-1. When the process finally ended for the PCU, the outputs were identified by looking for the mentioning of the PCU providing something to some other individual or organization in AFR 85-1. In some

cases, identifying the outputs from the verbage in AFR 85-1 was easier than identifying the inputs. For these processes, a "backward pass" through the process was accomplished to eventually end with identifying what the inputs to the processes were and from whom. The final diagrams account for every locatable mentioning of information or actions passing from the PCU to any other individual or organization in AFR 85-1. To be consistent with how AFR 85-1 already identified the events in a process in the figures in appendix B, the same identifying symbols were used in developing the diagrams in appendix D. The exception is that a rectangle, identified in AFR 85-1 as representing a "process," was used in the new diagrams to identify an action that did not require a decision (12:p.4-6). A diamond represents a point where a decision must be made, circles are used to connect diagrams, and a triangle is used to identify some type of final output, such as filing, when it does not occur outside the PCU. All inputs into the PCU from outside sources have no border around them, are numbered with numbers preceded by the letter "I," and are identifiable by the arrow pointing to the rectangle or diamond in the PCU process. Likewise, outputs to outside recipients also have no border around them, are numbered with numbers preceded by the letter "O," and are identifiable by the arrow pointing away from the rectangle or diamond in the PCU process (refer to the legend at the

beginning of appendix D). The diagramming process went only into as much detail as AFR 85-1 did, as these diagrams were constructed to exactly reflect the requirements as stated in either the diagrams or the text of AFR 85-1.

Listing Inputs, Outputs, and Processes

The lists in appendices C, E, F, G, H, I, and J were formulated by reviewing the diagrams in appendix D. All inputs originated from a source outside the PCU were identified and listed. The outputs were similarly identified and listed. The diagrams were then separated into separate processes. The diagrams were generally separated according to where the process ended with output(s) to outside sources. The next process then started with new inputs from outside sources. Some processes were separated simply as a matter of simplifying the indexing of the process. Letting a process get too big can make it difficult to refer back to a portion of the process. A convenient point was selected, such as a decision point that had several possible outputs, and each output would then become the initial input for a new process. At these points, connector symbols were used to ensure understanding that the outputs and inputs were internal in the PCU, not to or from outside sources. Once the diagrams had been separated into processes, the process names were established and listed in appendix C to serve as a reference for appendices D through J.

Once the processes had been listed, the lists of inputs and outputs were divided according to the processes they entered or exited. The original list also made it clear that each input and output had two other characteristics worth separating them into for closer study: the medium, or form, that they were in, and the source in the case of an input or the recipient in the case of an output. The fourth research question and first research subobjective necessitated the separation of the inputs and outputs by source or recipient, at least, to the extent where all automated interactions could be identified.

After all data had been collected and the lists in appendices C, and E through J had been completed, each list was reviewed for any significance they may have with respect to the research objectives. These observations of the researcher have been related in the following chapters.

CHAPTER III

PCU INFORMATIONAL INPUTS

Ninety-three informational inputs to the PCU from outside sources were identified as required by AFR 85-1. Of these, five inputs were identified with no prescribed procedure to use or process these inputs. These inputs are:

1. Requests from members of the BCE organization for communications equipment or support (12:p.1-5).

2. Requirements for the BCE communications system as outlined in AFR 85-1, paragraph 2-7.

3. Requirement for service call to function as a command post during emergency operations in AFR 85-1, paragraph 7-6e.

4. Requirements to brief the chief of resources and requirements on all aspects of PCC activity and job stoppages (12:p.1-5).

5. Requests for work or work request status from customers (12:p.1-5).

One notable omission in AFR 85-1 is requests from managers on PCU processes and work management related information for the purpose of making individual management decisions, beyond that provided in briefings. This requirement is universally recognized of all subordinate units, so mention

of it in AFR 85-1 is not necessary. However, processes do need to be developed to process these important inputs. The inputs that were used in processes prescribed in AFR 85-1 have been categorized in three ways for further analysis: by the processes the inputs are used in (the processes they feed), by the medium the input is received in by the PCU, and by the source of the input. Lists of the inputs in these three categories are in appendices E, F, and G respectively. These lists provide the answer to the first research question presented in chapter 1.

Inputs by Process

By Listing the inputs prescribed for a particular process, one can get an appreciation for the complexity or extent of the particular process. If a large number of inputs are required from many different sources, then the process is probably rather complex and would require a large amount of time to go through. Examples of this are the work request (AF Form 332) approval process (see figures D-1, D-2, and D-3) and the work order close-out process (see figures D-26 and D-27). On the other hand, processes that require little or no outside inputs suggests that most of the informational resources should be available within the PCU, and therefore the process should be simple and quick. An example of this is the Structural Maintenance And Repair Team (SMART) job order process (see figure D-20).

When a production control specialist prepares to begin a particular process (most likely because he or she has received the particular input(s) that begin that particular process) the list of inputs by process acts as a "shopping list" of information to collect. The specialist can then use these "ingredients" according to a "recipe" (process) to prepare or produce a "meal" (outputs). It is important, however, to keep in mind that just as a good chef uses secret ingredients and techniques to prepare an above average meal, a good production control specialist is not limited to this "shopping list," but will obtain more information and develop his or her own process to produce better outputs. These are the secret ingredients and techniques that should be discovered during the next step of the overall MIS/DSS design process discussed in chapter 1.

Inputs by Medium

Categorizing informational inputs by the medium used reveals a great deal about the way information was chosen by top level Air Force managers to flow through the information system in the PCU. As would be expected, the greatest number of inputs are received in the Medium of Air Force (AF) or Department of Defense (DD) forms. Thirty-one of the 93 inputs arrive in the PCU as AF or DD forms. Another 20 inputs are in another expected medium; guidance from AFRs/ AFMs and local directives. On a local basis, the inputs in the medium of guidance can be diagrammed in the same manner

as AFR 85-1 has been diagrammed in this thesis, to some extent. Some of the guidance is written in such a manner that diagramming offers no advantage, and possibly the disadvantage of missing the intent of the regulation. An example of this is the work classification guidance in AFR 86-1, paragraph 2-3. This section of the regulation attempts to give the reader a guideline for making a very judgemental decision, not a clearly defined set of rules. Instead of attempting to diagram a general judgemental process (which is really not possible, since everyone's individual process is different), this kind of guidance is best used in the diagram as a reference (as was done in this thesis) or as accompanying notes. What guidance is too judgemental to diagram and what isn't is a tough line to draw, as can be seen by the diagramming of the subprocess of establishing whether a job order is an emergency, urgent, or routine job order in figure D-8. A great deal of judgement is involved in the questions in this particular subprocess. For this research effort, whether or not to diagram a judgemental process was determined primarily by whether it appeared to complicate the diagramming more than it simplified it, since the main purpose for diagramming is to simplify the regulation. Those decisions that relied on a locally developed directive or procedure was also inputted into the diagrams in the medium of guidance, since this is how AFR 85-1 stated the input and because there is no way of

knowing what these local processes will be like.

A large number of inputs, 17, were not specified in AFR 85-1 as to the medium it must be in, giving each base the flexibility to develop whatever medium is most beneficial. Another seven inputs were in an interesting medium; as a date or time. These covered the requirements for the PCU to start itself on a particular process. However, time is still enough of an outside factor (since it cannot be controlled really by the PCU, or anyone else for that matter) that it should be considered as an outside input to the PCU. Not surprisingly, very few inputs were specified in oral form or in a specified written form other than an AF or DD form (three inputs each). The Air Force has been very decumentation oriented, and whenever something was determined to be needed in a written form, a special AF Form was usually created for it. The written forms specified in this situation are only guidelines to show what type of information needs to be conveyed, not really the way it must be conveyed (see figures K-15, K-16, and K-17).

The automated inputs into the PCU are in the medium of BEAMS reports. This does not mean that these inputs necessarily come to the PCU directly from the computer, but they may come from another source. As an example, the Collection Work Order Number (CWON) listing and Work Authorization List (WAL), which is BEAMS product PCN SF 100367, is inputted to the PCU from the chief of

resources and requirements (R & R) after he has approved the listing. The input is from the chief of R & R, not BEAMS. Because of this, knowing what inputs arrive in the PCU in the form of BEAMS products does not indicate the amount of information BEAMS supplies to the PCU, only the number of those large stacks of paper that eventually end up in the PCU. What information BEAMS supplies to the PCU is better determined by looking at the last method of categorizing inputs: by their source.

Inputs by Source

Knowing where the PCU receives its inputs from is very important. These sources are the hands that feed the PCU and keep it alive. Without them, the PCU would serve no purpose, and cease to exist. For this reason, it is important to production control specialists to know where their inputs come from, and to make an effort to facilitate the transfer of the input as much as possible. This primarily means having a good working relationship with those that provide information, and being easily available to those that input requests.

The list of inputs by source reveals quickly the large amount of interaction the PCU has with other individuals and organizations. This list has been divided into 19 such groups. Attesting to the PCUs centrality in the BCE organization, every branch except the administration and fire protection branches are listed among the sources of

PCU inputs (actually the fire protection branch is indirectly included in this list as it is a big "customer" of the BCE organization). Within the operations branch, the PCU receives multiple inputs from every other section in the branch. The unspecified source group should be of interest to the PCU specialists as sources for these inputs need to be identified. Closely related to the medium category of inputs are the sources of the AFRs/AFMs and time. Almost the same inputs are listed in these categories, with few exceptions.

Nine inputs of the 93 are identified as coming from the BEAMS. Even though this isn't even nine percent of the inputs, this figure can be misleading. This method of identifying and listing inputs does not weight the inputs properly as to their value to the PCU. The BEAMS product PCN SF 100252 (see figure L-3), BCE Monthly Labor Analysis Report, provides vital historical data for probably the two most important PCU processes, the weekly scheduling and Inservice Work Plan (IWP) processes (figures D-30 through D-34). The other reports play almost as important roles, providing much more than nine percent of the information needed by the PCU. When evaluating the value of BEAMS to the PCU, an appropriate weighting factor must be developed to account for the amount of information provided, which is beyond the scope of this study. Another factor to keep in mind is that the value of the BEAMS inputs is also related to the

accuracy of the products. Inaccurate reports are of no value to the PCU, and this is an important factor in weighting the BEAMS value to the PCU.

As expected, the regulation was not clear in some cases concerning inputs. For example, the Shop Foreman Man-Hour Projection input (see figure K-17) to the IWP process is unclear as to whether the shop supervisors submit one of these estimates each month for the new third future month and make oral corrections as the third future month becomes the second future month, etc., or does he or she submit three projections each month for the third, second, and first future month, with the second and first future month projections corrections to the previous month's third and second month's projections. Another interesting observation is that the chief of the PCU is provided no prescribed inputs useful in developing the SMART schedule (see figure D-20) except very little guidance in AFR 85-1, paragraph 6-7c. This is not necessarily a problem with the regulation, as it simply provides the PCU chiefs complete flexibility as to how, what, and where they get their information. The only problem that this could pose is if there is a tendency to not give the SMART schedule the planning it needs because of a lack of guidance to a PCU chief that has no idea how to approach this requirement. Most likely there is enough help available from others in

the organization or higher echelons to prevent this from being a problem, if the PCU chief seeks it.

The prescribed inputs are hardly sufficient to accomplish the processes they support. There is a great deal more information needed to make good decisions in the PCU. These other inputs should be identified in step four of the overall MIS/DSS design process presented in chapter 1. The "ideal" inputs may not include some of the prescribed inputs identified in this thesis, and the need of these inputs should be evaluated and eliminated from the prescribed system if found to be unnecessary.

CHAPTER IV

PCU PROCESSES

By searching through AFR 85-1, identifying PCU inputs and outputs, and then looking for the links between them, 26 prescribed processes were identified. AFR 85-1 also contained requirements for four more processes, but provided no prescribed process for them. All of these processes are listed in appendix C, answering the second research question presented in chapter 1.

Making a list of the PCU processes may give the illusion that these processes are distinct from one another, receiving and sending their own sets of inputs and outputs. This is not the case. Most of the processes build on one another. This means the outputs of one process may be the inputs to another process. For example, the job order classification process (figure D-8) receives its inputs from the authorization document decision process (figures D-4 and D-5_ and the work request (AF Form 1135) approval process (figures D-6 and D-7). Furthermore, the outputs of the job order classification process are the inputs for the routine job order process (figure D-9) and the emergency and urgent job order process (figures D-10 and D-11). The processes have been separated and titled as an aid to production control specialists to give them an idea of the processes

included in the PCU and to help them locate a particular process they may be interested in. In other words, it is the best method for labeling and indexing the diagrams for reference.

The four processes that are implied, but not prescribed, by AFR 85-1 require each MAJCOM/DE or individual BCE organization to develop their own processes to meet these requirements. This presents another advantage of diagramming prescribed processes as done in this project. The diagrammed prescribed processes serve as examples to the individual BCE organizations for thinking through, developing, and diagramming their own processes. These could be new processes where no prescribed process exists, or an alternate process to the one prescribed. AFR 85-1 allows BCE organizations to develop their own processes in lieu of following those prescribed in section C of the regulation, but also requires BCE to document their alternate processes (12: p.1-1). By diagramming the prescribed process, the BCE can more readily analyze this process, and use the diagram as a framework for their own process, staisfying the requirement for documentation. In addition, with the local process diagrammed, it is much easier to train incoming personnel in these unique procedures. This helps provide continuity, preventing confusion between what AFR 85-1 says and what is actually being done, and provides a framework for even further

improvement.

Probably the largest advantage of how the PCU processes have been diagrammed in this project is that they conform nicely to development of an interactive computer algorithm to help the production control specialist through the process, or to actually do part of the process itself. This can be a very useful tool, and will be discussed further in chapter 6.

As mentioned in the previous chapter, some of the processes include some judgemental decisions on the part of the production control specialists. These judgemental decision could be broken into decision tree diagrams in each individual BCE organization where some limits are imposed by unique base requirements and more clearly defined variables allow these decisions to be diagrammed. For example, at a Strategic Air Command (SAC) base that has an alert facility, any job order needed to be done in that facility could be classified as an emergency job order automatically removing some of the judgement required in the job order classification decision process (figure D-8).

Some of the vagueness of the prescribed system was intentional to allow individual bases the flexibility to develop a system that works best for them. For example, how a base determines which competing work orders or job orders are done first is completely up to the BCE organization. Likewise, how the programmer determines when a work order

will start or when it is time to send a work order to scheduling is completely up to the individual BCE organization. Another example of how the details are left out of AFR 85-1 to cut down on the size of the regulation is how AF Form 1219 has been assigned a job order number, entered in the job order lob (AF Form 637), and the AF Form 1219 returned to the SMART or shop supervisor to do the work, no further mention is made of the form. The form has served its purpose, so what the individual BCE organization desires to do with the form is up to them, there is no need to prescribe a method for filing or disposing of the form. One more example is when the SMART is assigned another job order to accomplish while they are in a facility (figure D-20), no mention is made as to whether the SMART enters the work required on the AF Form 1219, or if the AF Form 1879 prepared for the job order is given to the SMART, or if some other method is to be used. How a base wants to handle this is not important, so there is no need for AFR 85-1 to require a particular method.

All of these examples emphasize that the diagrams in this project are generalized, and that they should be modified by each individual BCE organization to reflect their own requirements. The generalized diagrams can be followed by a base, but personalizing it to the base will enhance the functioning of the system, and the training of new people in the system.

CHAPTER V

PCU INFORMATIONAL OUTPUTS

The PCU was found to be responsible for 91 outputs to individuals and organizations outside the PCU according to AFR 85-1. All but four of these outputs were from prescribed processes. The four required outputs that do not have prescribed processes are:

1. Briefings to the chief of resources and requirements on "all aspects of the PCC activity" [12:p.1-5].

2. Briefings on work that is on job stoppage (12:p.1-5).

3. Briefings to the chief of R & R on the backlog of work orders awaiting funds (12:p.8-2).

4. Providing status of work requests and work to customers (12:p.1-5).

These outputs are closely related to some of the inputs that did not have prescribed processes, as these are the outputs to be produced from these inputs. How the inputs are used to produce these outputs is left up to each MAJCOM/DE or individual BCE organizations to determine. As mentioned in chapter 3, one output not mentioned in AFR 85-1 is information to managers from the PCU regarding work control or work status for the purpose of making management decisions. The PCU at each base should determine what recurring

informational requests are made (inputs) for what information, in what form (outputs), and develop a process to provide this information to the requesters. Also, as done in chapter 3, the prescribed outputs have been categorized in three ways for further analysis: by the processes that produced the outputs, by the medium the outputs are in, and by the recipients of the outputs. Lists of the outputs in these three categories are in appendices H, I, and J respectively. These lists provide the answer to the third research question presented in chapter 1.

Outputs by Process

Listing the outputs by processes allows one to see what the purpose of a particular process is. Outputs define the purpose of a process. A process that produces no outputs serves no purpose. This does not mean that those processes not listed in appendix H have no purpose. Recall that in chapter 4 it was stated that many of the processes in the PCU build or feed one another. The list in appendix H lists only outputs going outside of the PCU. The processes not listed do provide outputs, but they are internal outputs, from one PCU process to another.

If a production control specialist, or anyone else, is interested in which processes directly output to other individuals or organizations, the list in appendix H can indicate how many outputs are generated per process. Some processes produce a large number of outputs, such as the

weekly scheduling process (figures D-22 and D-23). This gives one an idea of the importance of some processes to the rest of the BCE organization, and the entire base. It must be remembered, however, that these processes that output directly to outside individuals and organizations are in many cases dependent on other PCU processes generating internal outputs used as inputs for the final PCU process. This makes them equally as important to the quality of the eventual output.

One final purpose for the list in appendix H is it can be used by a production control specialist as a checklist to ensure that all required outputs from a particular process have been produced and delivered. This helps the specialist comply with the requirements of the regulation.

Outputs by Medium

The list of outputs by the medium used reemphasizes the points made in chapter 3 regarding what mediums the top managers in Air Force Civil Engineering decided should be used for the PCU information system. The largest output medium by far is AF and DD forms, or groups of forms (such as the work packages or work order folders). Over a third of the outputs, 37 of 91, are in this medium. The list of outputs in the medium of AF and DD forms provides information to production control specialists which AF and DD forms to keep on hand and know how to prepare properly.

Again some flexibility in AFR 85-1 is evident by the 15 outputs that are not specified as to the medium to be used, and the 6 written outputs that are not specified as to what the output should look like, only the type of information that should be conveyed. Each base will have the responsibility to determine the form these outputs will take t satisfy local requirements.

As stated in chapter 1, an informational output is either used as an input into another process, or is action of some kind. There are two such action outputs of the PCU: providing taxi transportation to members of the BCE organization, and accomplishment of emergency work. Although taxi drivers and Do-It-Now (DIN) workers are not actually assigned to production control, they are under the direct operational control of the PCU, and therefore effectively become PCU assets.

Just as with the inputs in chapter 3, the outputs in the medium of BEAMS products does not necessarily indicate the level of interaction the PCU has with the computer, but rather how many bulky listings are passed around. Of the 23 outputs in the form of BEAMS products, 17 are outputs directly to the computer files, and 6 are listings delivered to other individuals or organizations. The significance of the BEAMS outputs will be discussed in the next section covering the significance of the list of outputs by recipients.

Outputs by Recipient

Probably the most important method of categorizing PCU outputs is by who receives the outputs. The need to separate the outputs into 22 different recipient groups emphasizes the wide interaction the PCU has with outside individuals and organizations, both in and out of the BCE organization. Once again, the centrality of the PCU is illustrated by the fact that every branch of the BCE organization, except the administration branch, receives outputs from the PCU according to AFR 85-1. Every subunit within the operations branch receives multiple outputs from the PCU. The members of the PCU need to be aware of the organizations they support, and how they support them. The listing in appendix J helps provide the PCU with the checklist of items they are responsible to deliver (at a minimum) to other individuals and organizations.

Just as identification of inputs into the PCU in chapter 3 helps start the diagramming processes for the inputting organizations, the list of PCU outputs provides more information towards diagramming other portions of the BCE organization by identifying the inputs these subunits receive from the PCU. This helps with the completion of step two of the overall MIS/DSS design process described in chapter 1, which is diagramming of the prescribed information system for all of the BCE organization.

because of the erroneous information it will provide. Fearful that this will happen, redundancy was introduced in some processes, requiring the same information to be "filed" by several different methods. The best example is the IWP process. The IWP consists of three different "filing" systems for the same information: the BEAMS, wall charts, and a work order register and AF Forms 919. Whenever the status of a work order changes, all three systems must be updated. This duplication of effort could be an indication of distrust of the BEAMS, and/or it could also indicate a transitioning from manual to automated methods of processing information

By accomplishing the next step in the overall MIS/DSS design process presented in chapter 1, determining what information PCUs actually input and output, the significance BEAMS actually has can be determined. If PCUs are not really using the information provided by the BEAMS, the reasons why could be investigated and corrected.

The outputs identified are only those required by AFR 85-1. Each BCE organization requests much more information from their PCUs than those prescribed. The important and recurring outputs needed should be identified, processes developed, and information sources to provide the needed inputs located to meet the needs of the local organization in the same manner as the prescribed system has been identified and diagrammed in this project.

Of the 91 outputs of the PCU, 17 of them are delivered to the BEAMS files. This indicates a much higher interaction between the PCU and the BEAMS than was indicated by the number of inputs in chapter 3. This might tend to suggest that the PCU puts more into the BEAMS than it gets out of it, but once again, this could be an erroneous conclusion. Many of the outputs to the BEAMS are very simple transactions, requiring minimal amounts of time to accomplish. Also, the BEAMS actually acts as a sophisticated filing system for the PCU. For example, the outputting of information on CWONs and authorized shops for the WAL are solely for the production of the BEAMS product PCN SF 100367 which is listed as an input to the PCU from the BEAMS. The BEAMS simply collects and formats the data outputted to it to provide a more useful product to the PCU. All but two of the outputs to the BEAMS are for this purpose. This should emphasize to PCU personnel that inaccuracies with BEAMS products are largely the fault of the PCU, as this is where the outputs to the BEAMS originate to provide inputs to the PCU. The PCU can be their own worst enemy, poisoning their own data source from which they must make decisions from. The bottom line is that the significance that the BEAMS has in the PCU is largely dependent upon the significance the PCU places on the BEAMS. Unless the PCU regards the BEAMS as vital enough to carefully and accurately output data to it, the inputs from the BEAMS will be of little value

CHAPTER VI

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

Referring back to chapter 1 of this thesis, the research questions were:

1. What information inputs are provided to the PCU according to the AFRs/AFMs and from what sources?

2. What are the information processes that are supposed to process these inputs according to the AFRs/AFMs?

3. What information outputs is the PCU responsible to produce, and for whom?

4. What portions of the system are manual operations and which portions are automated?

Question 1 has been answered by the lists found in appendices E, F, and G; the answer to question 2 in appendix C; and the answer to question 3 in appendices H, I, and J. The answer to question 4 is found in the BEAMS category of the lists in appendices G and J. As mentioned in chapter 5, the only real automated portion of the PCU information system is an automated filing system provided by the BEAMS.

The diagrams in appendix D provide a framework for the other portions of the BCE organization to be similarly diagrammed. They also provide a basis for accomplishing the next step in the overall MIS/DSS design process, describing and diagramming actual information systems in BCE organizations. Using the prescribed diagrams, and going through procedures at various bases, deviations will become apparent and can be easily documented. This fulfills the main objective of this research. The first subobjective, identification of the portions of the prescribed MIS/DSS that are manual and those that are automated, was accomplished in answering the fourth research question. The diagrams in appendix D also accomplish the second subobjective by demonstrating how these diagrams simplify regulation requirements by putting them into a form that is easier to follow. Because they are easier to follow and understand, they can improve the learning process when training production control specialists in the prescribed procedures, satisfying the third subobjective.

Many more possible benefits have been discovered during the course of this research. The diagrams developed in this thesis, if personalized by individual BCE organizations, can provide a good framework for further modification, improve training of base personnel in local procedures, and constitute documentation of the locally used procedure, satisfying the requirements of AFR 85-1 to

document any deviations from the optional prescribed procedures. If an interactive computer system is developed to take PCU specialists through the processes, the diagrams can serve as a back-up when computer support is lost.

One important conclusion of this research for the present system is that the significance and usefulness of the BEAMS is dependent upon the PCU's knowledge of the purpose and functions of the BEAMS, and the significance they place on it evidenced by the care taken to output data to it accurately. The PCU must recognize the BEAMS as simply a sophisticated file cabinet, and that the "files" in it are only as good as the filer makes them.

General Recommendations

The main reason for this research effort was to offer an alternate and more systematic objective approach to the IRS. Therefore, it seems appropriate that the first and strongest recommendation be that the AFESC adopt the approach presented in this thesis for accomplishing the IRS.

A recurring theme throughout this thesis has been the personalizing of the diagrams in appendix D by each individual BCE organization to reflect local requirements and procedures. It is strongly recommended each base do this to help them document deviations from AFR 85-1 prescribed processes, as is required by AFR 85-1, to help in the training of incoming personnel, and to provide the framework and stimulation for revising and improving these

processes.

In keeping with the second subobjective of this research, it is recommended that consideration be given to incorporating some or all of the diagrams in appendix D into AFR 85-1 and deleting the verbage portions of the regulation they represent. A variation of this recommendation is that the entire BCE information system be diagrammed before revision to AFR 85-1 is made to help tie in these diagrams with other processes in the BCE organization.

For the near future, before any AFR 85-1 revision, and in keeping with the third subobjective, it is recommended that the diagrams in appendix D be used to supplement the training of production control specialists. By diagramming the entire PCU information system, it is possible that PCU personnel will get a better understanding of how the entire PCU operates, and not just their particular job. This will give the chief of the PCU more flexibility in how he uses his people, make it easier to accommodate absences since other qualified people will be available, and allows job enlargement, rotation, or enrichment possibilities to improve the morale of PCU personnel (8:154-160).

Although the complete design process presented in chapter 1 is the best method to determine what kind of MIS/DSS Air Force Civil Engineering should adopt, the effort put into this portion of the design process has generated

some preliminary recommendations for what should be incorporated into a new MIS/DSS. An interactive, or conversational computer system with individual monitors for select positions in the PCU would be desirable. The centralized computer files would contain the processes diagrammed in appendix D, and would be programmed to present the questions in the processes in sequence to the PCU specialist. The computer would respond to the PCU specialist's answers by continuing along the appropriate path for the particular response. If the PCU specialist is presented with a question that the specialist desires more information on, a secondary subroutine could be programmed in at each decision point that ties in the information available in the computer's files pertinent to that particular decision. For example, if the question presented is "what is the work classification," the PCU specialist could request further information and the computer would then present the information in AFR 86-1 concerning work classification, or any locally developed decision process. After this question is answered, the computer would then continue on where it left off in the original process. At the point where a form needs to be generated, a printer could be used to automatically determine the proper form and print the information from the decisions made by the PCU specialist. In many situations, the need for a form can be eliminated. Examples are the

work order register, the job order log (AF Form 637), and the IWP worksheets (AF Forms 919). Hard copies of information at key points could be produced and filed as back-up in the event that computer support is lost or interrupted. In this situation, the diagrams in appendix D would be invaluable as they would continue to help PCU specialists through the processes even without the computer program, since they would be the source documents the computer program would be developed from. Another desirable characteristic of this type of a system would be the ability to quickly try different solutions before selecting one. For example, the scheduler could go through the scheduling process and construct a preliminary schedule. The schedules from all shops could be tied in so when the scheduler schedules a work order requiring more than one shop, the hours needed in the other shops would be automatically included in the other shop's schedules. Once a preliminary schedule for each shop is obtained, the scheduler and shop supervisors together can enter in alternate jobs and immediately see the impact on the entire schedule and all the other shop's schedules. This is a much quicker and easier way to fine tune a schedule, and not a single form needs to be filled out. When the final schedule is completed and approved, hard copies of the schedule and authorization documents can be printed by the computer. Better yet, controllers and shops would also have

direct access to a monitor and all transaction could be made right into the computer files, without the middle medium of a form. The IWP process could similarly benefit from this type of a fine-tuning interactive computer system.

It is strongly recommended that any Air Force wide computer design allow for individual base modification in the same manner the diagrams of AFR 85-1 do. Otherwise, every base would be tied to a fixed prescribed process, and the interactive system would not be as useful. A preprogrammed process reflecting the prescribed processes in AFR 85-1 could be entered into each base's computer system, but the ability to modify that process must be available. Portions of the prescribed process that are not optional could be programmed so that they could not be altered, or to print a warning message to the individual working with the computer that a waiver is required to change that particular part of the process. This prevents a base from inadvertantly violating public law or requirements that must be observed. Other specific examples of capabilities that a system of this type should have are:

1. When a work request is inputted to the PCU, the information from the work request could be entered into the computer and vital information regarding the work requested could be obtained immediately such as:

a. By entering the facility number, all other work in the facility or future disposition plans,

and/or items under warranty/guarantee in the facility could be printed on the monitor to ensure there is no duplicate or needless work done, or that warranties/guarantees are not voided.

b. When the work classification decision is made and entered, the computer could list the recent history of work of that classification (or any other classification if requested by the PCU specialist) to help determine if there is a recurring problem that needs a better solution, or if the work is a series of minor construction projects to accomplish a large change which is illegal (11:p.5-2).

c. After entering the facility number or the requesting organization, the computer could immediately indicate whether or not the BCE is responsible for providing support to that particular organization or facility, or if the customer is a reimbursable customer.

d. Once the facility number is entered, the building custodians name and phone number could be presented so he or she can be immediately contacted by the PCU specialist to determine if he or she is aware of the work request.

e. Depending on local conditions, entering a particular facility number (such as an alert

facility) on a particular customer could automatically determine the work priority.

2. For the programmer and scheduler, several forecasting methods could be programmed into the computer that would forecast the number of manhours required for direct scheduled work or emergency job orders, or any other category of work based on historical data, recent trends, or seasonality considerations. The computer could also automatically evaluate each forecasting method, determine which forecast has the lowest Mean Average Deviation (MAD) and "suggest" a forecast to the scheduler or programmer (4:241-243). The scheduler or programmer should have the capability, however, to make their own choice as to what the forecast should be.

3. Have the files from the administration branch tied in so dates that workers are on leave, leaving the base, arriving at the base on temporary duty, in training, or any other conflicts that decrease the available manhours for work, are made available to shop supervisors, and/or to the programmer to help forecast available manhours for future work.

All of these recommendations would greatly enhance the information system effectiveness in the PCU, which would help obtain the ultimate objective that this thesis effort was intended to accomplish: to improve the quality of the decisions made in the PCU in an effort to keep doing more

with less.

The Next Step

The next step in the MIS/DSS design process presented in chapter 1 is to determine the actual information system that exists in PCUs. This step will require field studies to investigate individual PCUs, compare their processes to the prescribed processes, note deviations, diagram the actual processes, and attempt to determine the reasons why the deviations exist. This information will provide some of the criteria for what a new MIS/DSS should incorporate.

The step after this will complete the list of characteristics that the new MIS/DSS should have. This step requires the construction of an "ideal" information system for the PCU. This means that if there were no cost, technology, or other constraints, what kind of information would be desired for PCU processes? To illustrate, consider the weekly scheduling process (see figures D-22 and D-23). When the scheduler considers the question of how many hours are needed for emergencies, ideally, the scheduler would like to know exactly how many hours of emergency work will be inputted into the BCE organization for each shop for the next week. Because it is impossible to know the future with certainty, the best possible forecast is what is desired by the scheduler. Presently, historical data is presented to the scheduler by BEAMS, but no forecast. This

is the current gap between the present and the "ideal" information systems, and this is where further research is necessary.

Recommendations for Further Research

The following subjects are presented as follow-on research efforts that build on the research done in this thesis.

1. Determine and diagram the prescribed information system by AFRs/AFMs for the other subunits of the BCE organization (completion of step 2 of the MIS/DSS design process).

2. Determine and diagram the actual information systems in BCE PCUs (step 3 of the MIS/DSS design process).

3. Determine and diagram the "ideal" information system for the PCU (step 4 of the MIS/DSS design process).

4. Evaluate forecasting models to identify one that can accurately forecast BCE work requirements.

5. Investigate alternate methods for classifying work (other than the M, R, C, and MC classes and definitions) that are less subjective.

6. Develop a computer model that will prioritize and schedule all work requirements based on variables selected by a BCE organization.

7. Develop a system or a model that will accurately forecast BCE manhour availability for accomplishing in-service work.

8. Life-cycle cost analysis of equiping BCE organizations with interactive computer systems.

APPENDICES

APPENDIX A

GLOSSARY OF TERMS AND ABBREVIATIONS

AF Form - Air Force form.

AFESC - Air Force Engineering and Services Center, Tyndall Air Force Base, Florida.

AFIT - Air Force Institute of Technology, Wright-Patterson Air Force Base, Ohio.

AFM - Air Force manual.

AFR - Air Force regulation.

Approval Authority - The individual or office that has the authority to approve work, depending upon the cost of the work, work classification, and who work is to be done for, as outlined in AFR 86-1, chapter 2.

ATA - Actual time accounting.

BCE - base civil engineer or base civil engineering.

BEAMS - Base Engineer Automated Management System. The computer based MIS/DSS used by civil engineering organizations.

CE - civil engineering.

COCESS - contractor operated civil engineering supply store.

COPARS - contractor operated parts store. A store operated by a contractor primarily for the transportation organization to supply automotive parts.

CPM - critical path method.

CSU - Customer service unit (see figure 3).

CWK - Recurring maintenance completion cards.

CWON - Collection work order number. Used to collect material and labor costs for work that doesn't require separate work order numbers, such as job orders, operations and services, and recurring maintenance (12:p.5-1).

DD Form - Department of Defense Form.

DIN - Do-It-Now. Workers and vehicles equipped to respond quickly to emergencies.

DSS - Decision support system.

EEP - Engineering and environmental planning branch (see figure 3).

ETA - Exception time accounting.

GOCESS - Government operated civil engineering supply store.

Hopper - A technique used by BCE to schedule routine job orders. Job orders are collected by geographic area and scheduled as packages instead of individually to reduce time lost in travel (12:p.6-1).

IE - Industrial engineering branch (see figure 3).

IRS - Information requirements study.

IWP - In-service work plan.

LOGCESS - Logistics operated civil engineering supply store.

LSF - Labor summary file.

LUC - Labor utilization code.

MAJCOM/DE - The Deputy Chief of Staff for Engineering and Services in each Major Command.

MFH - Military family housing.

MIS - Management information system.

PCC - Production control center. Consists of the chart, control, and service call rooms; the chief of operation; the chief of resources and requirements, the PCU; the superintendents; and the controllers.

PC Chief - Chief of the production control unit, usually a senior non-commissioned officer or civilian equivalent (see figure 3).

PCU - Production control unit. Consists of the chief of production control, the customer service unit, service call, and the scheduling and programming functions (see figure 3).

PERT - Program evaluation and review technique.

Prog. - Programmer.

QAE - Quality assurance evaluator.

RMP - Recurring maintenance plan.

RPIE - Real property installed equipment.

R & R - Resources and requirements section (see figure 3).

SC - Service call (see figure 3).

Sch - Scheduler.

Scope of work - "Any new or additional work that was not requested or approved on the original approval document /12:p.8-1/."

SMART - Structural maintenance and repair team. A multi-craft team used to perform minor maintenance and repair in high-use facility to preclude constant recurring trips to the facility by shop workers (12:p.6-3).

Soft copy/hard copy AF Form 1879 - The AF Form 1879 consists of two copies. The first copy is made of regular bond paper (the soft copy) and the second of much heavier paper (the hard copy).

WAL - Work Authorization List. Used to authorize operations and services type work (12:p.10-1).

WCM - work order master file in BEAMS.

WCN - work order shop record/file in BEAMS.

Work class C - Construction work. See AFR 86-1, paragraph 2-3c, p.2-2, for complete definition.

Work class M - Maintenance work. See AFR 86-1, paragraph 2-3a, p.2-1, for complete definition.

Work class MC - Minor construction work. See AFR 86-1, paragraph 2-3d, p.2-3, for complete definition.

Work class R - Repair work. See AFR 86-1, paragraph 2-3b, p.2-1, for complete definition.

Work order folder - A folder containing all documents pertinent to a work order. Typical contents of the folder are AF Forms 327, 1445, and 103; and the work plan.

Work packages - All the documents pertaining to the work planned to be scheduled or already scheduled. Typical contents are work order folders, AF Forms 1879, 1219, 1445, and 103.

APPENDIX B

DIAGRAMS FROM AFR 85-1

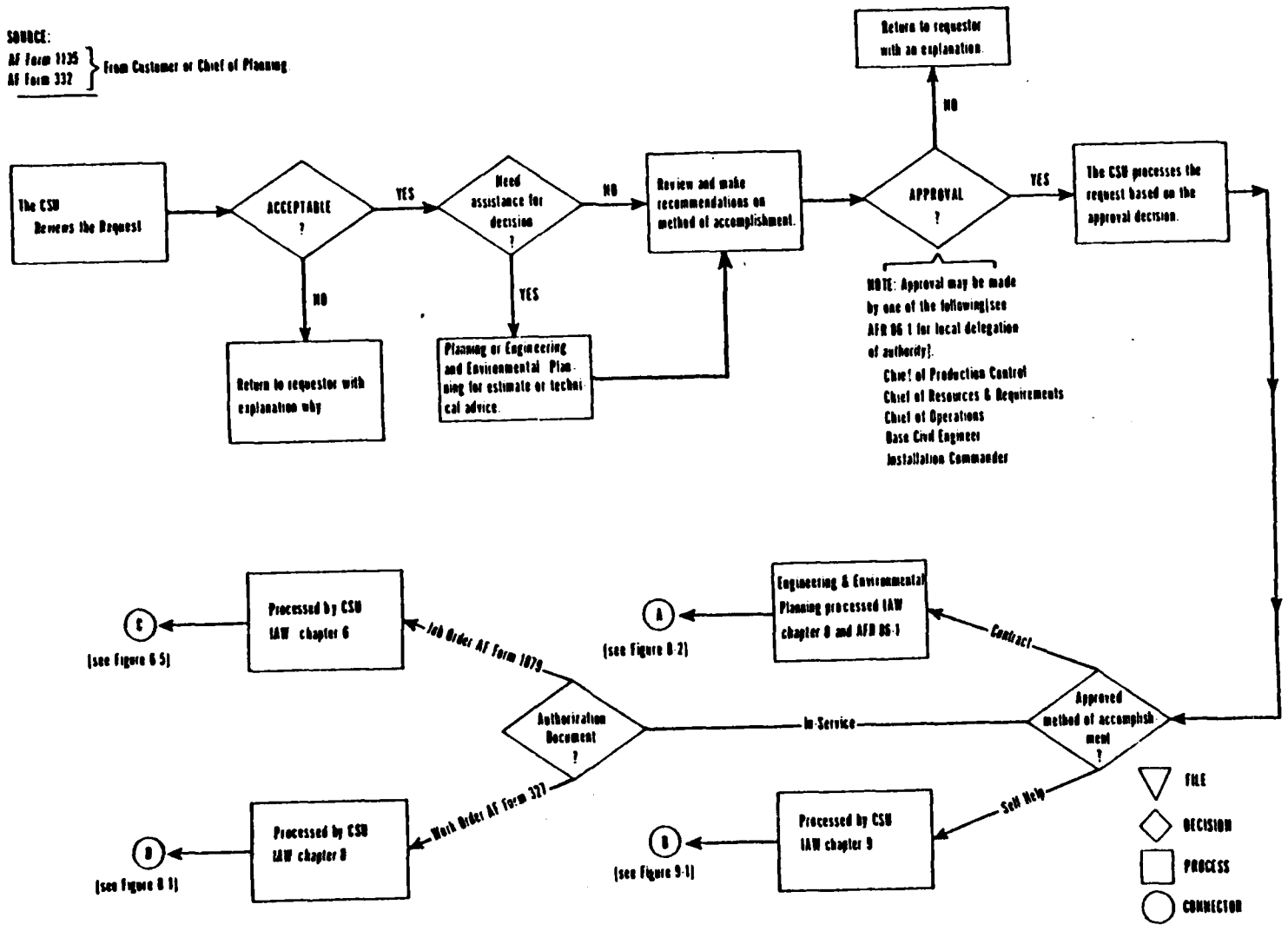


Fig B-1. Written Work Request Flow Chart [12:p.4-67]

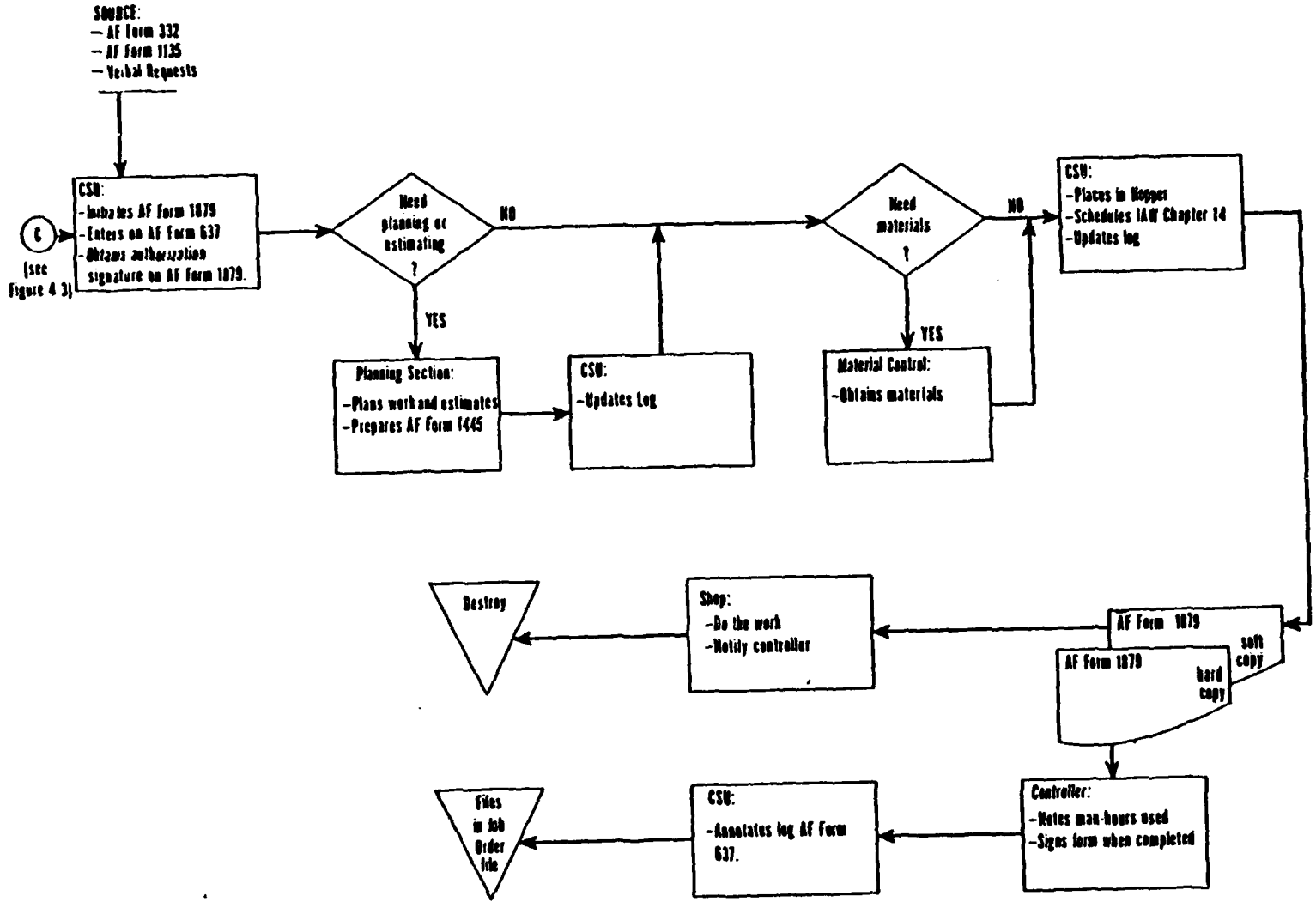


Fig B-2. Routine Job Order Flow Chart [12:p.6-10]

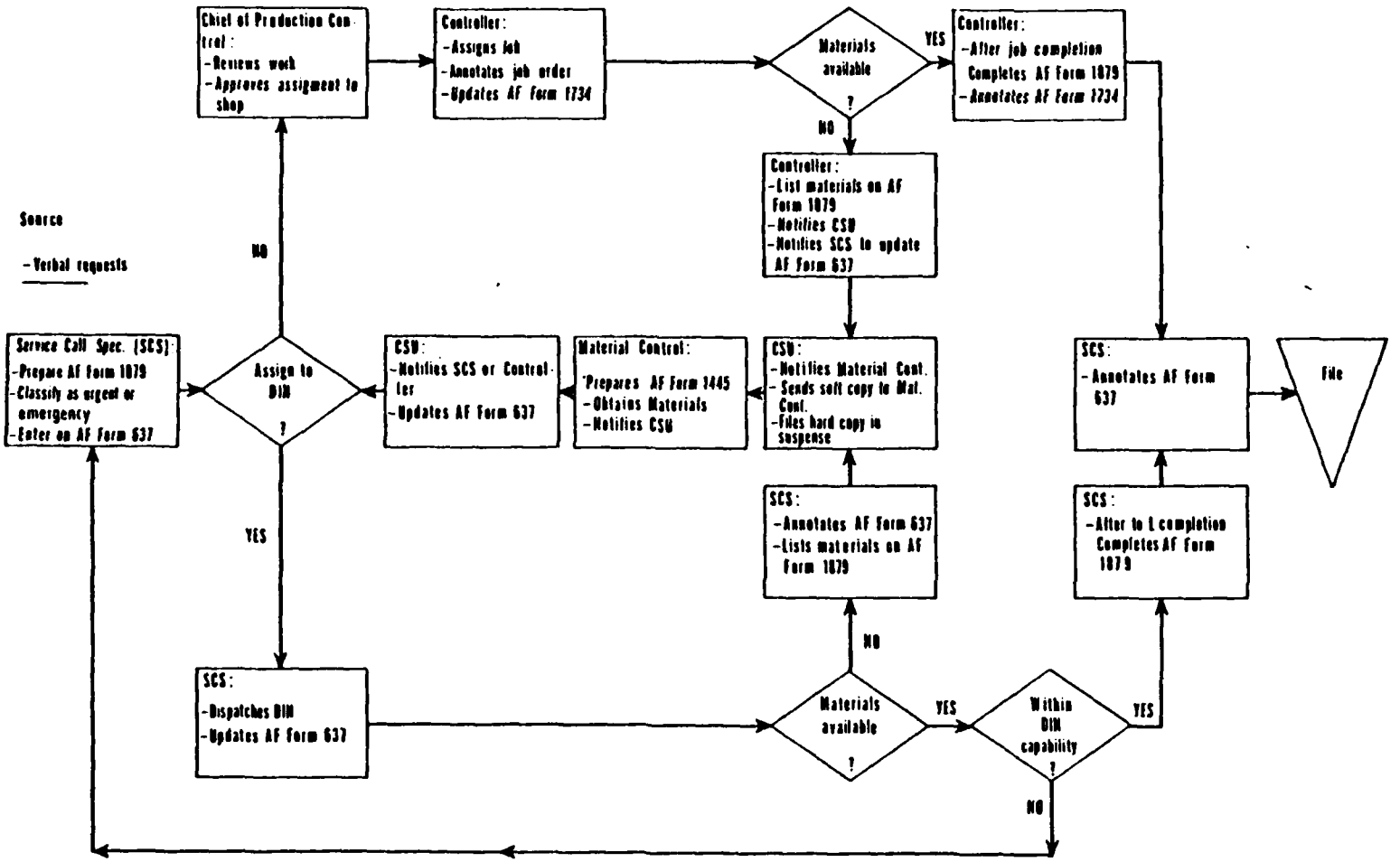


Fig B-3. Emergency or Urgent Job Order Flow Chart [12:p.7-67]

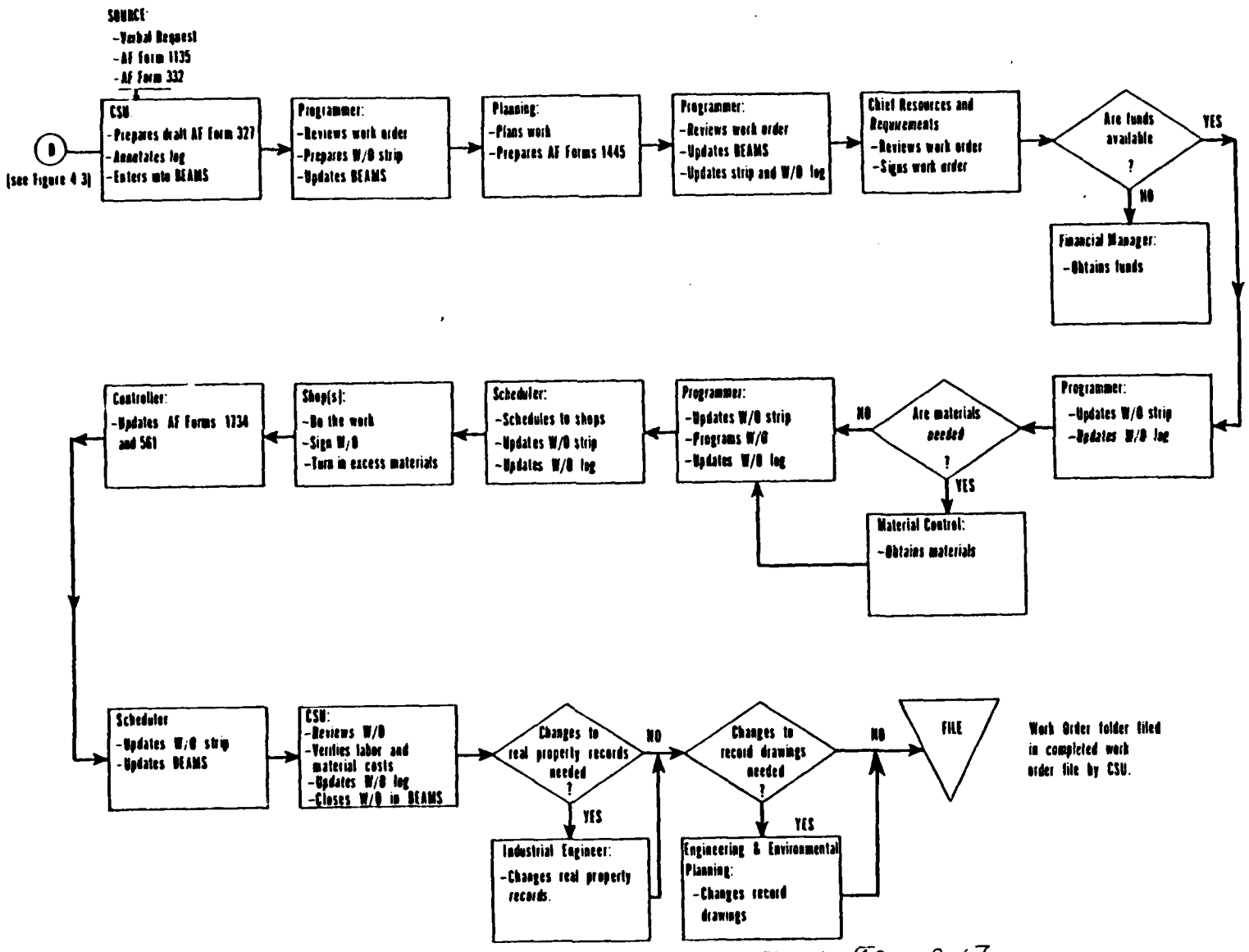


Fig. B-4. Inservice Work Order Flow Chart [12:p.8-6]

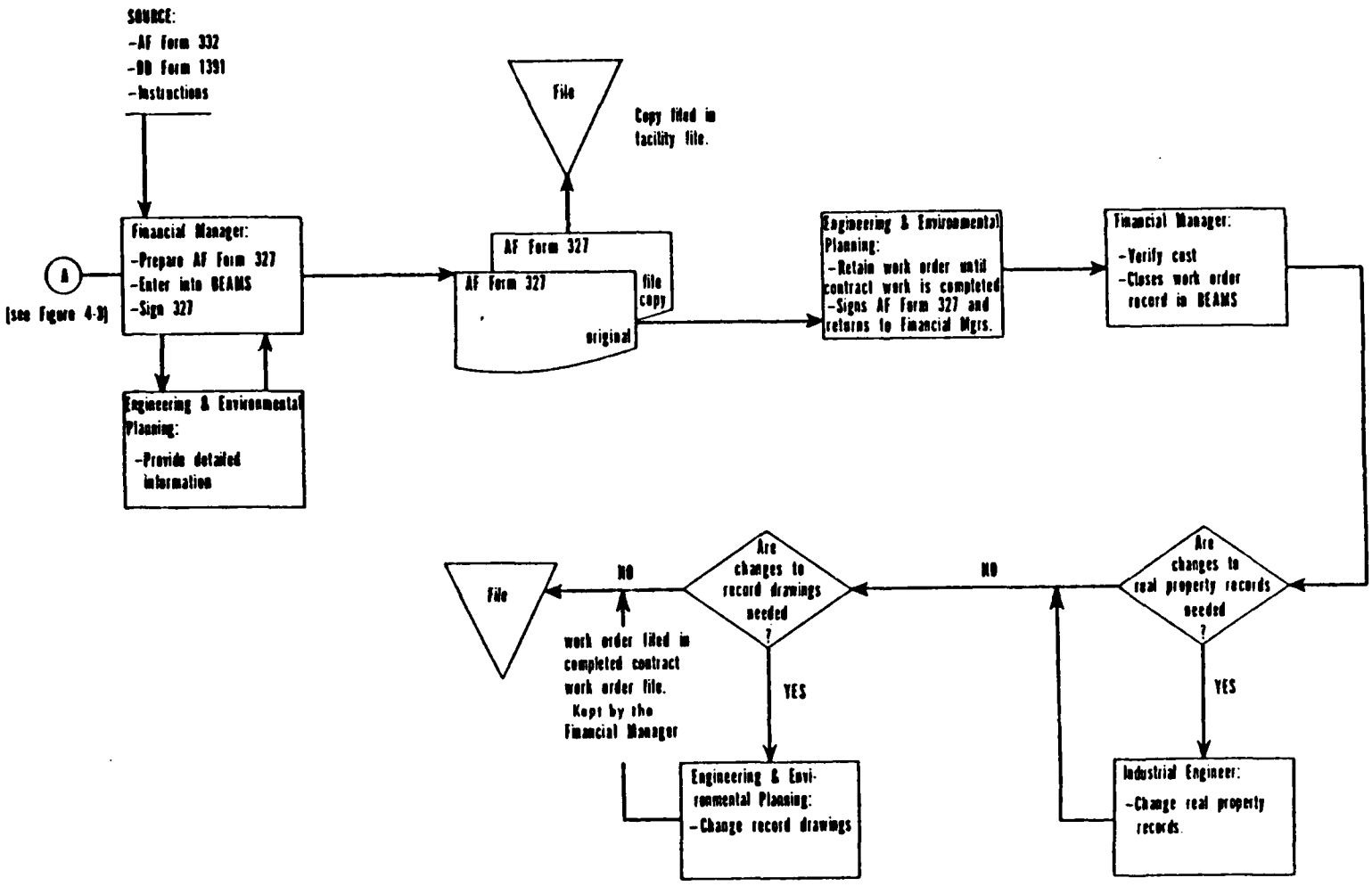


Fig B-5. Contract Work Order Flow Chart [12:p.8-7]

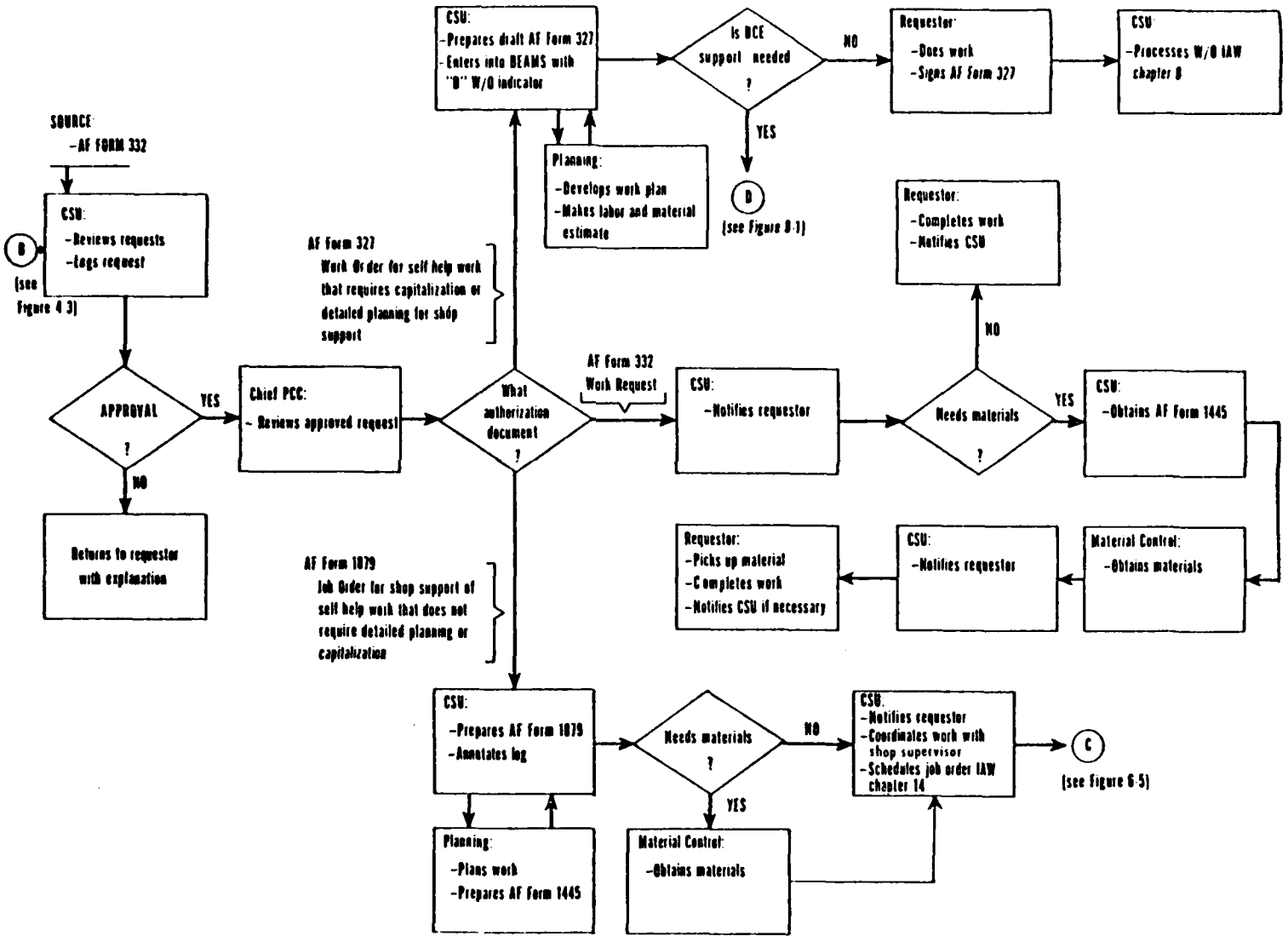


Fig B-6. Self-Help Work Request Flow Chart [12:p.9-5]

APPENDIX C

LIST OF PCU PROCESSES

A. Work Request (AF Form 332) Approval Process (Figures D-1, D-2, and D-3)

B. Authorization Document Decision Process (Figures D-4 and D-5)

C. Work Request (AF Form 1135) Approval Process (Figures D-6 and D-7)

D. Job Order Classification Decision Process (Figure D-8)

E. Routine Job Order Process (Figure D-9)

F. Emergency and Urgent Job Order Process (Figures D-10 and D-11)

G. In-Service Work Order Process (Figures D-12 and D-13)

H. Self-Help Work Order Authorization Document Decision Process (Figure D-14)

I. Self-Help Work Order (AF Form 332) Process (Figure D-15)

J. Self-Help Work Order (AF Form 327) Process (Figure D-16)

K. Recurring Maintenance Program Development Process (Figure D-17)

L. CWON and WAL Development Process (Figures D-18 and D-19)

M. SMART Schedule Preparation Process (Figure D-20)

N. SMART Job Order Process (Figure D-20)

O. MFH Renovation Job Order Process (Figure D-21)

P. Weekly Scheduling Process (Figures D-22 and D-23)

Q. Job Stoppage/Change Order Process (Figure D-24)

R. Work Order Cancellation Process (Figure D-25)

S. Work Order Close-Out Process (Figures D-26 and D-27)

T. Job Order Close-Out Process (Figure D-28)

U. Weekly Schedule Close-Out Process (Figure D-28)

V. Daily Schedule Close-Out Process (Figure D-28)

W. Contract Work Order Status Process (Figure D-29)

X. In-Service Work Plan Process (Figures D-30, D-31, D-32, D-33 and D-34)

Y. Warranty/Guarantee System Process (Figures D-35, D-36, D-37 and D-38)

Z. Transportation (Taxi) System Process (Figure D-39)

Unprescribed:

AA. Communications System Process

BB. Command Post/Communications Center Operations Process

CC. Briefings Preparation Processes

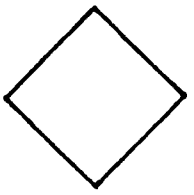
DD. Customer Assistance Process

APPENDIX D

DIAGRAMS OF PRESCRIBED PCU PROCESSES

Legend for appendix D:

action not requiring a decision



decision

connector with another diagram. The number within the circle refers to the figure number.

I99.

input

O99.

output

filing action - also an output

For explanation of any abbreviations, refer to Appendix A, Glossary of Terms and Abbreviations.

All references in parenthesis refer to a paragraph number in AFR 85-1 unless another directive is stated, in which case it is the paragraph number in the stated directive.

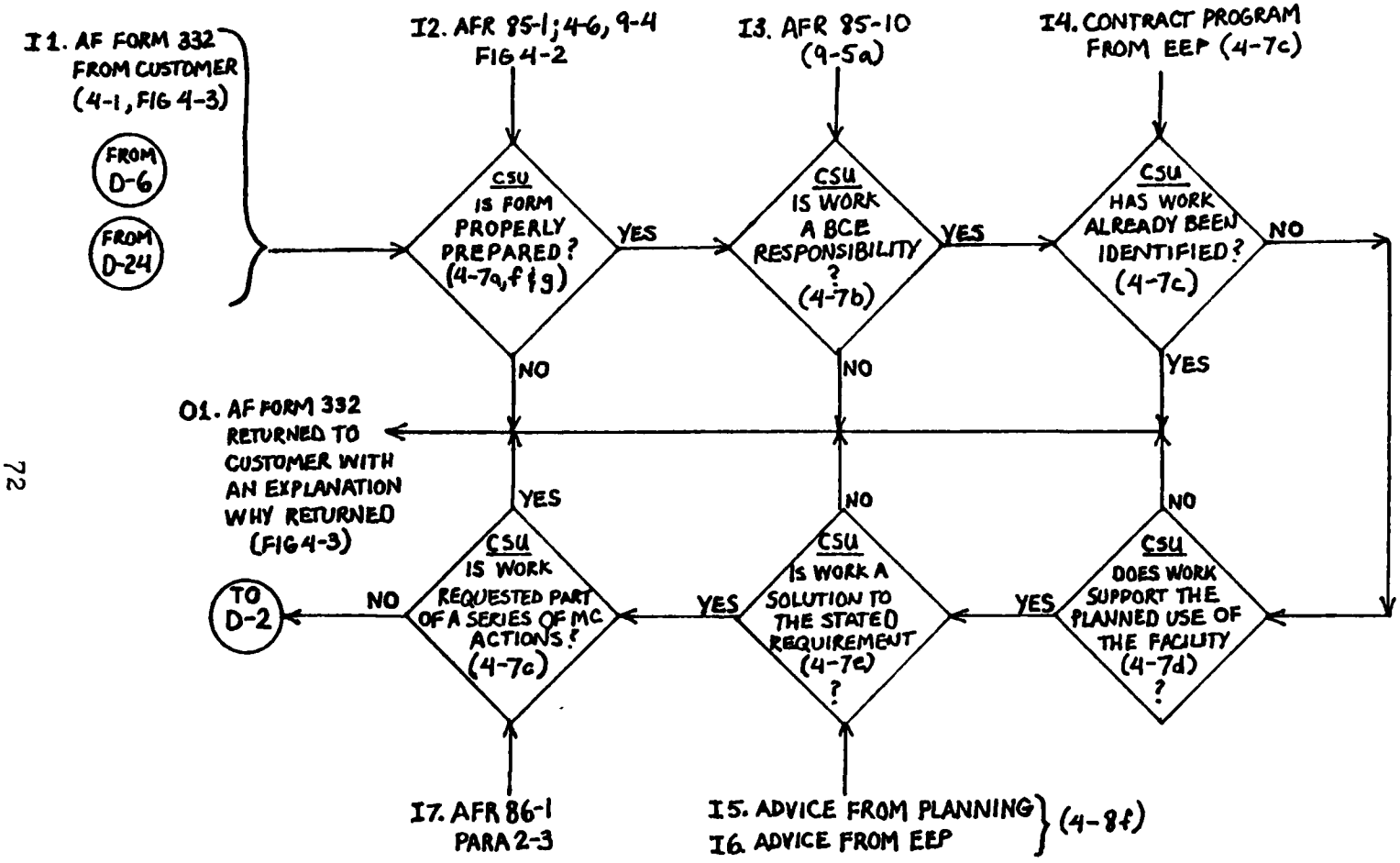


Fig D-1. Work Request (AF Form 332) Approval Process

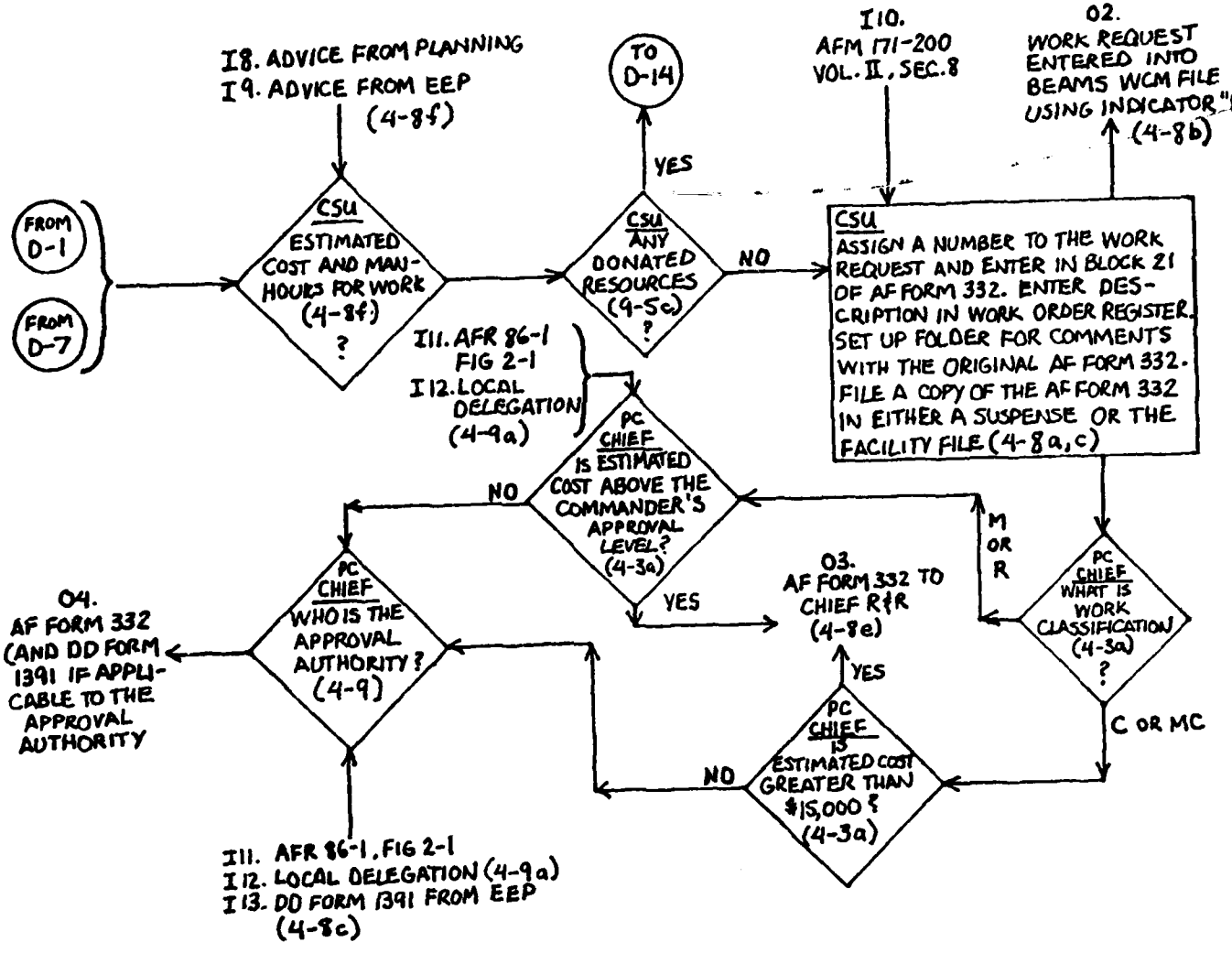


Fig D-2. Work Request (AF Form 332) Approval Process (cont.)

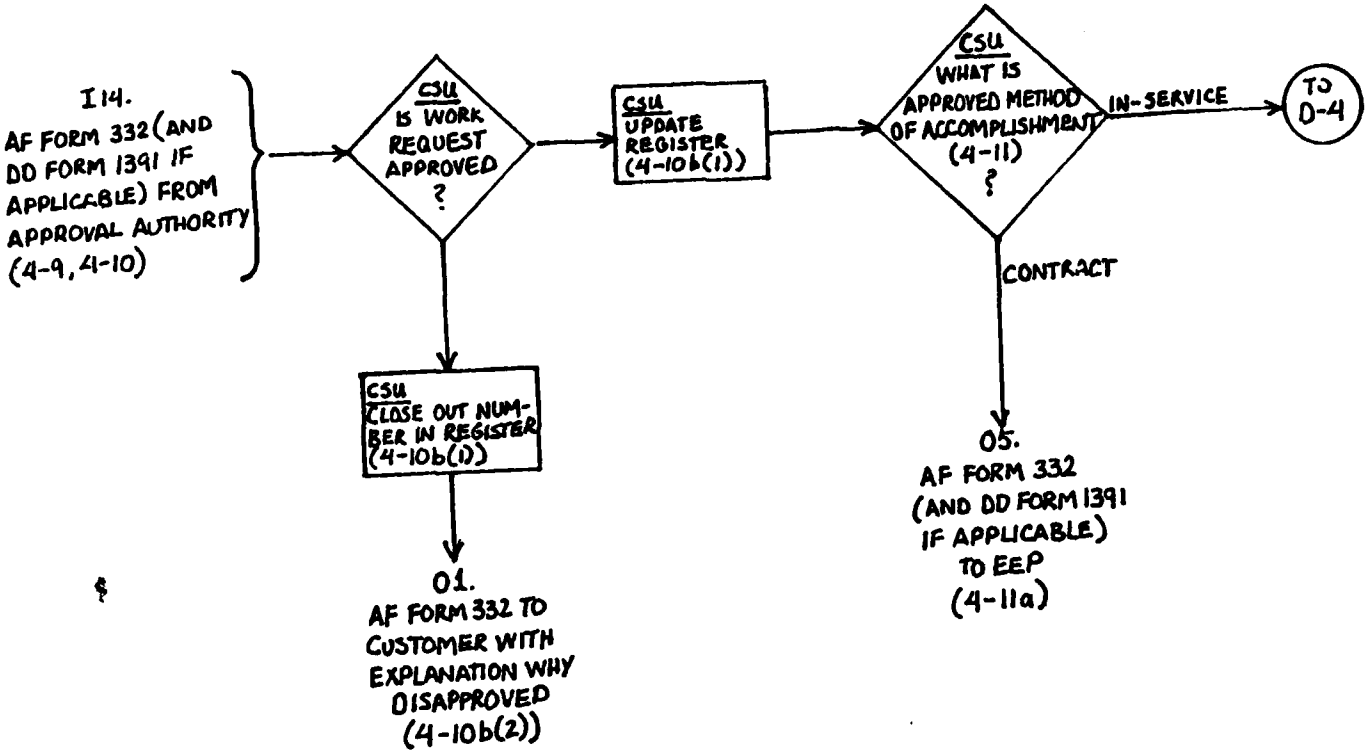


Fig D-3. Work Request (AF Form 332) Approval Process (cont.)

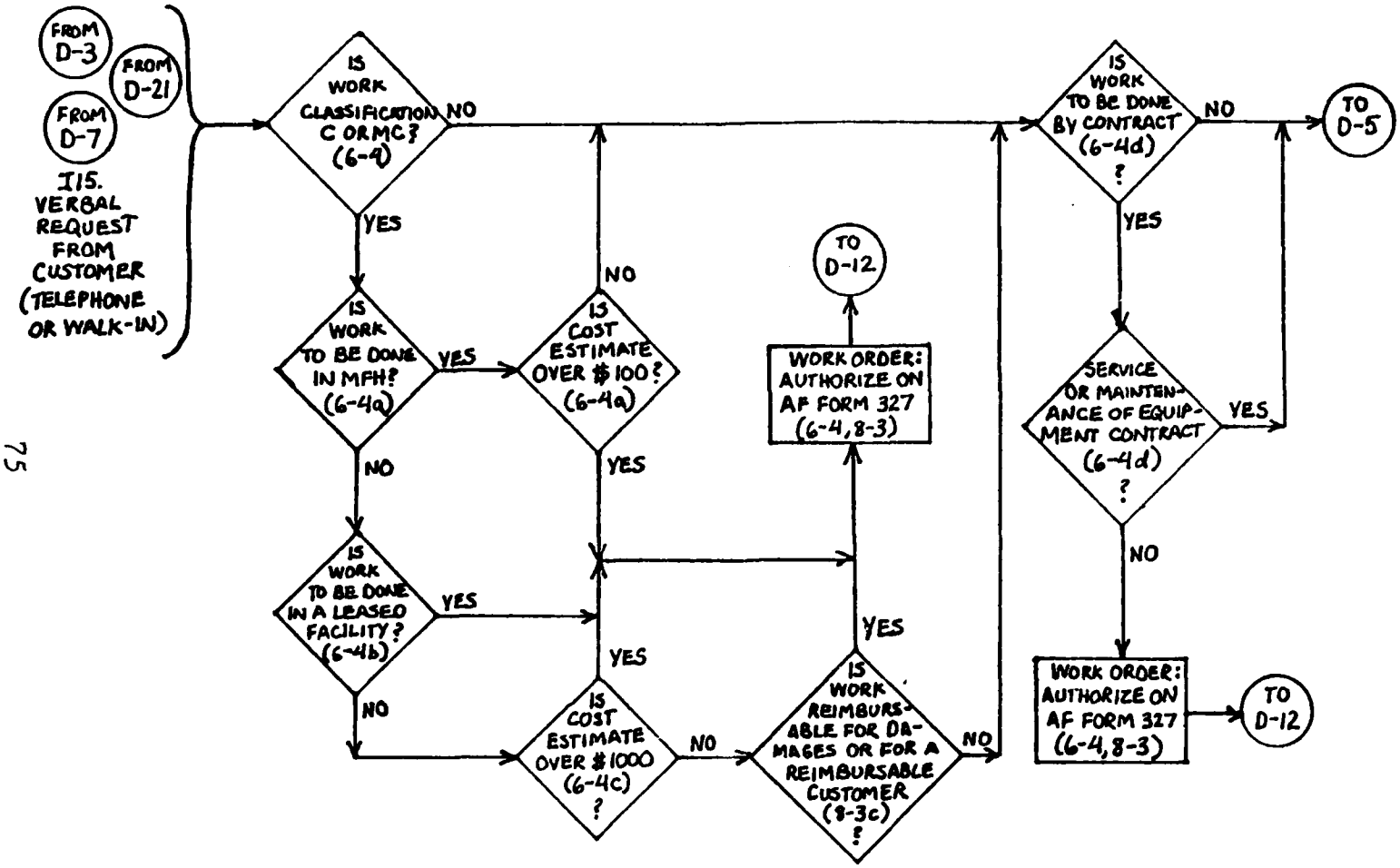


Fig D-4. Authorization Document Decision Process

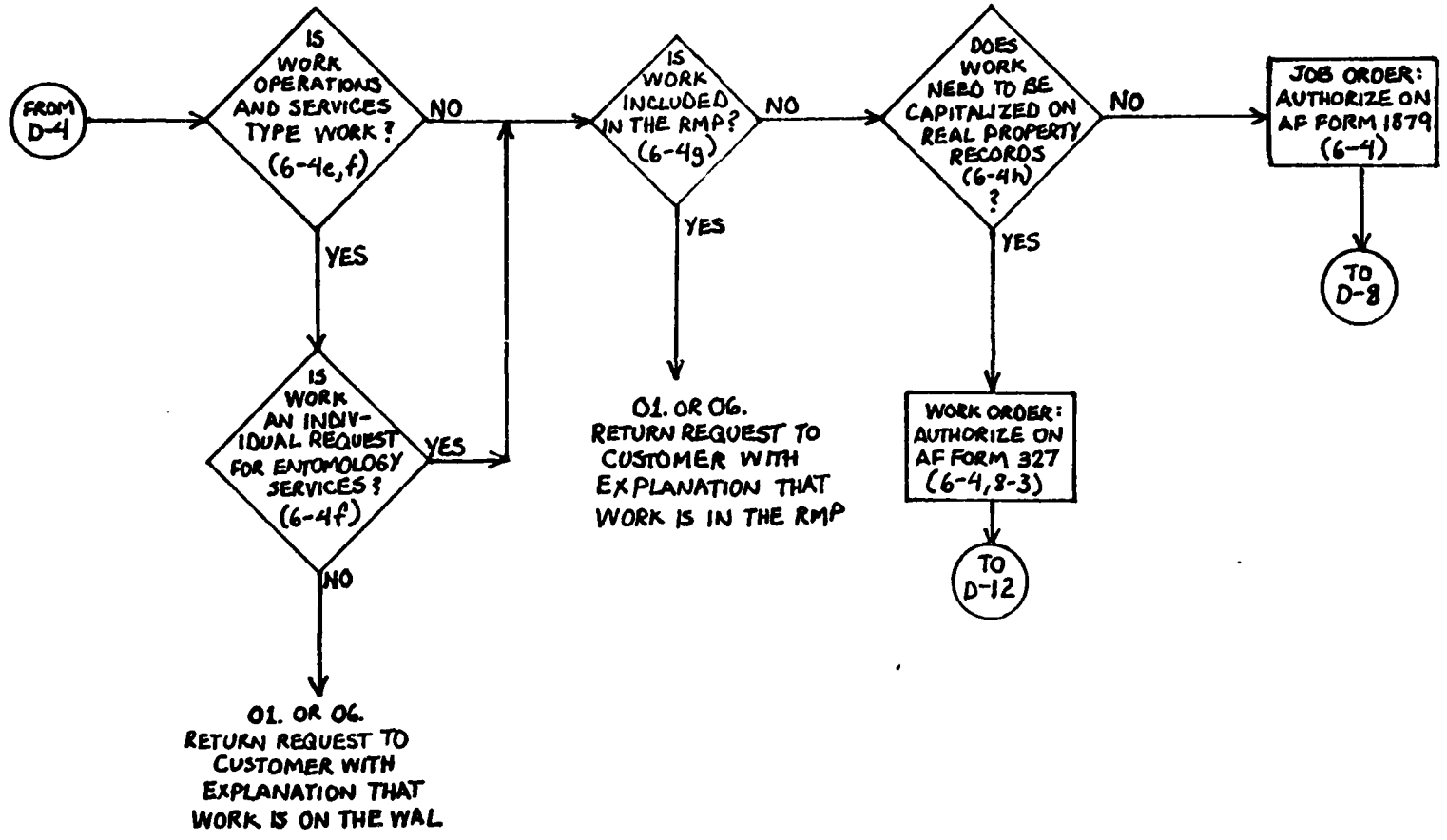


Fig D-5. Authorization Document Decision Process (cont.)

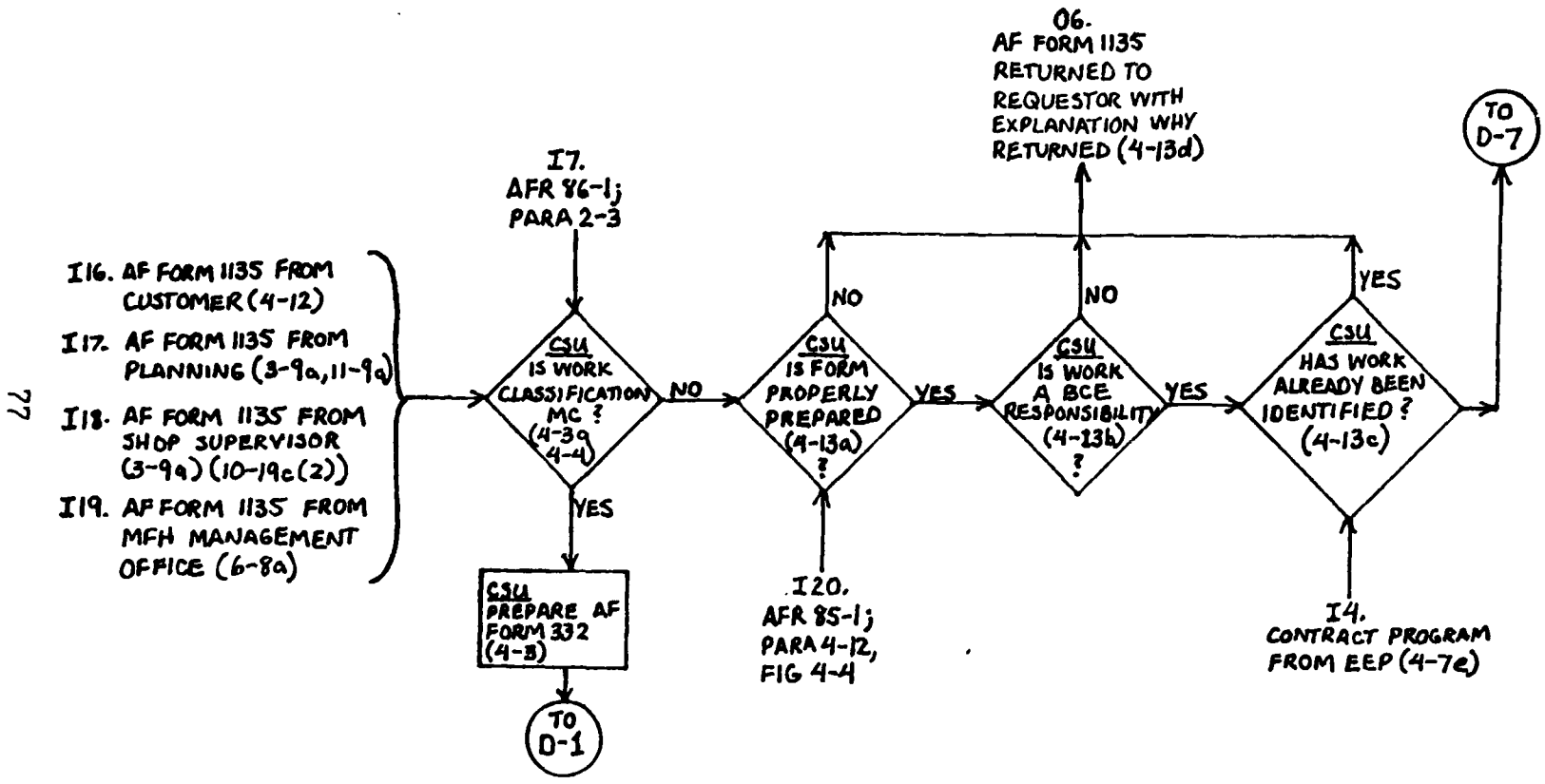


Fig D-6. Work Request (AF Form 1135) Approval Process

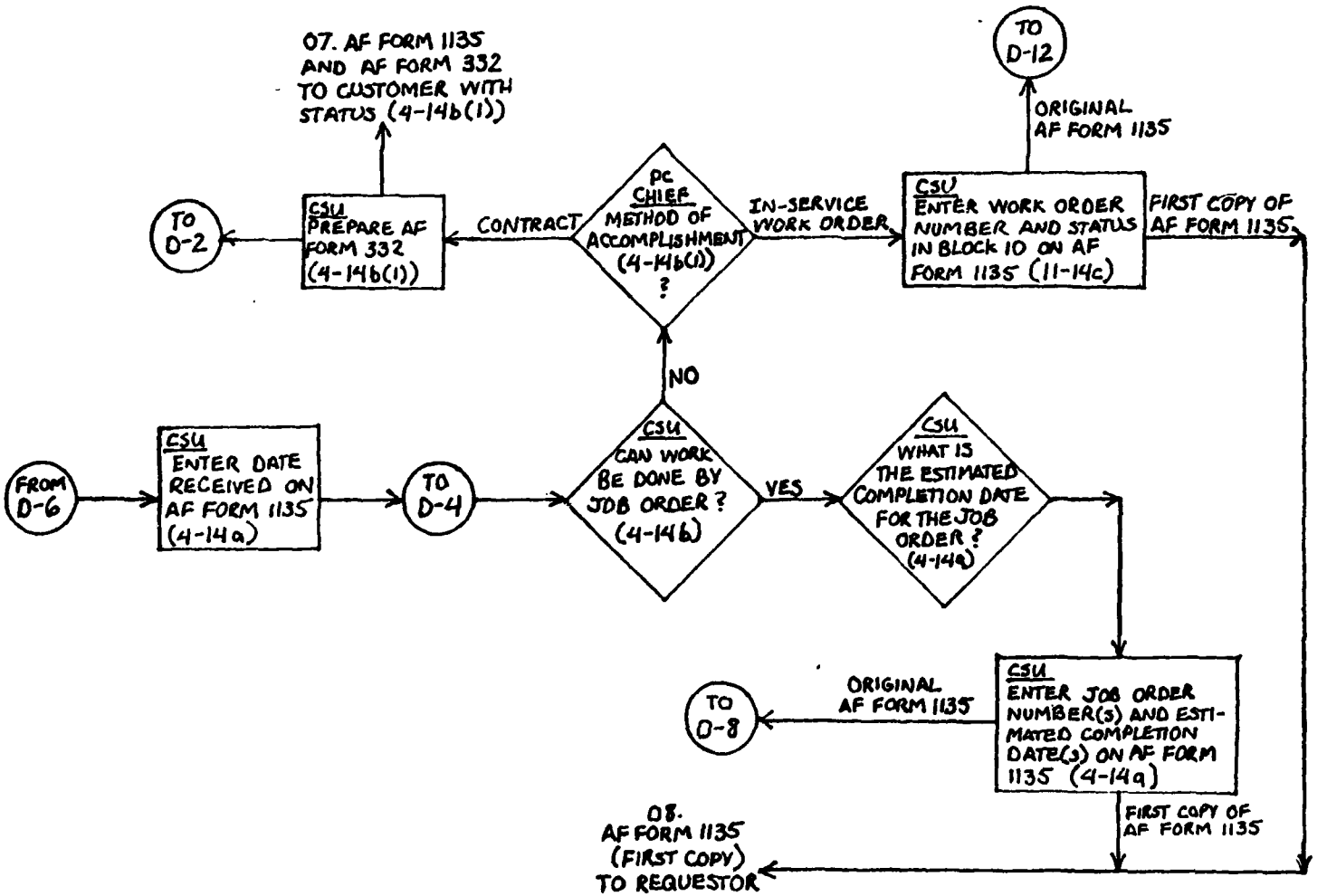


Fig D-7. Work Request (AF Form 1135) Approval Process (cont.)

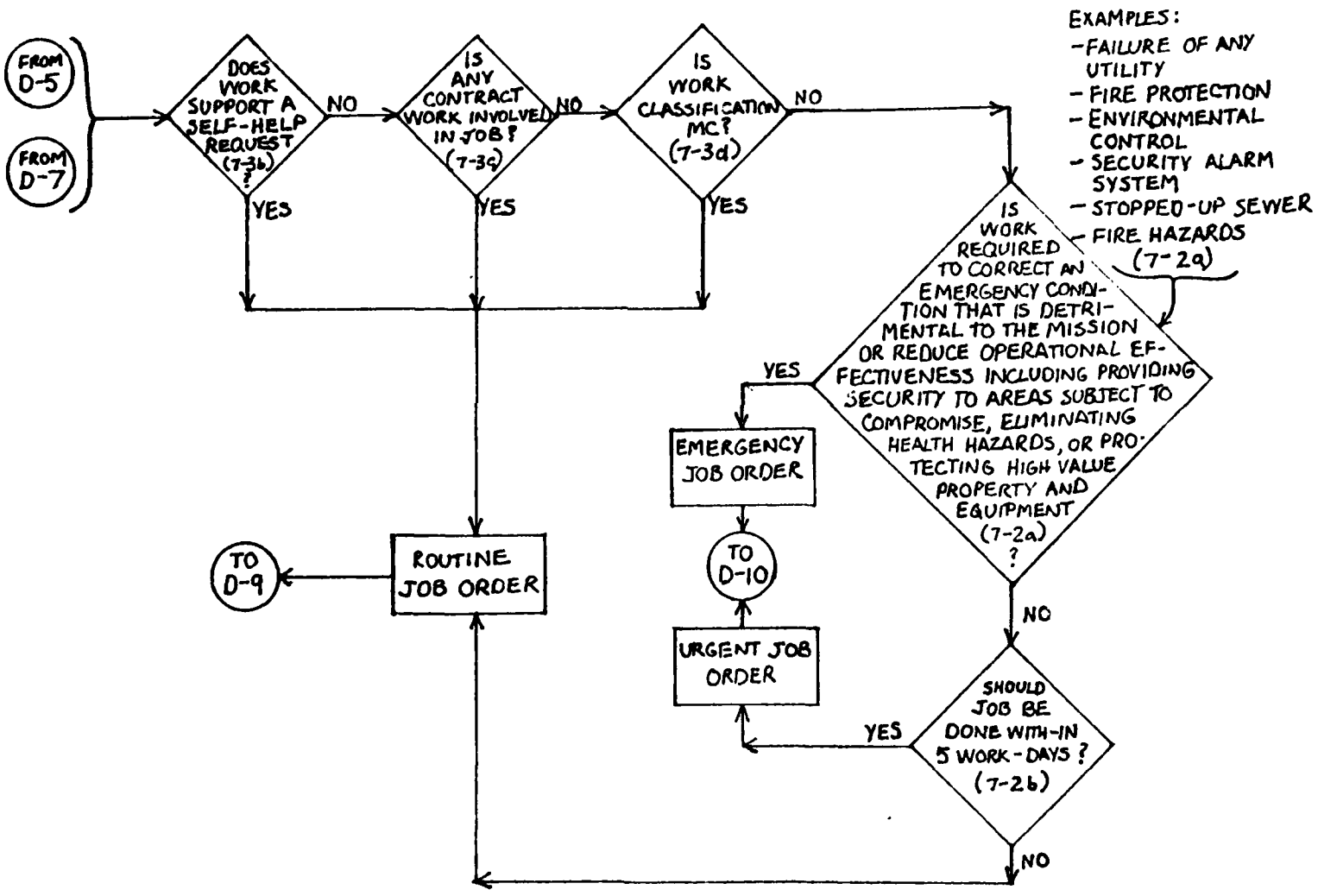


Fig D-8. Job Order Classification Decision Process

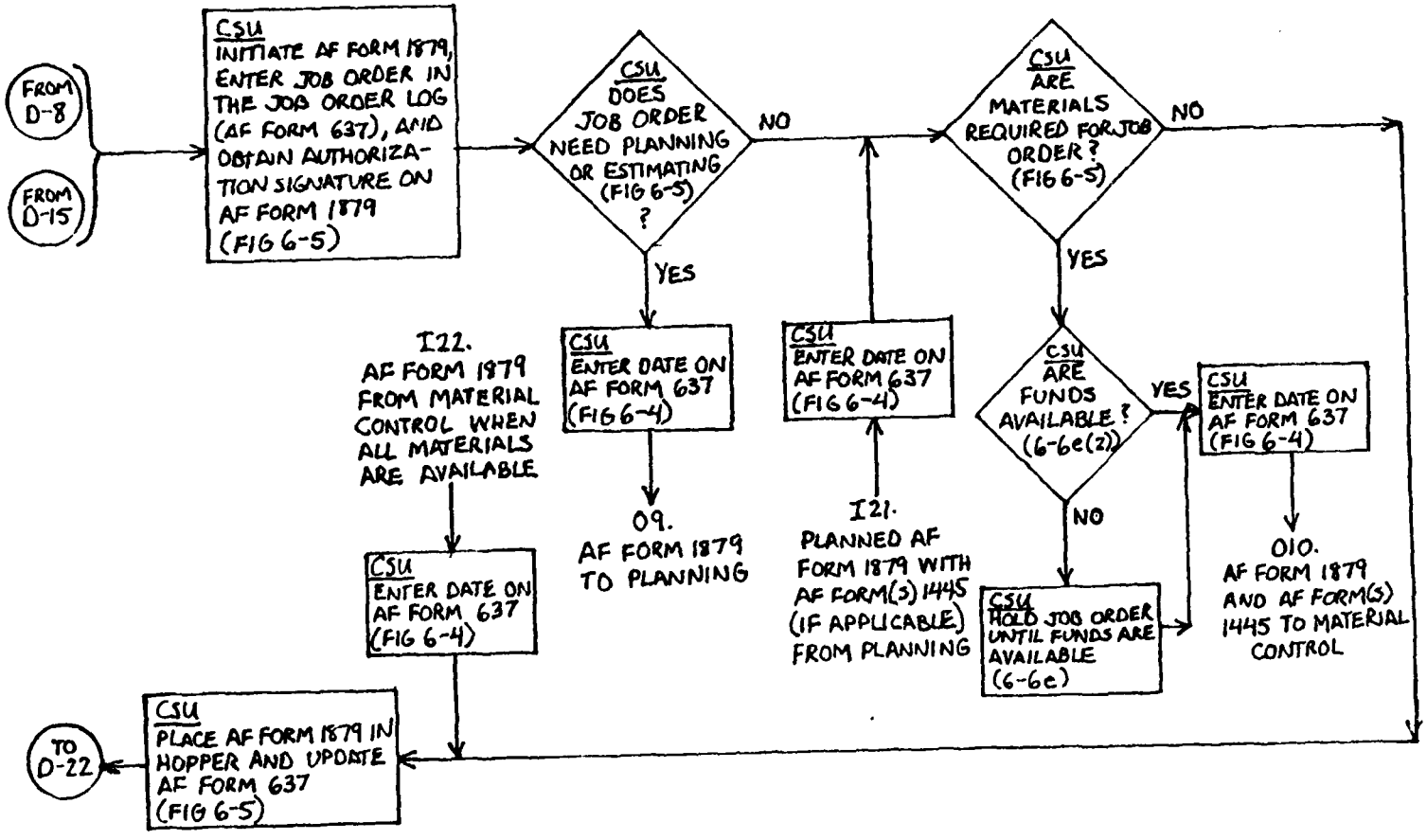


Fig D-9. Routine Job Order Process

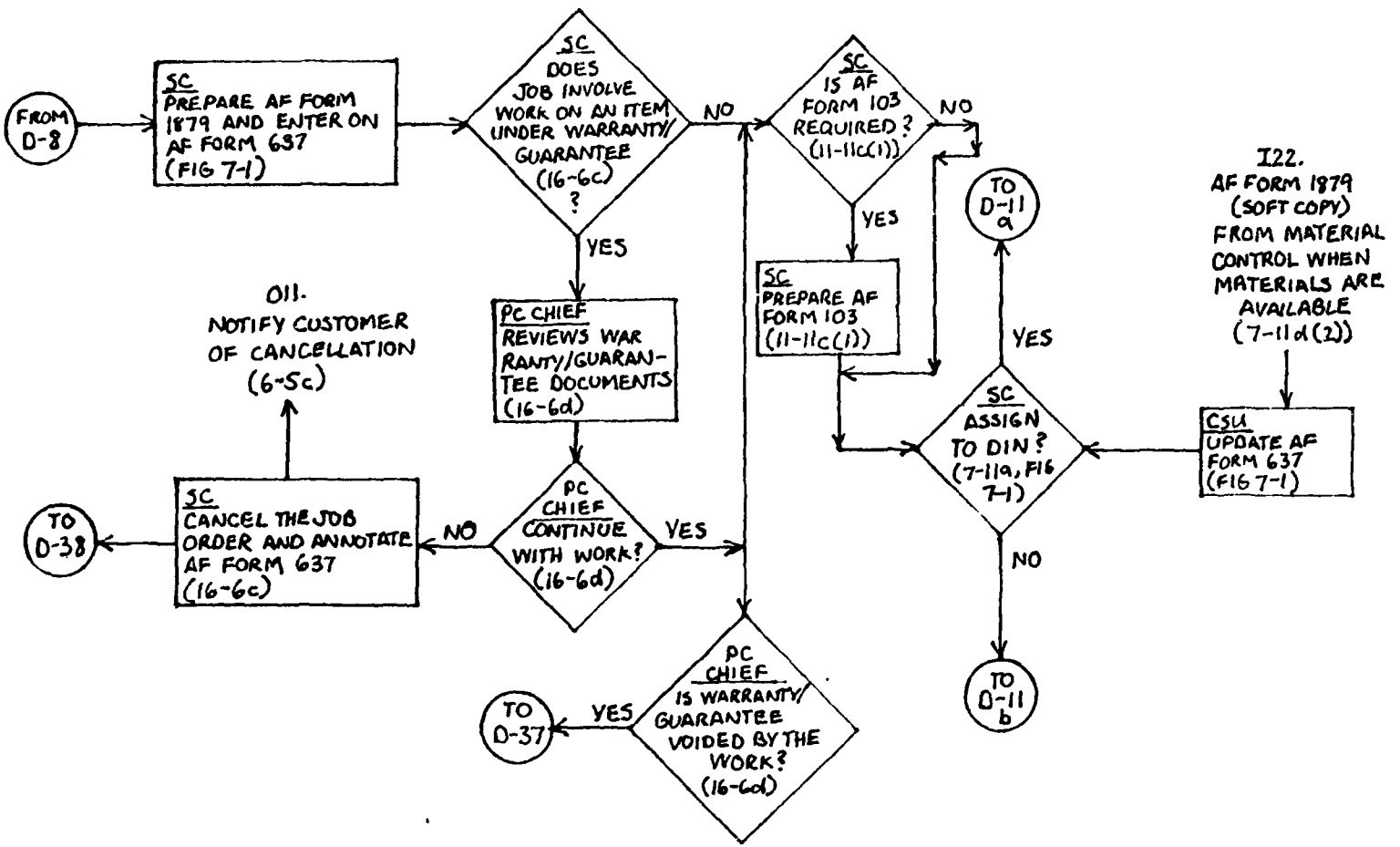
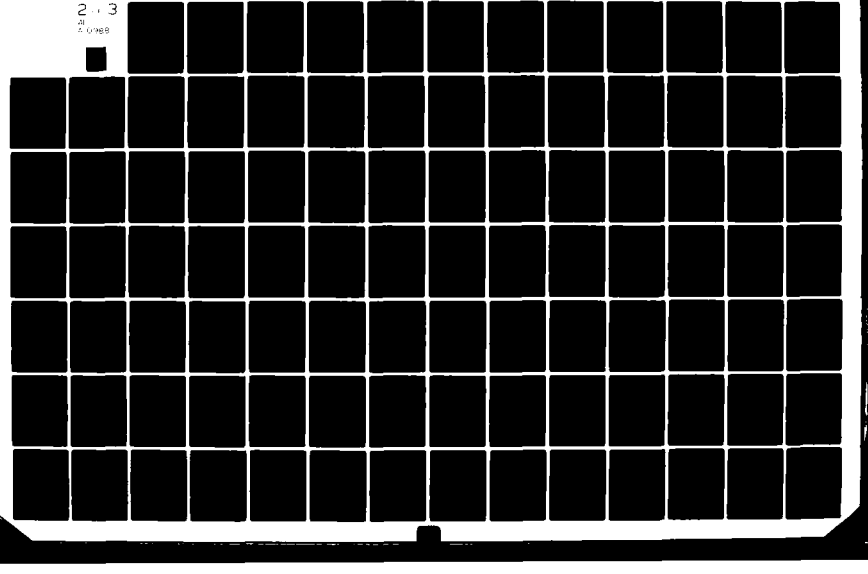
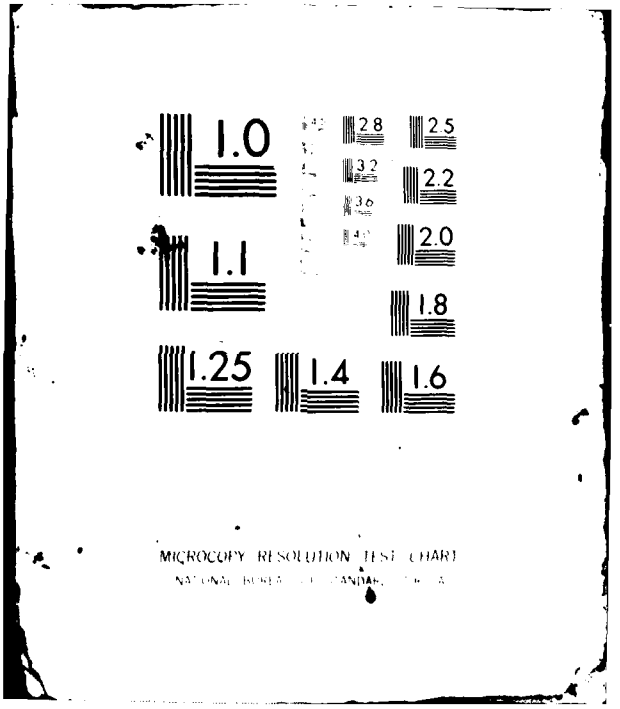


Fig D-10. Emergency and Urgent Job Order Process

AD-A109 881 AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OH SCHOOL--ETC F/G 5/2
THE PRESCRIBED INFORMATION SYSTEM OF PRODUCTION CONTROL UNITS I--ETC(U)
SEP 81 R A STROM
UNCLASSIFIED AFIT-LSSR-69-81 NL




1.0
1.1
1.25
1.4
1.6
1.8
2.0
2.2
2.5
2.8
3.2
3.6
MICROCOPY RESOLUTION TEST CHART

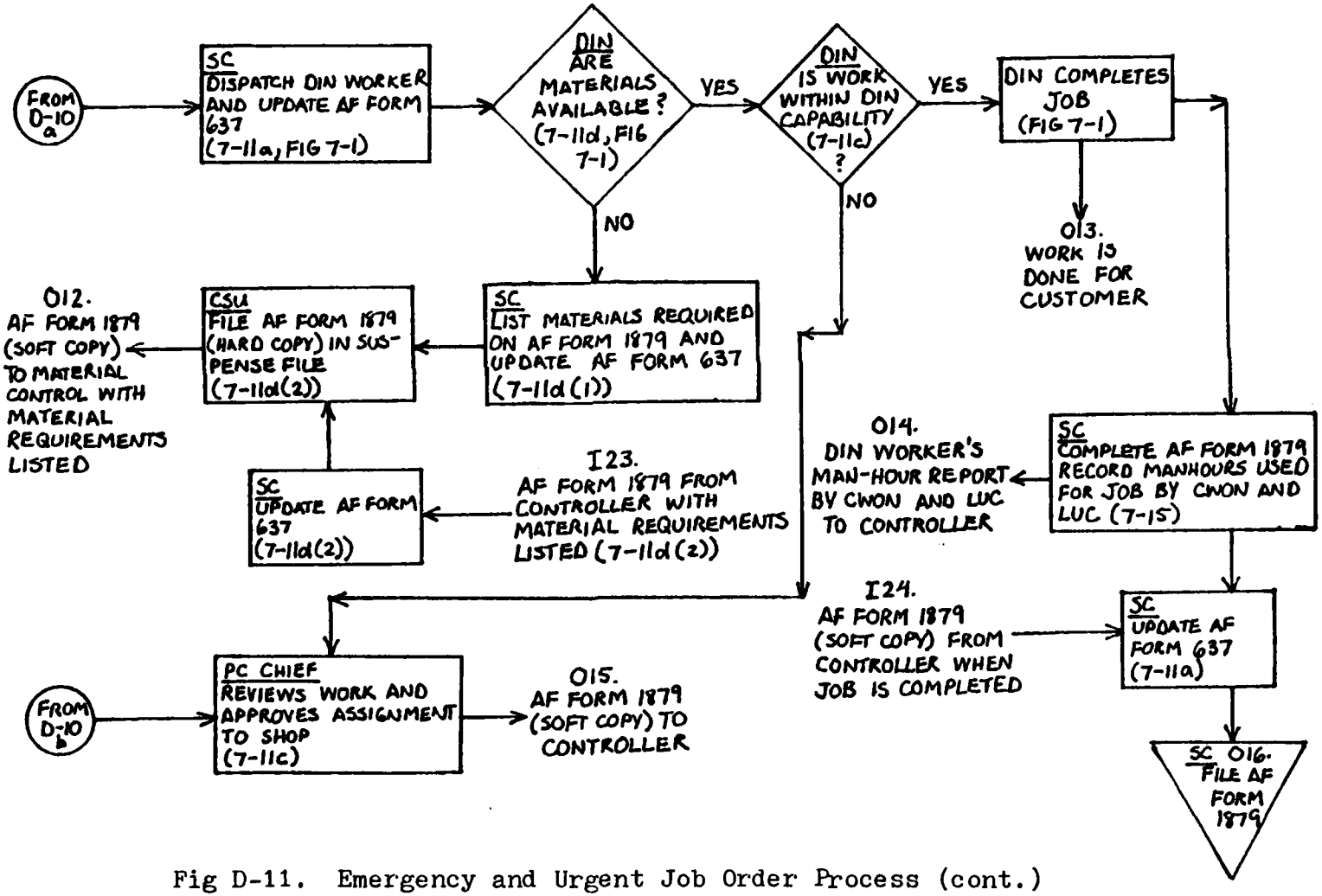


Fig D-11. Emergency and Urgent Job Order Process (cont.)

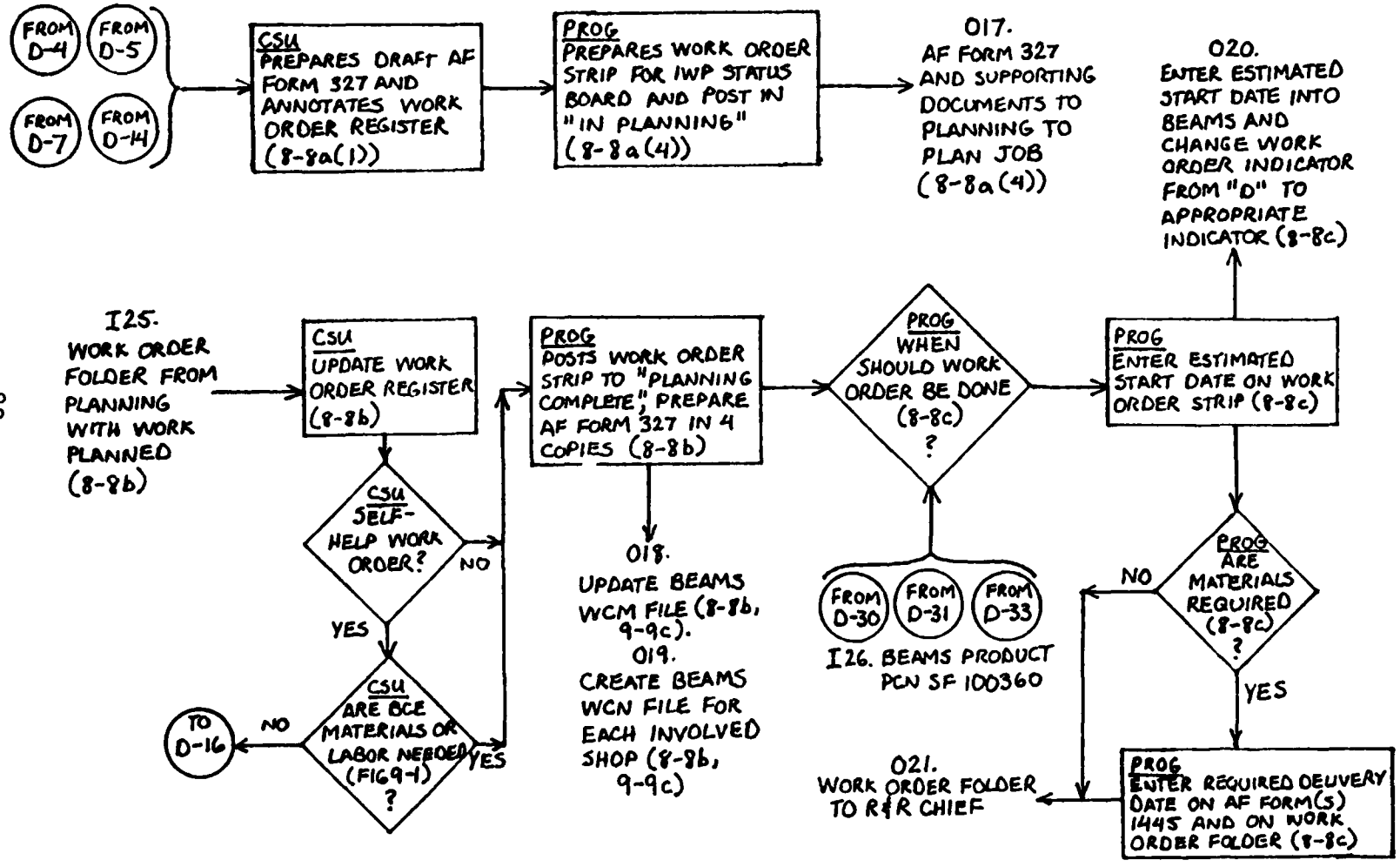


Fig D-12. In-Service Work Order Process

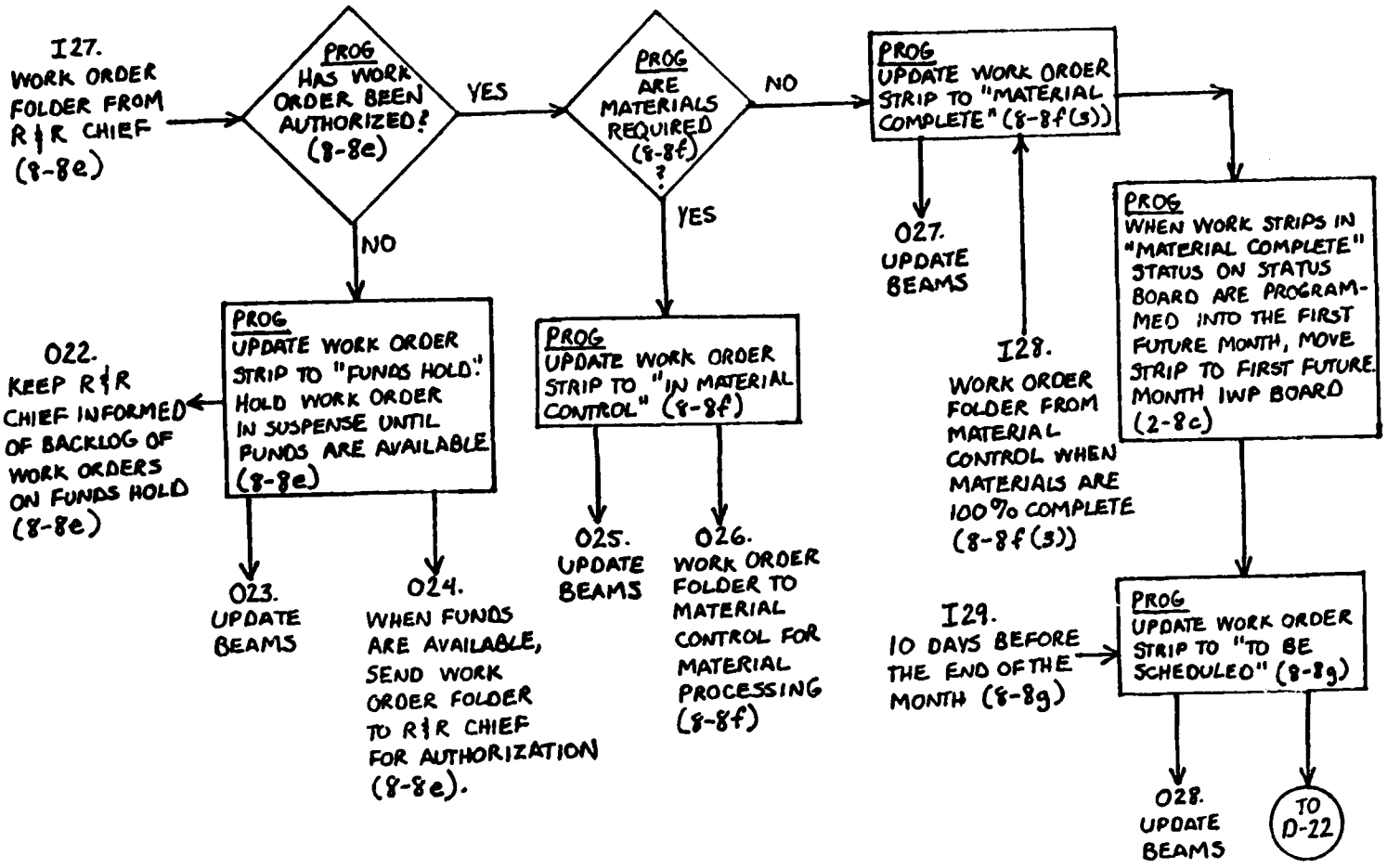


Fig D-13. In-Service Work Order Process (cont.)

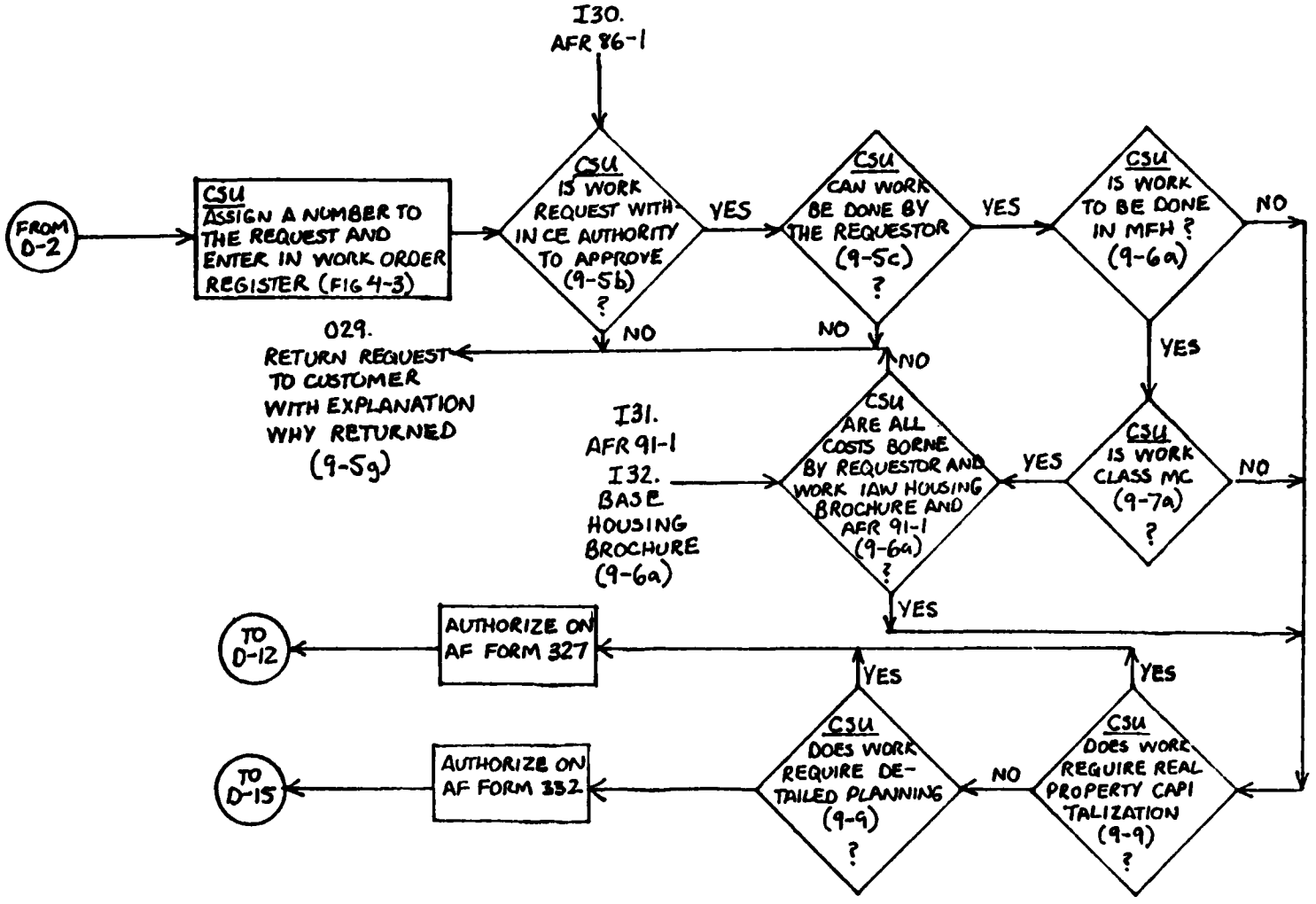


Fig D-14. Self-Help Work Order Authorization Document Decision Process

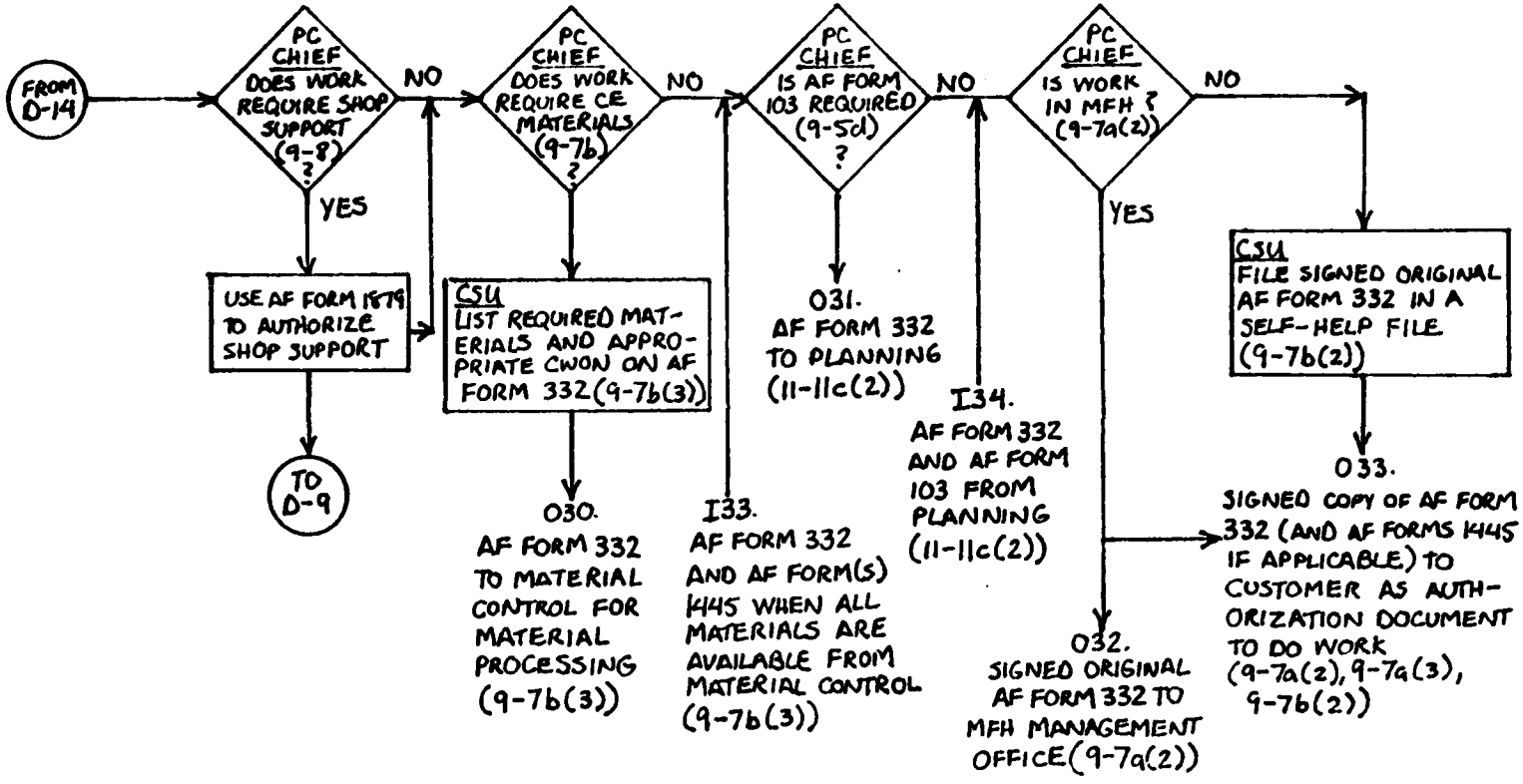


Fig D-15. Self-Help Work Order (AF Form 332) Process

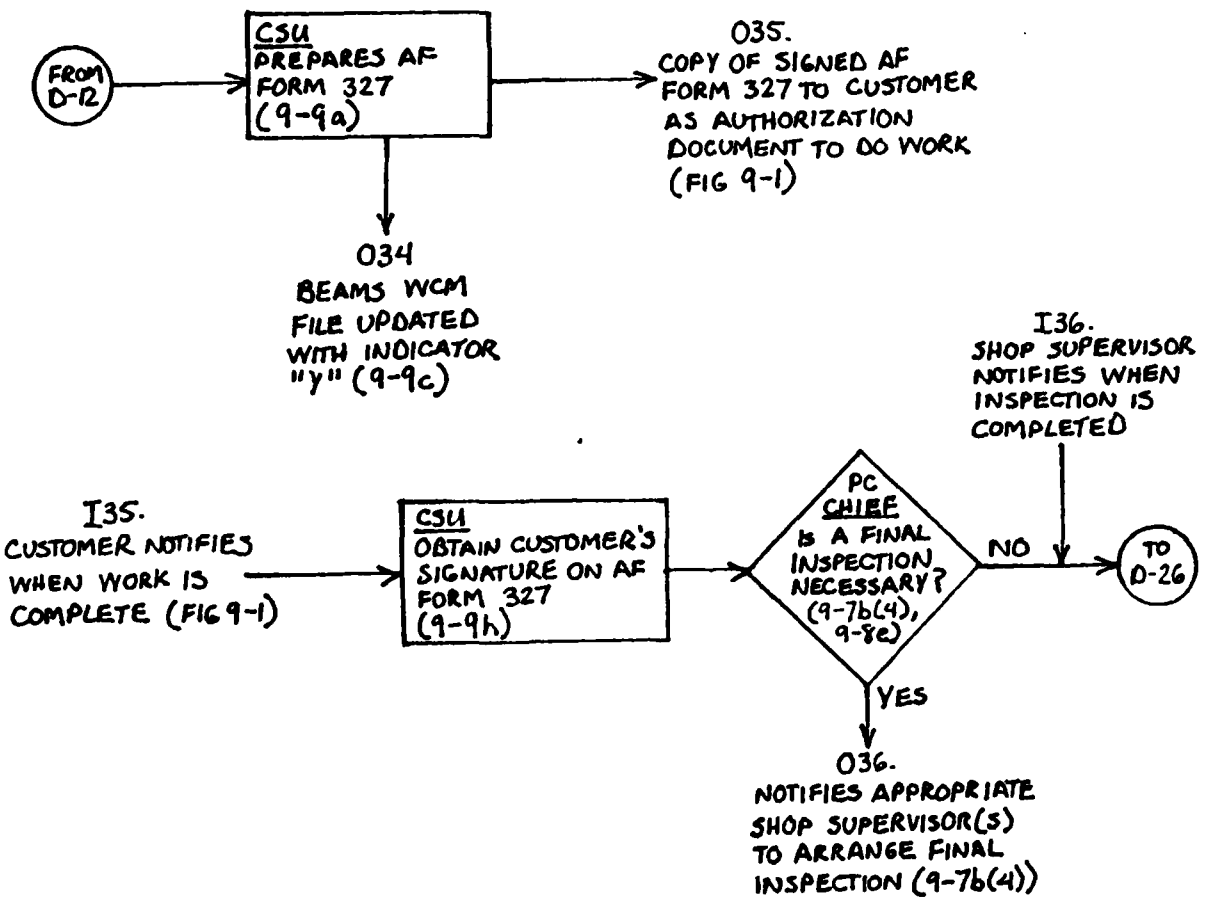


Fig D-16. Self-Help Work Order (AF Form 327) Process

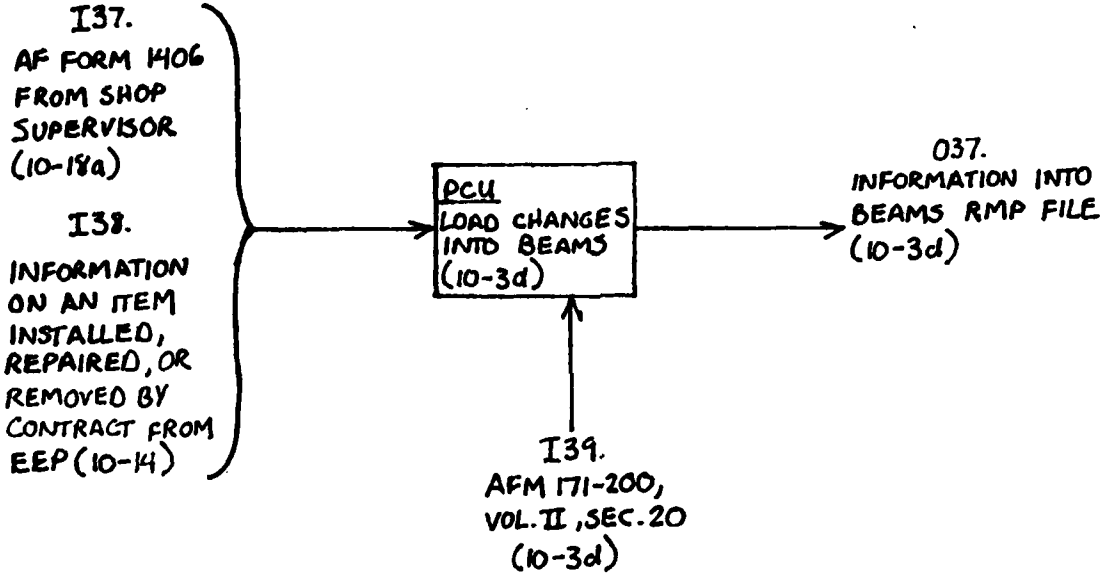


Fig D-17. Recurring Maintenance Program Development Process

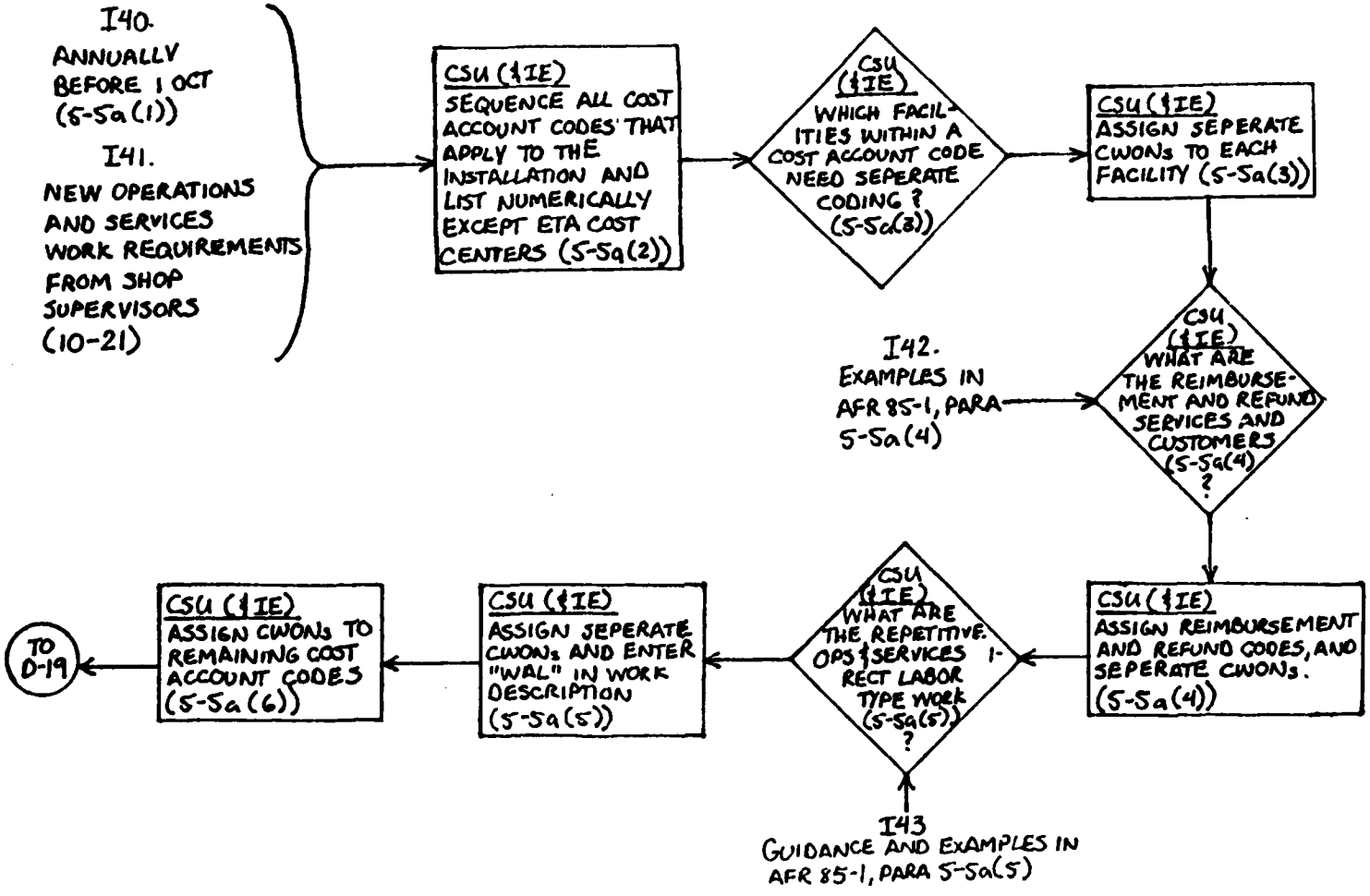


Fig D-18. CWON List and WAL Development Process

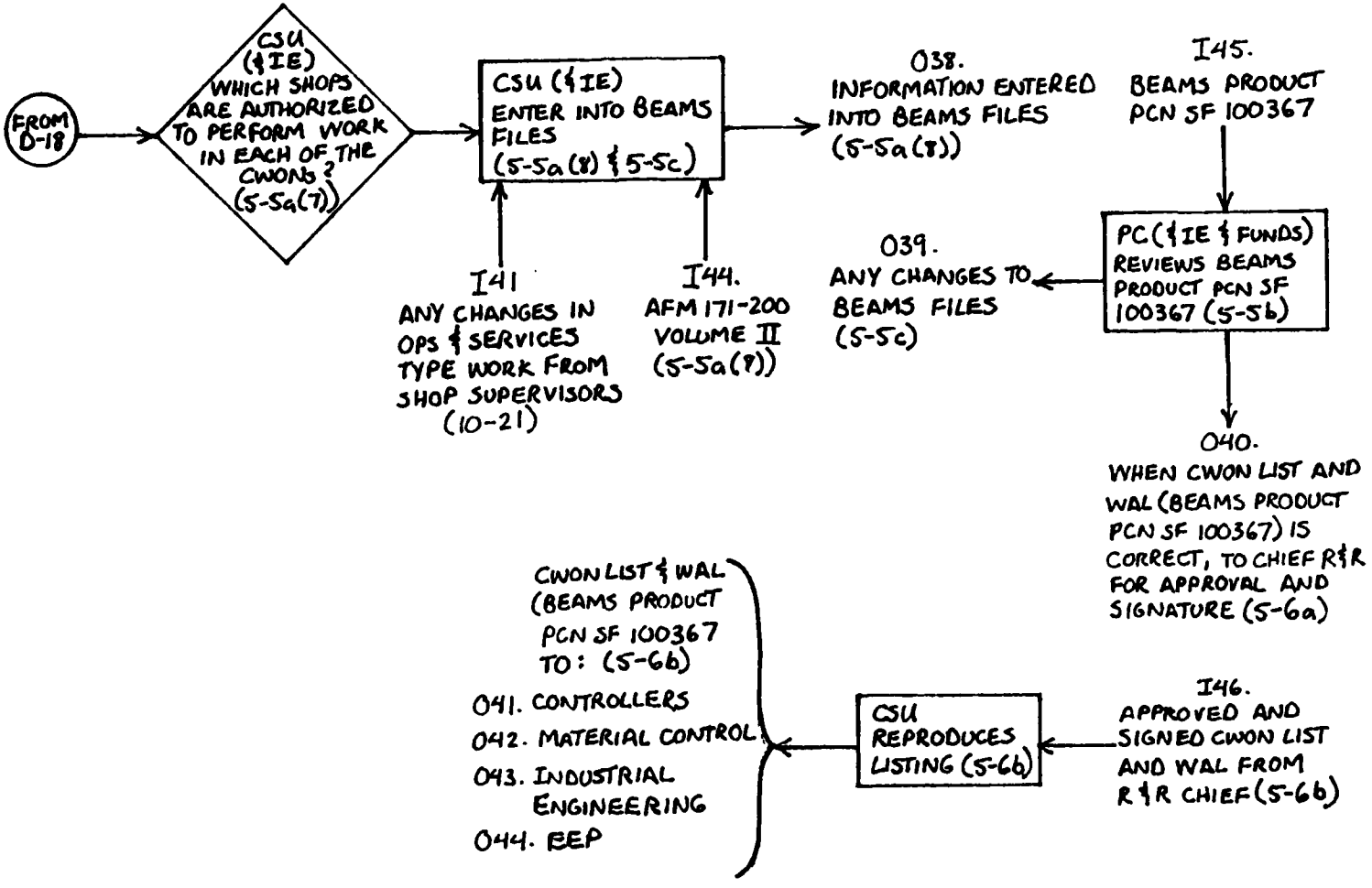


Fig D-19. CWON List and WAL Development Process (cont.)

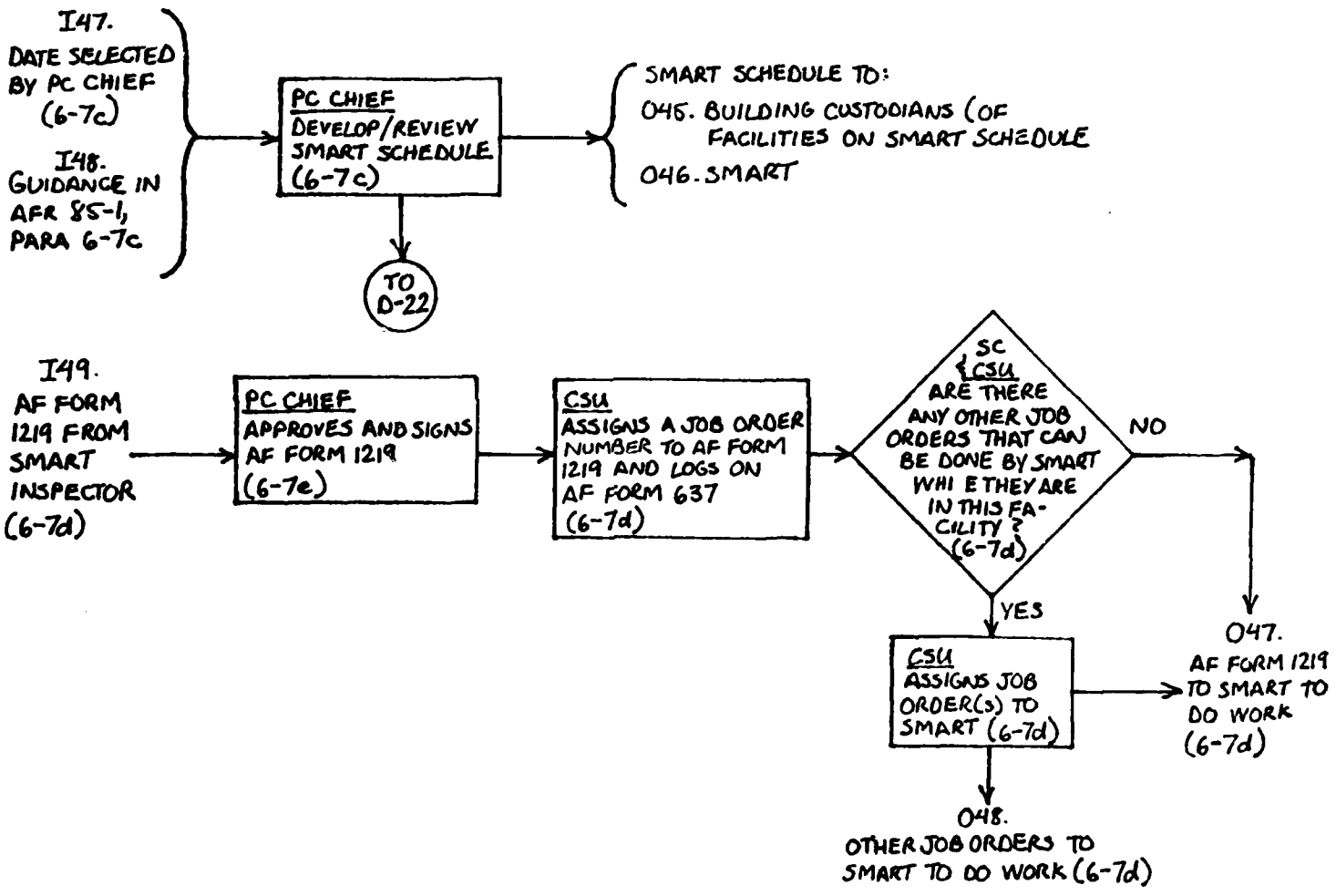


Fig D-20. SMART Schedule and Job Order Processes

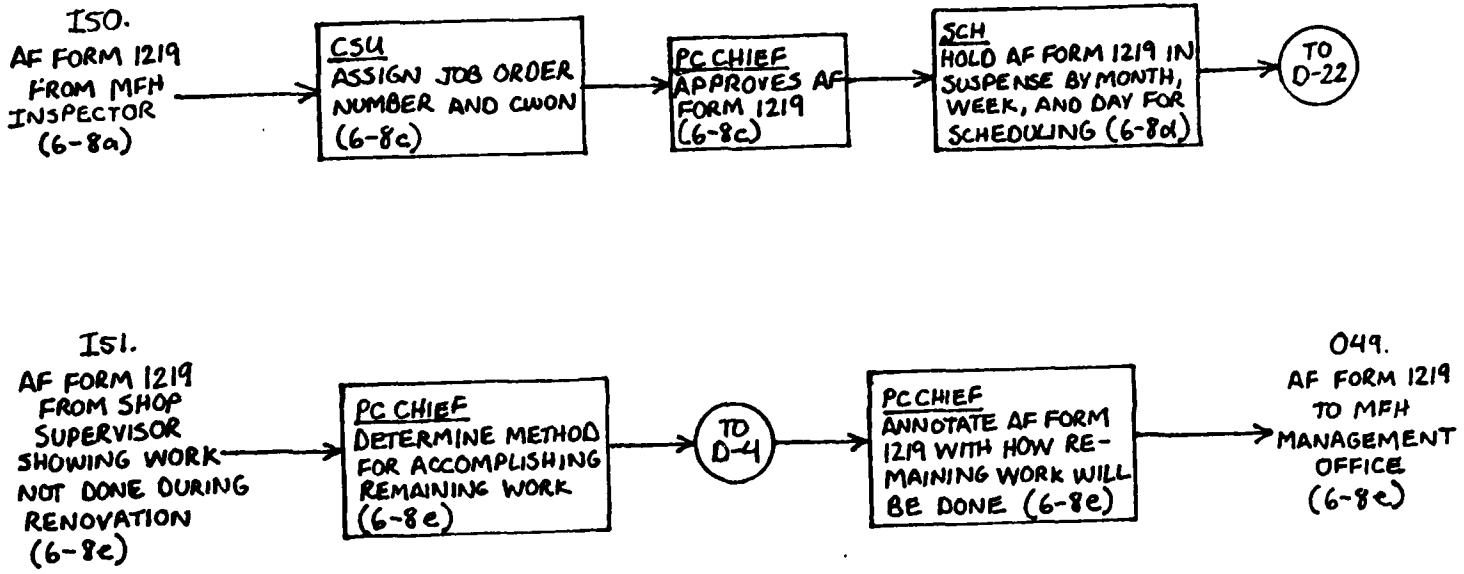


Fig D-21. MFH Renovation Job Order Process

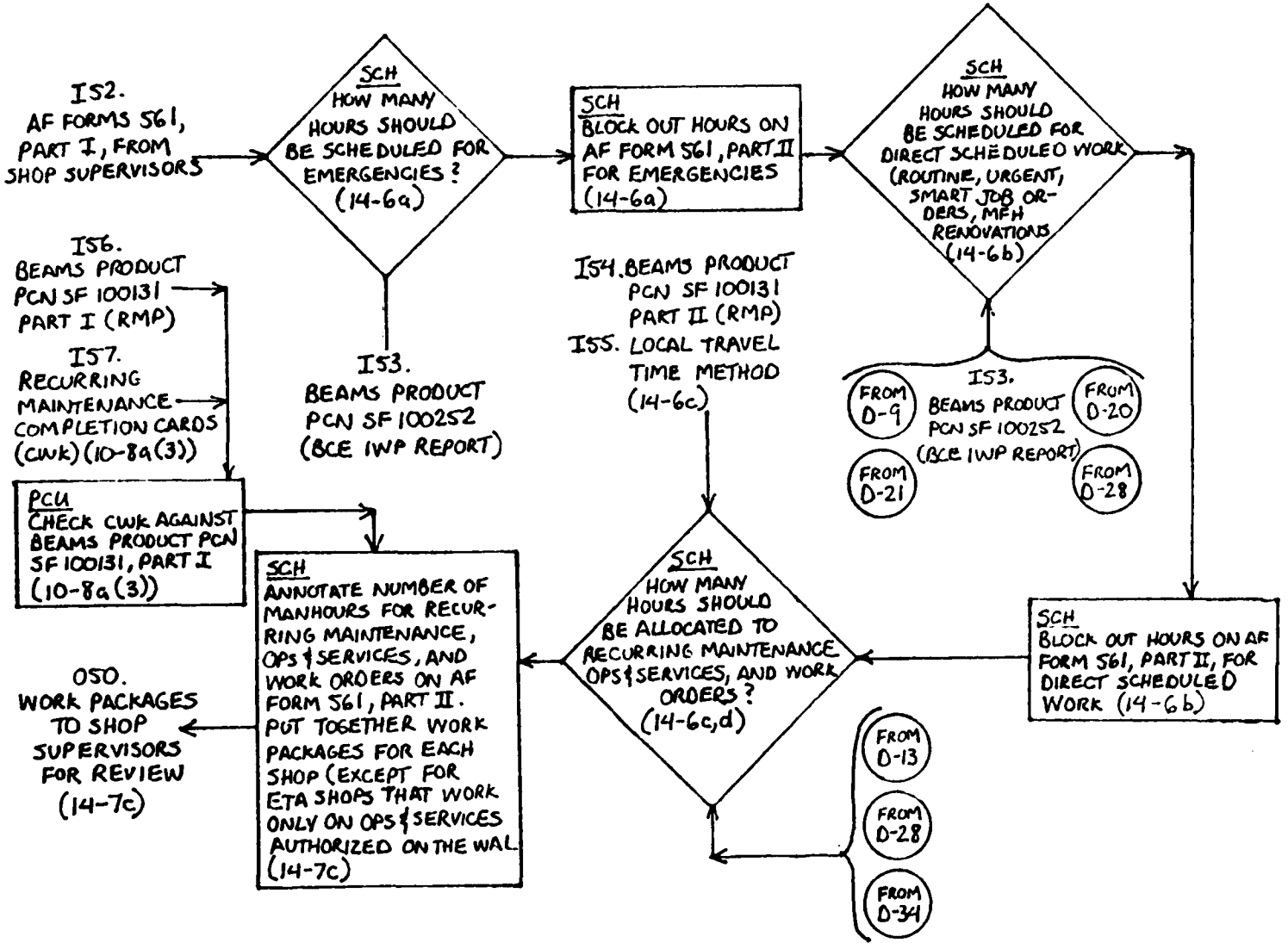


Fig D-22. Weekly Scheduling Process

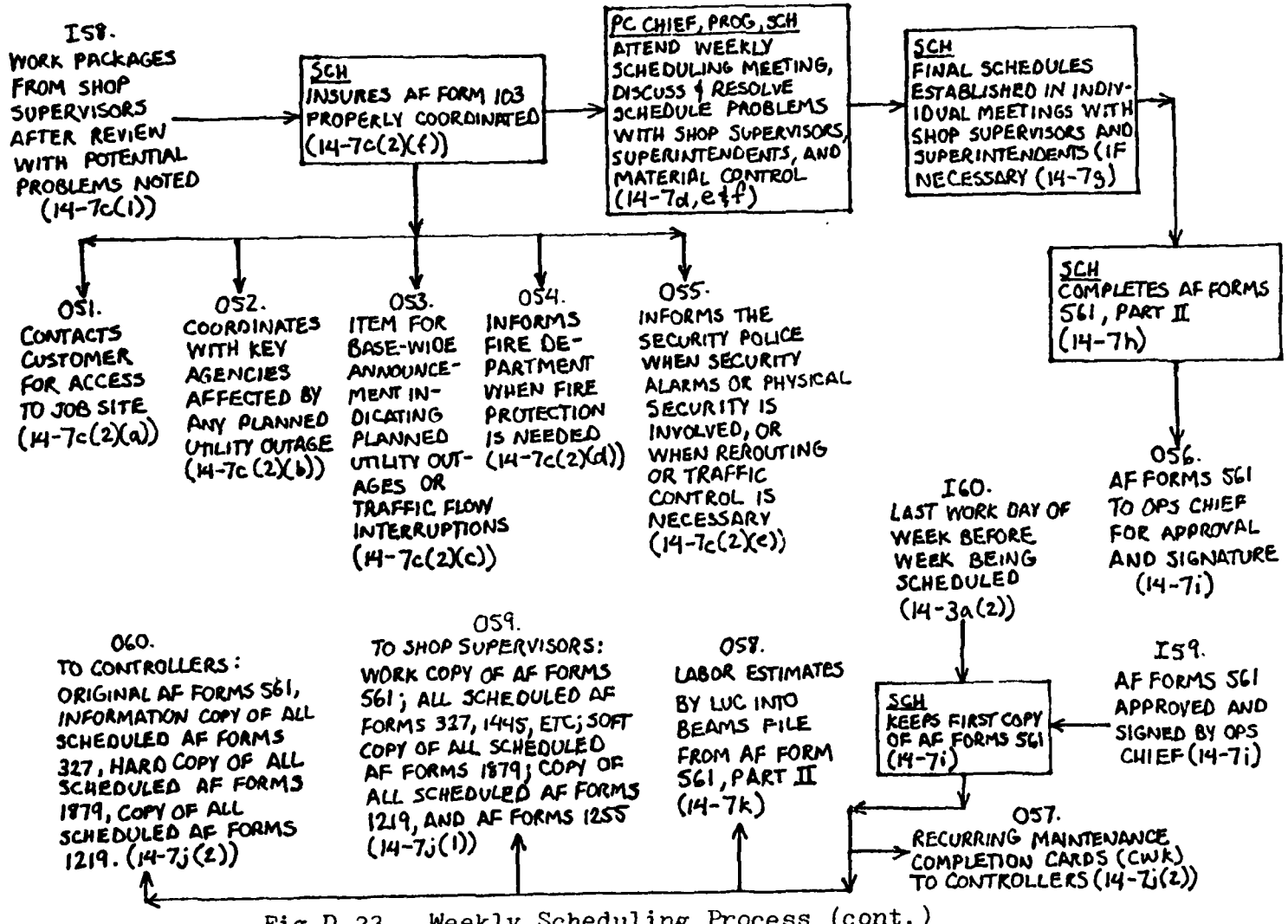


Fig D-23. Weekly Scheduling Process (cont.)

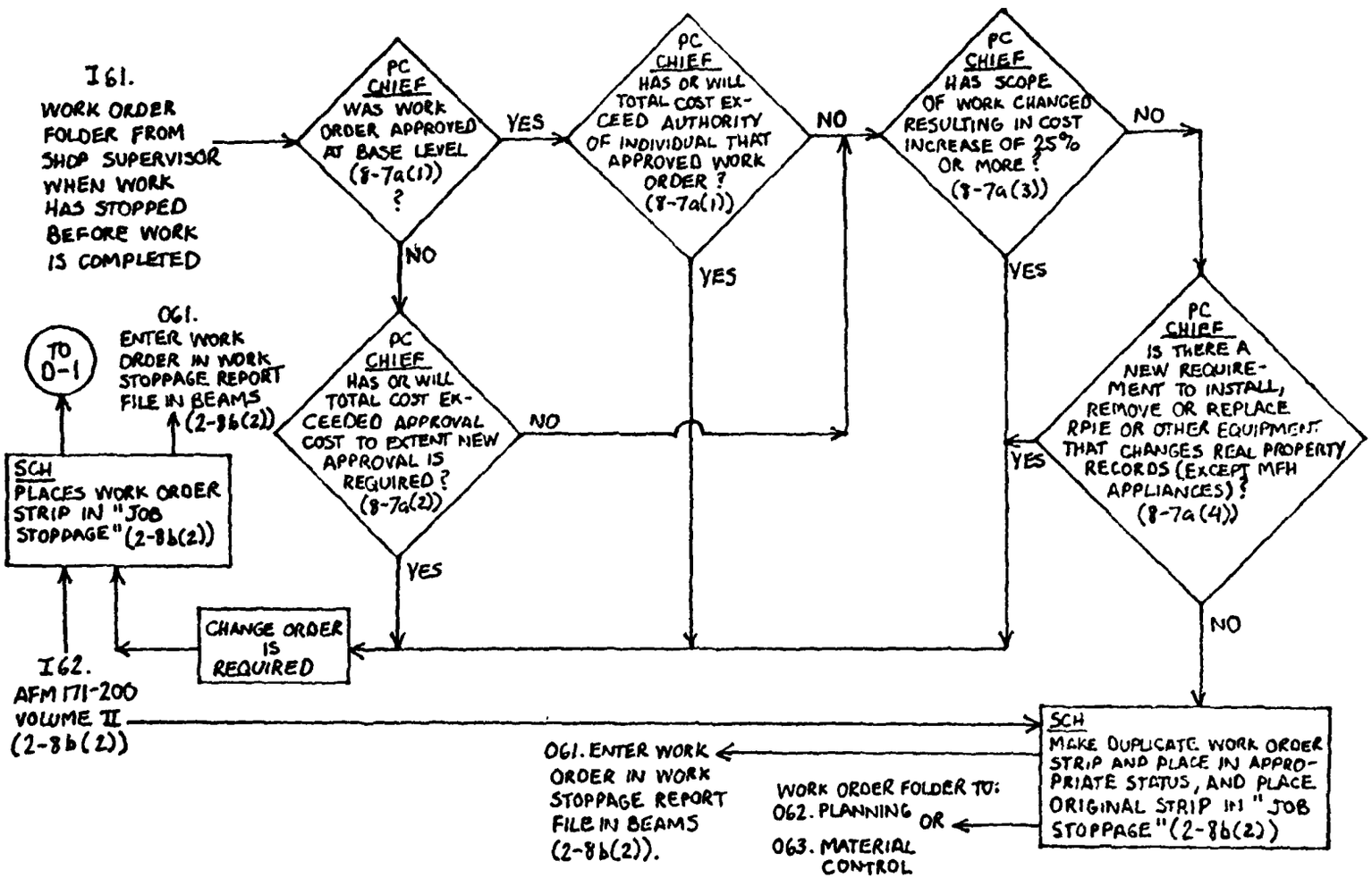


Fig D-24. Job Stoppage and Change Order Processes

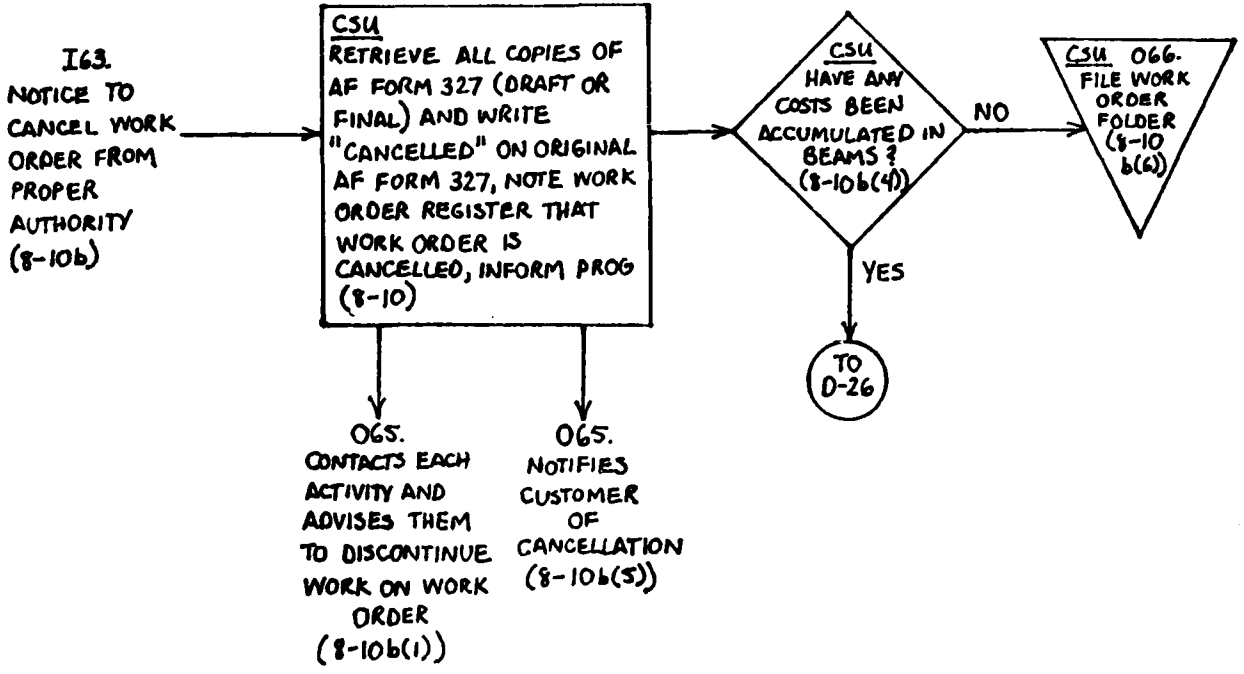


Fig D-25. Work Order Cancellation Process

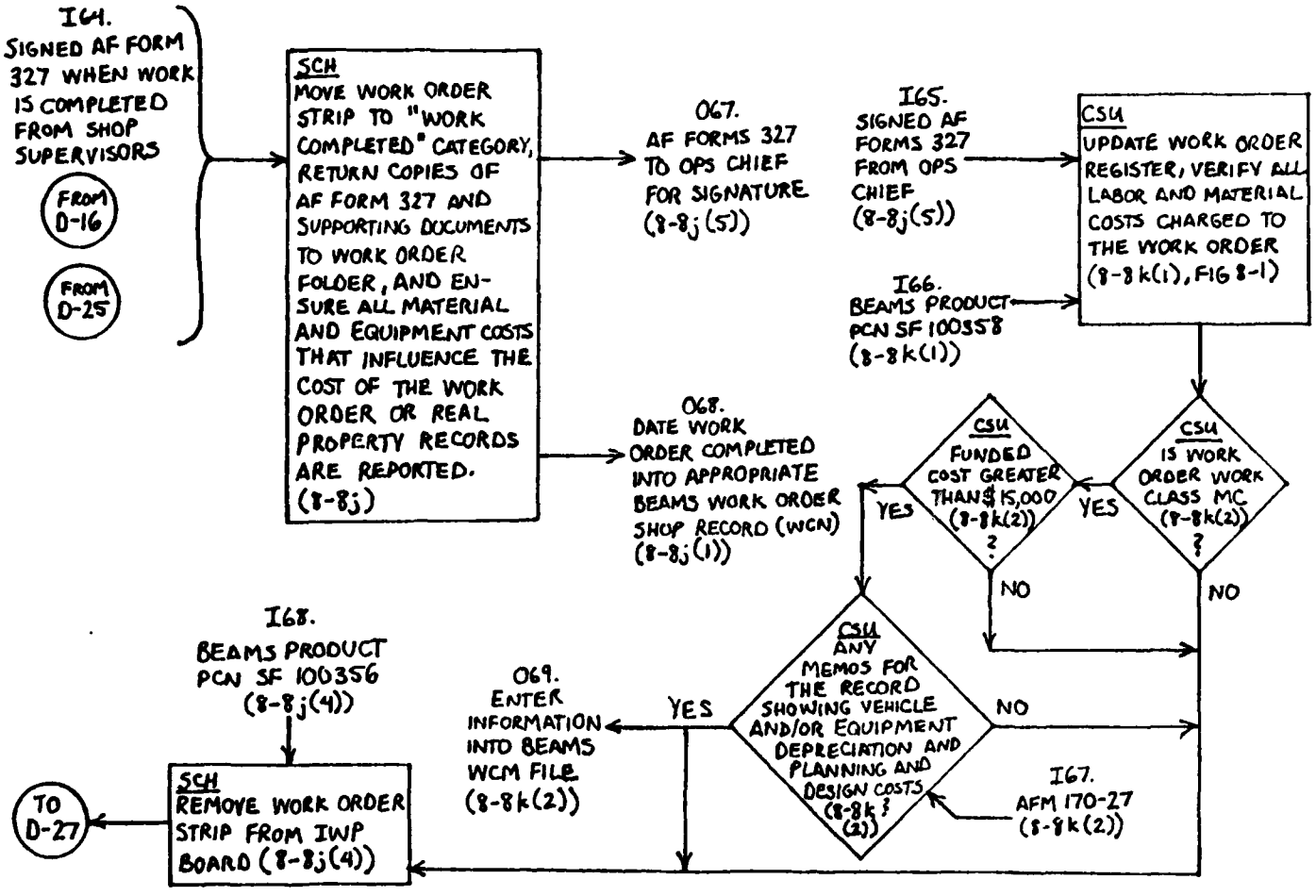


Fig D-26. Work Order Close-Out Process

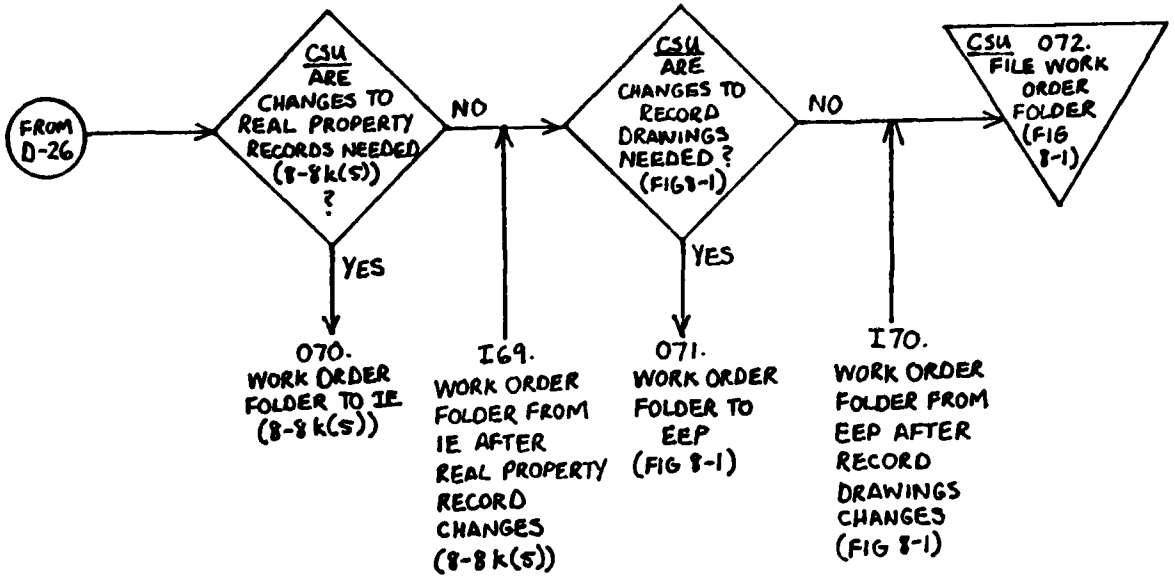


Fig D-27. Work Order Close-Out Process (cont.)

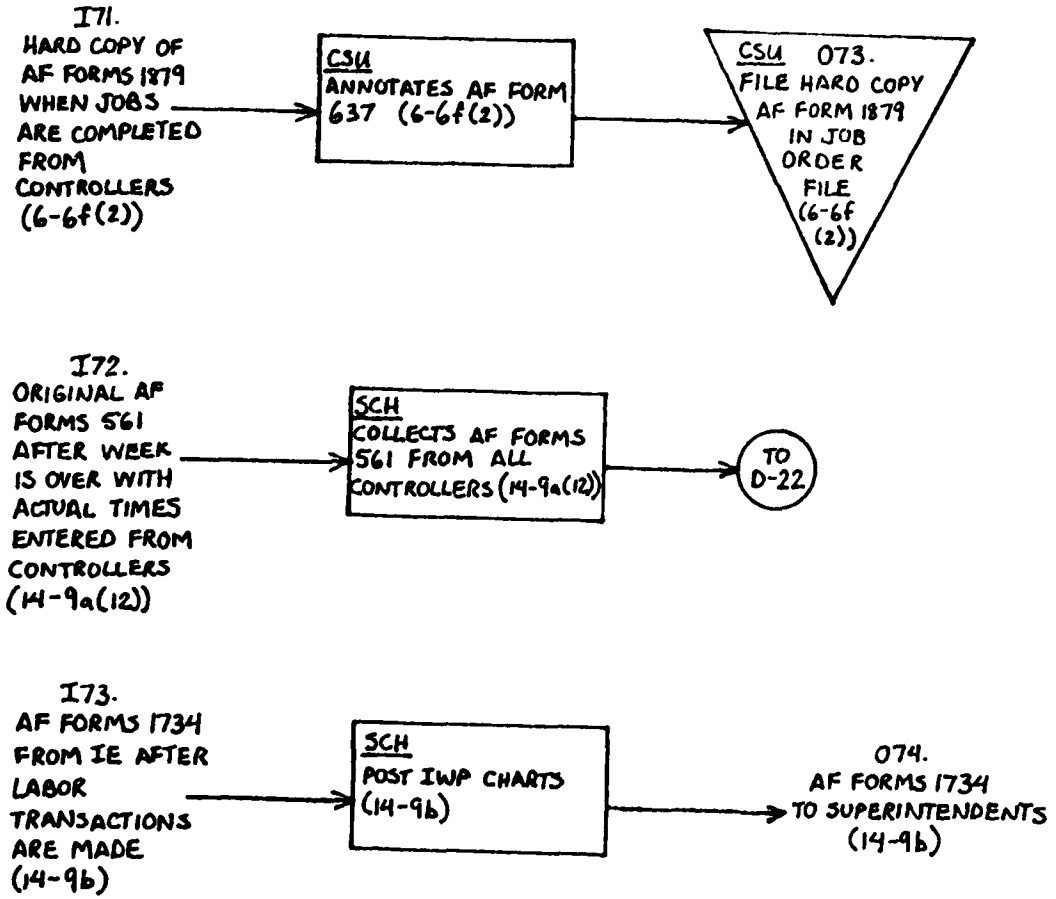


Fig D-28. Job Order, Weekly and Daily Schedule Close-Out Processes

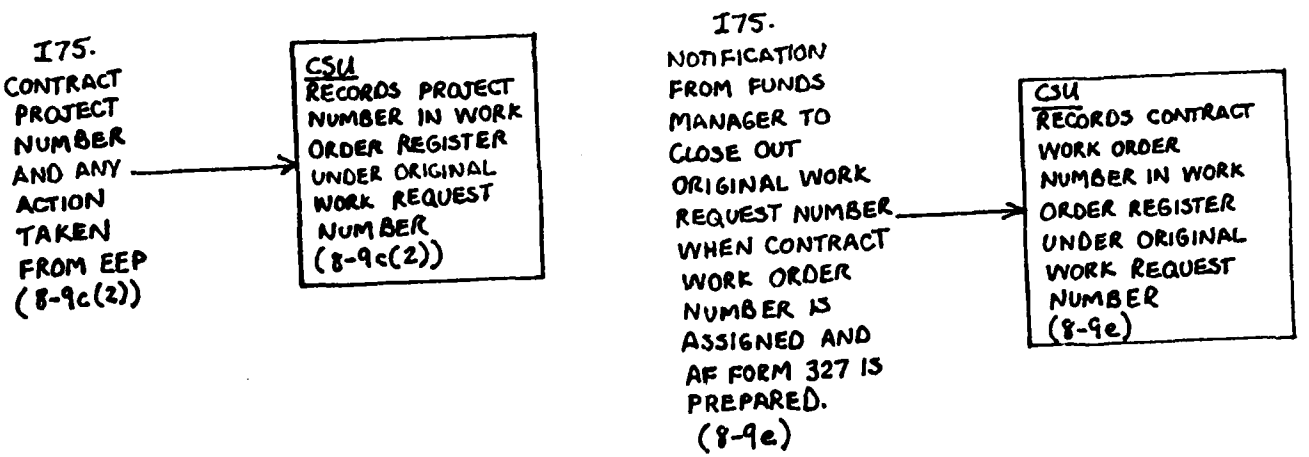


Fig D-29. Contract Work Order Status Processes

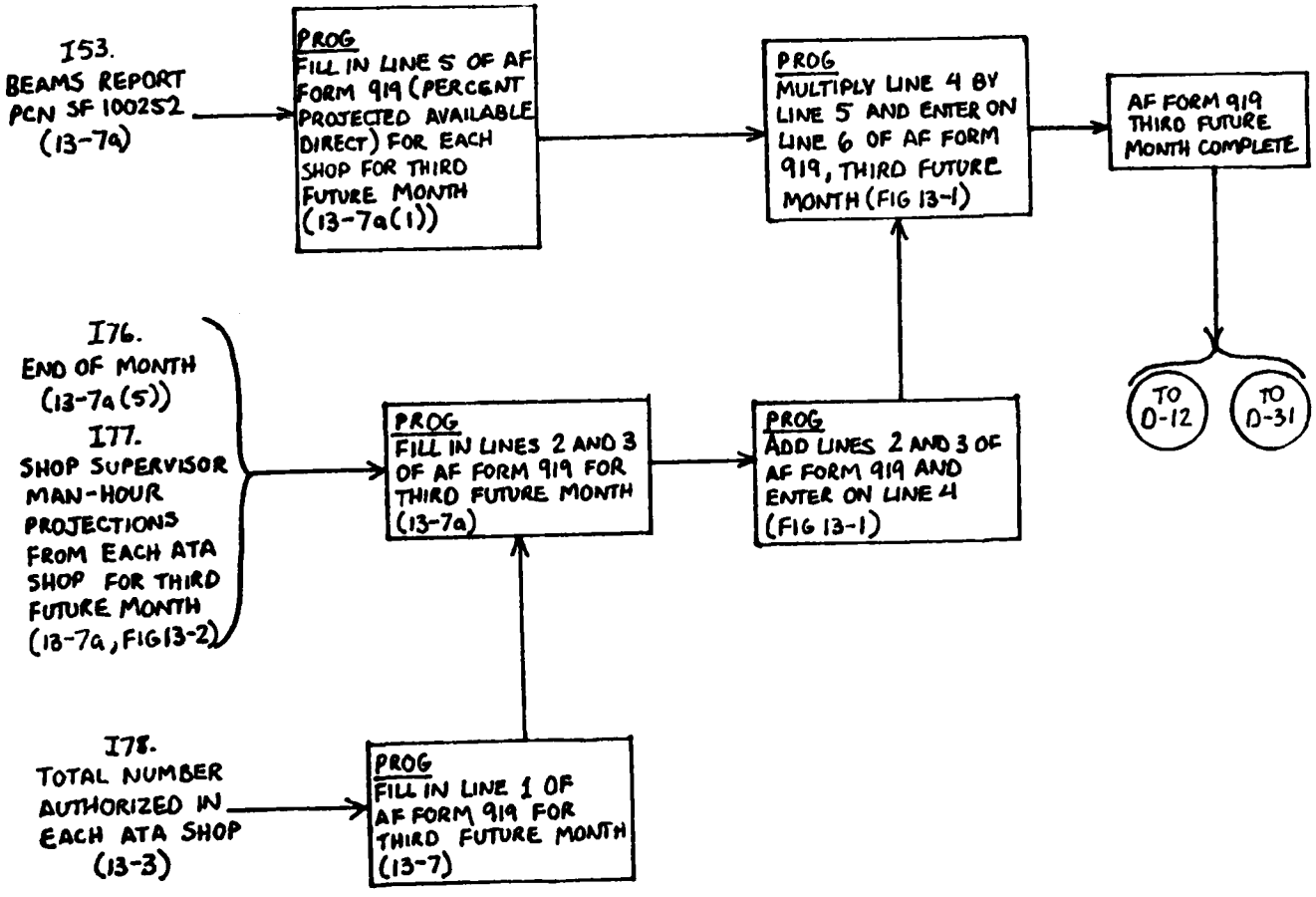


Fig D-30. In-Service Work Plan Process

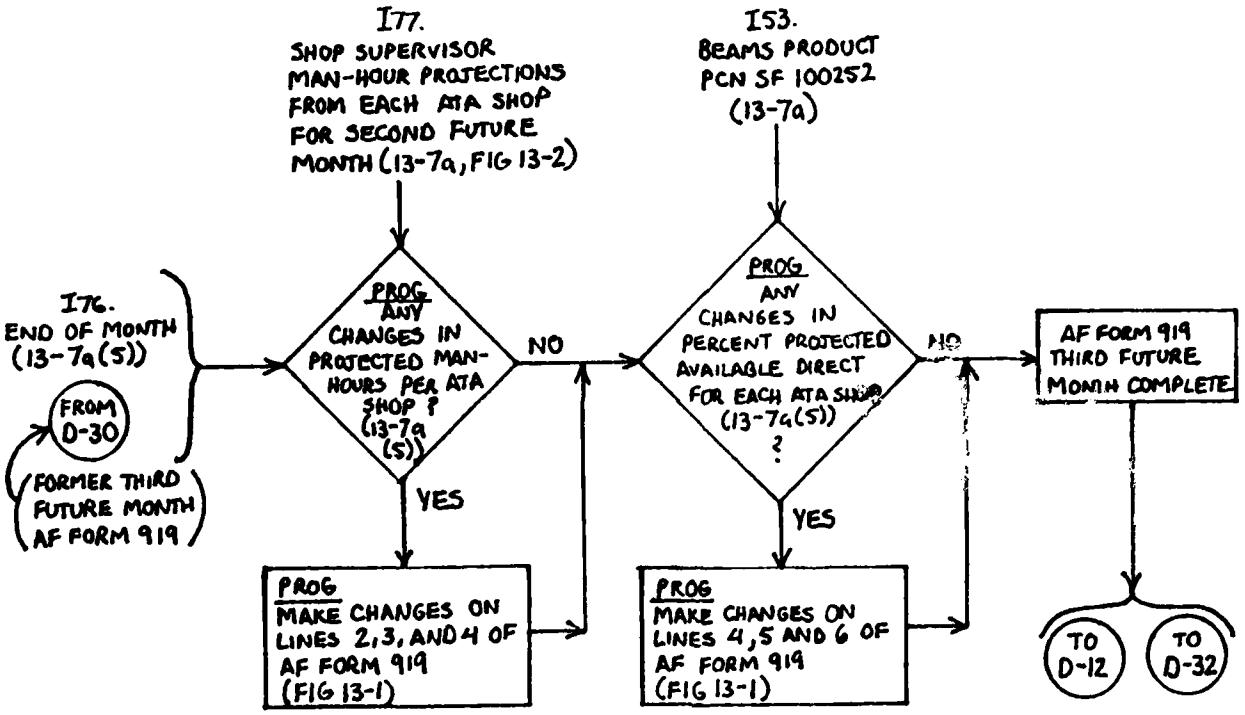


Fig D-31. In-Service Work Plan Process (cont.)

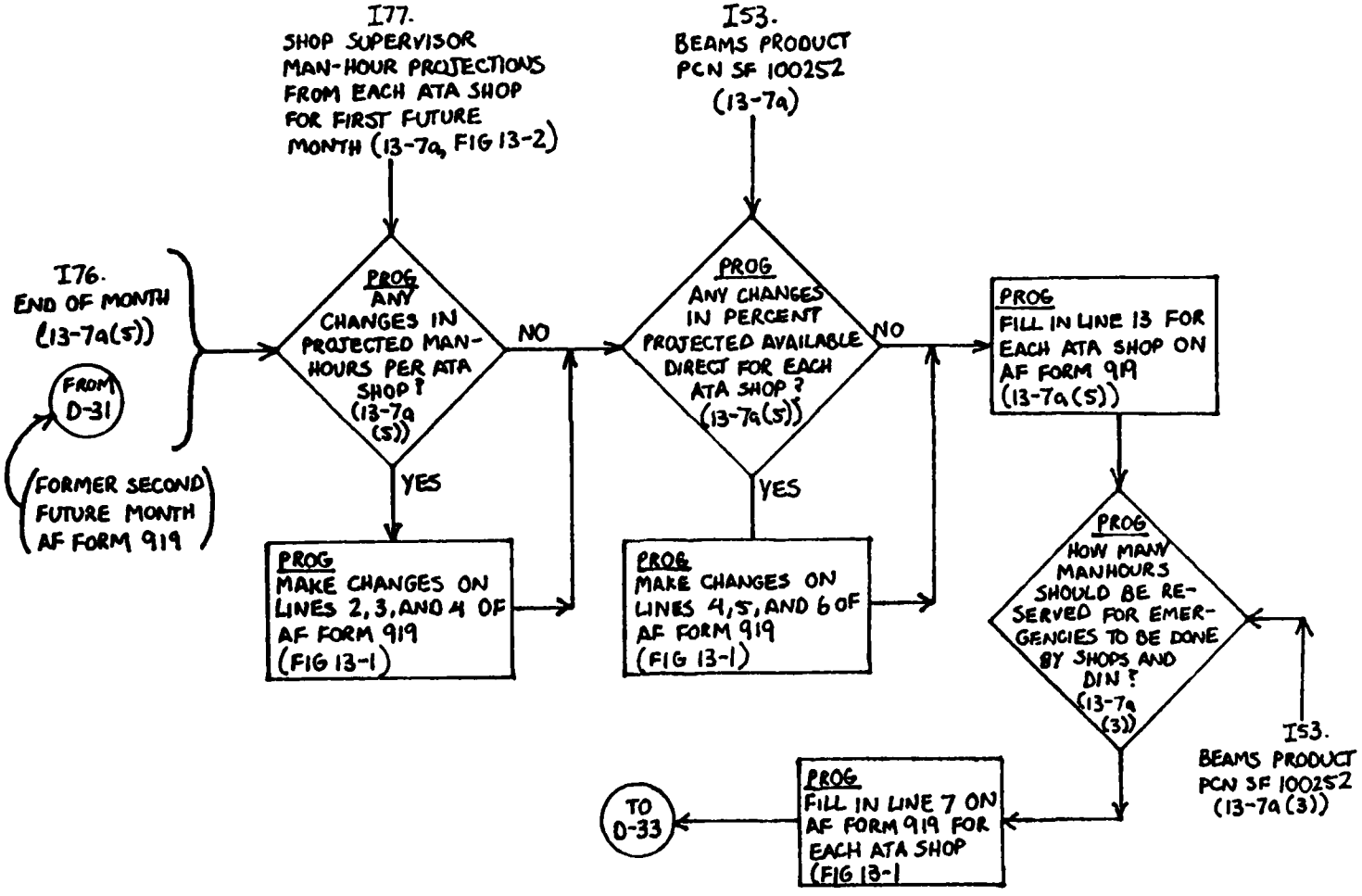


Fig D-32. In-Service Work Plan Process (cont.)

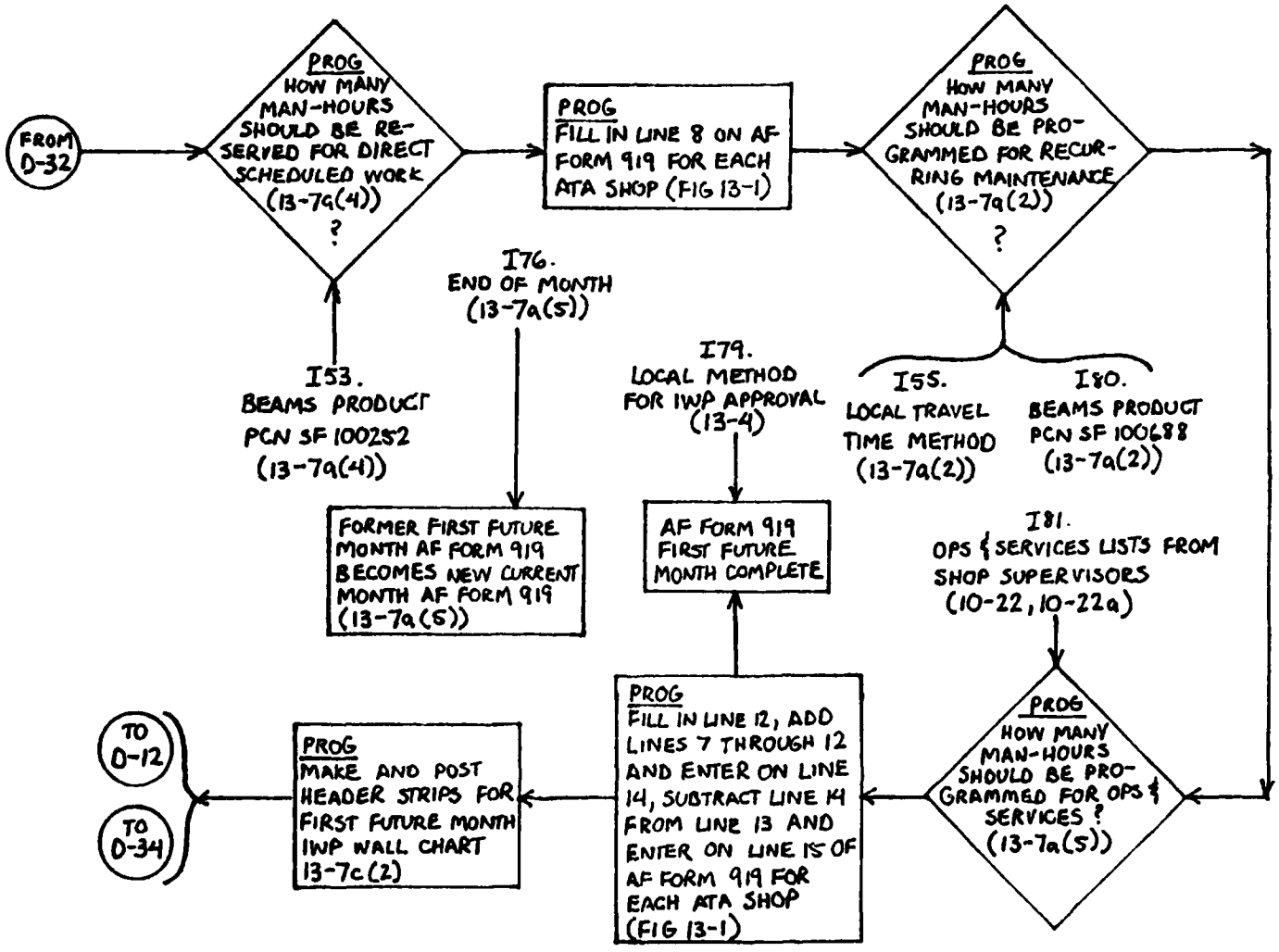


Fig D-33. In-Service Work Plan Process (cont.)

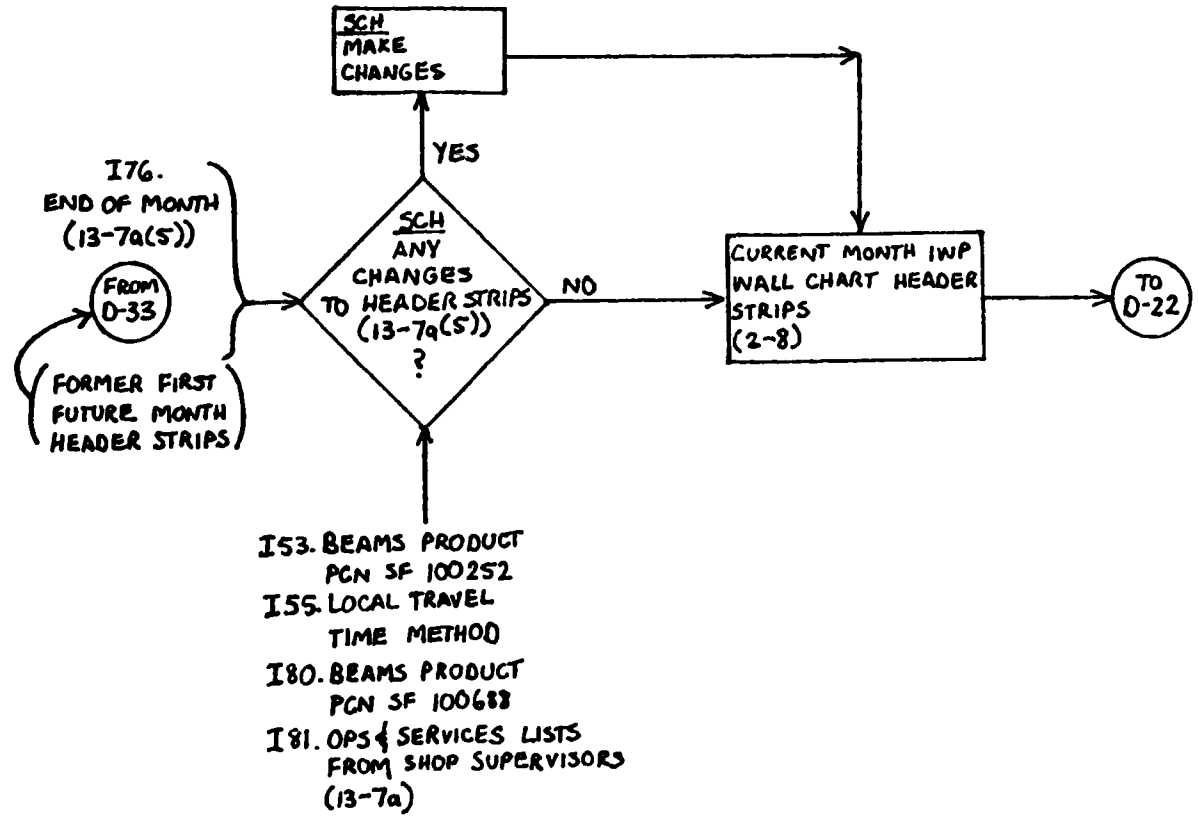


Fig D-34. In-Service Work Plan Process (cont.)

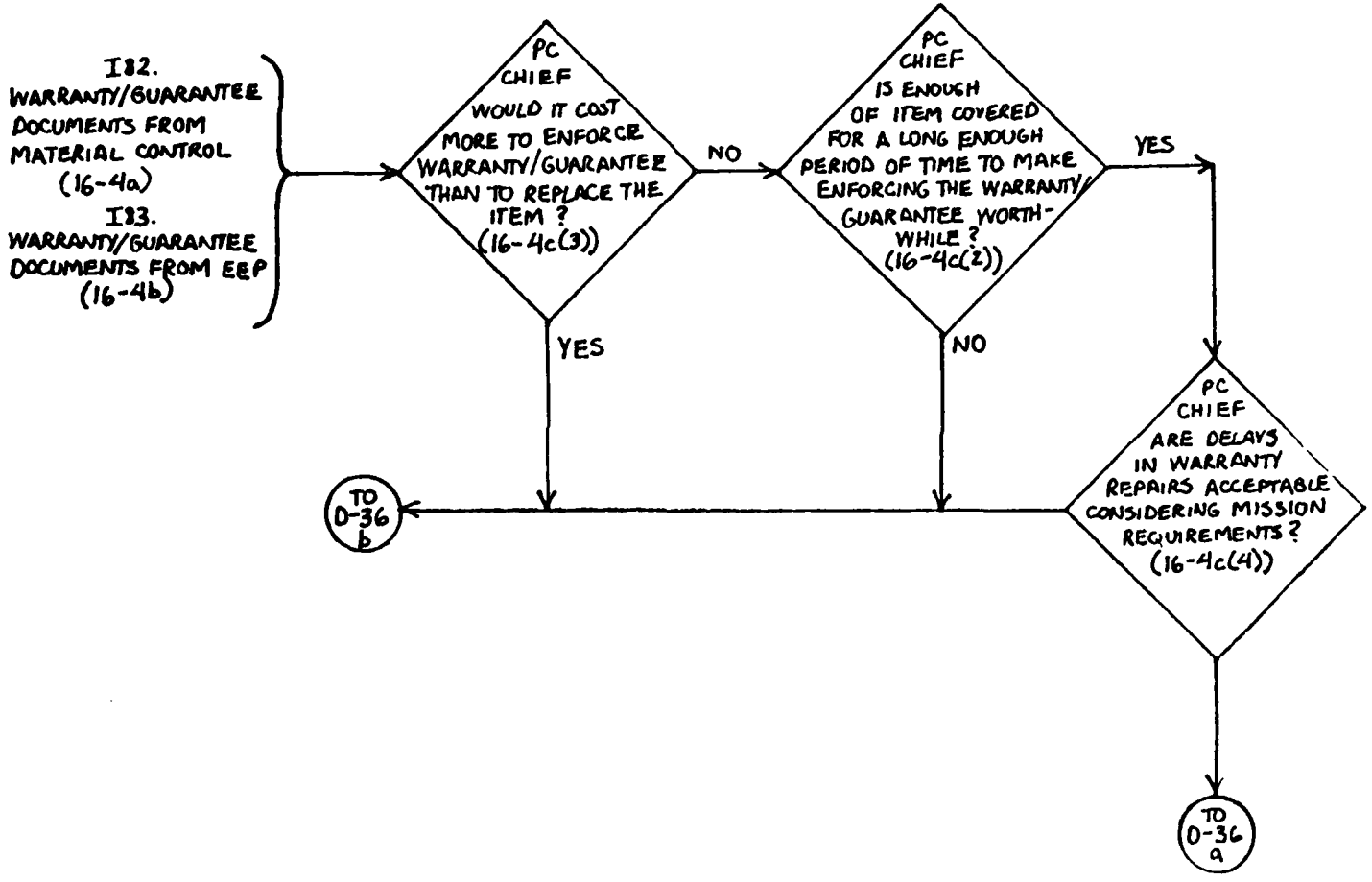


Fig D-35. Warranty/Guarantee System Process

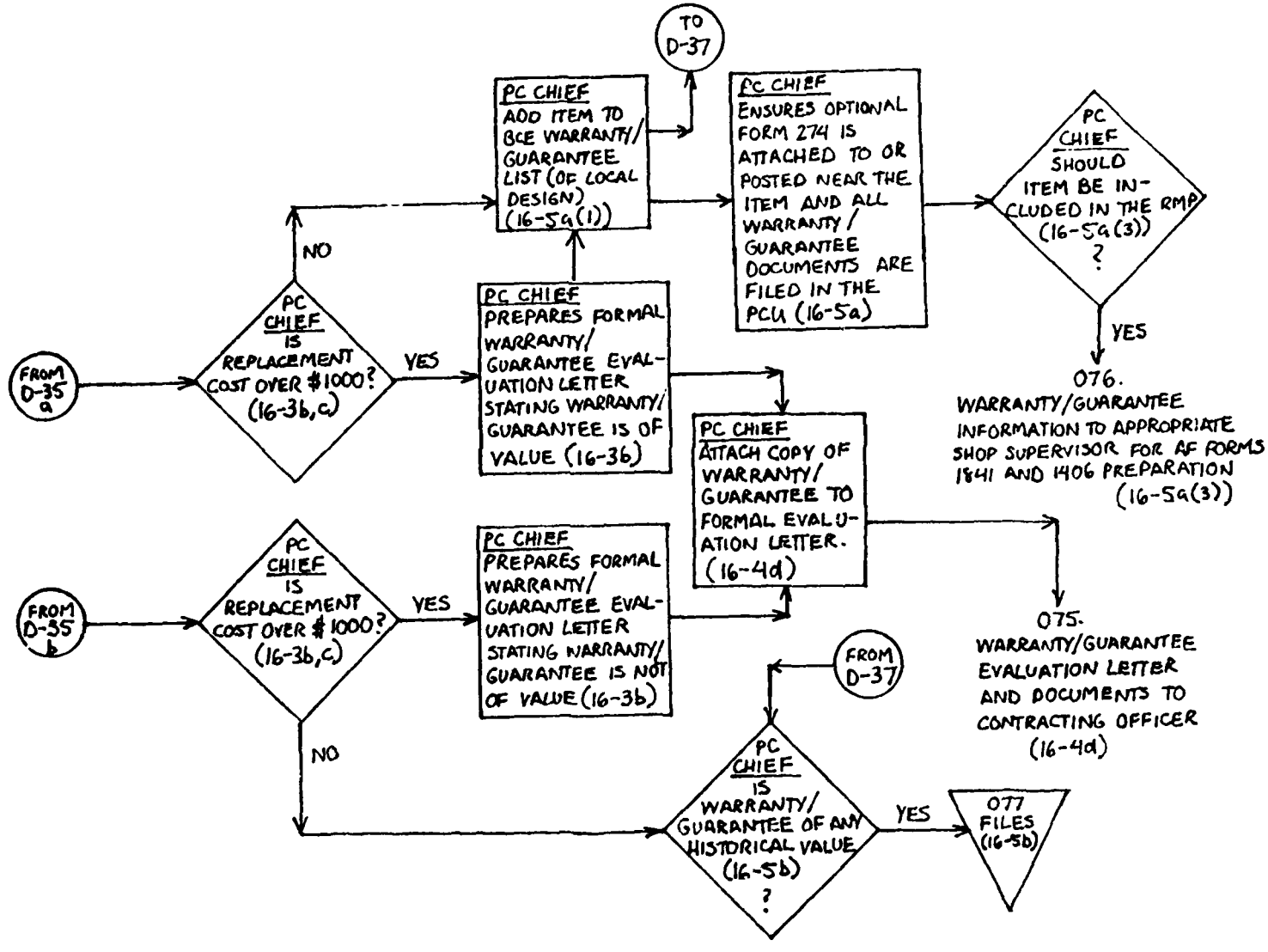


Fig D-36. Warranty/Guarantee System Process (cont.)

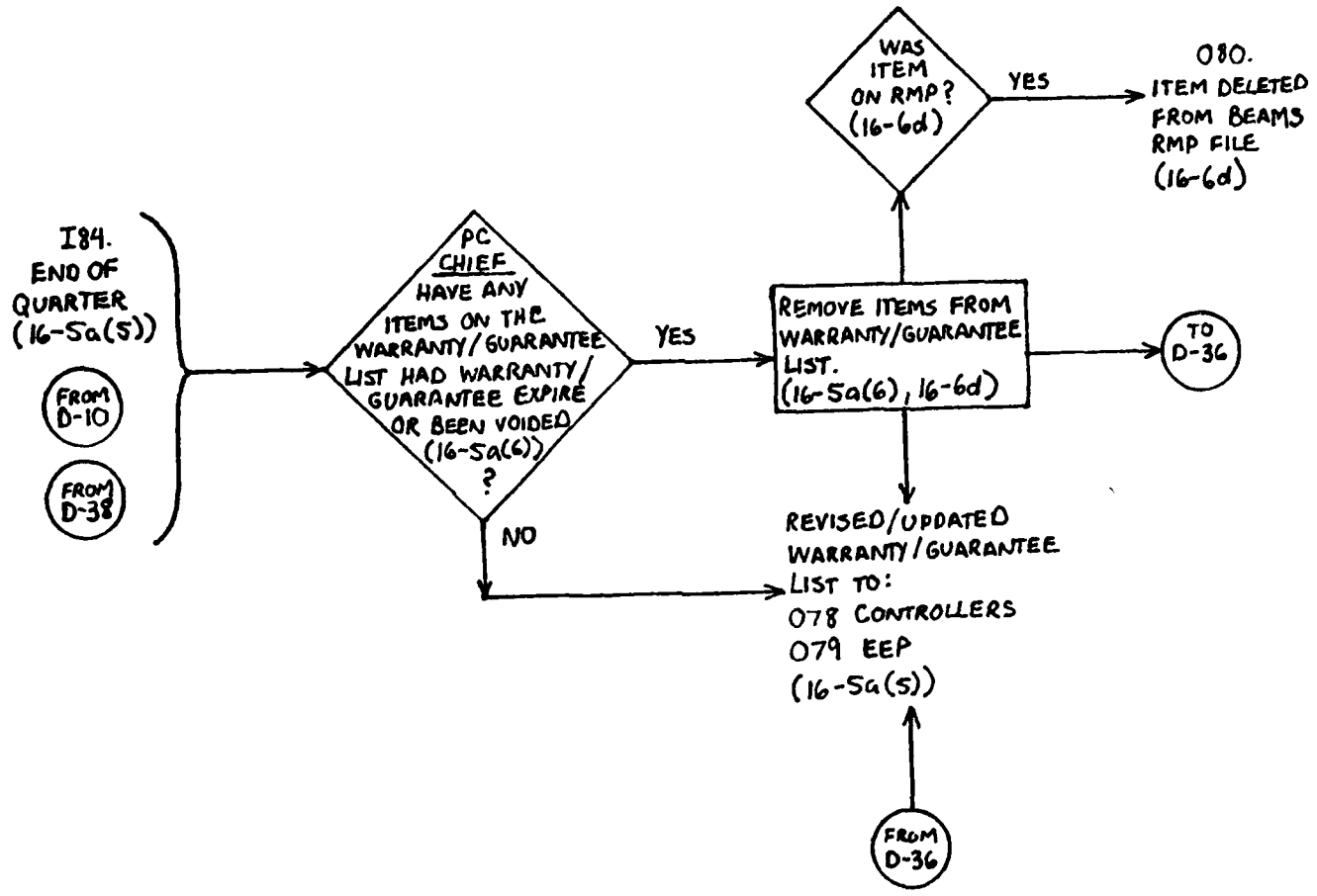


Fig D-37. Warranty/Guarantee System Process (cont.)

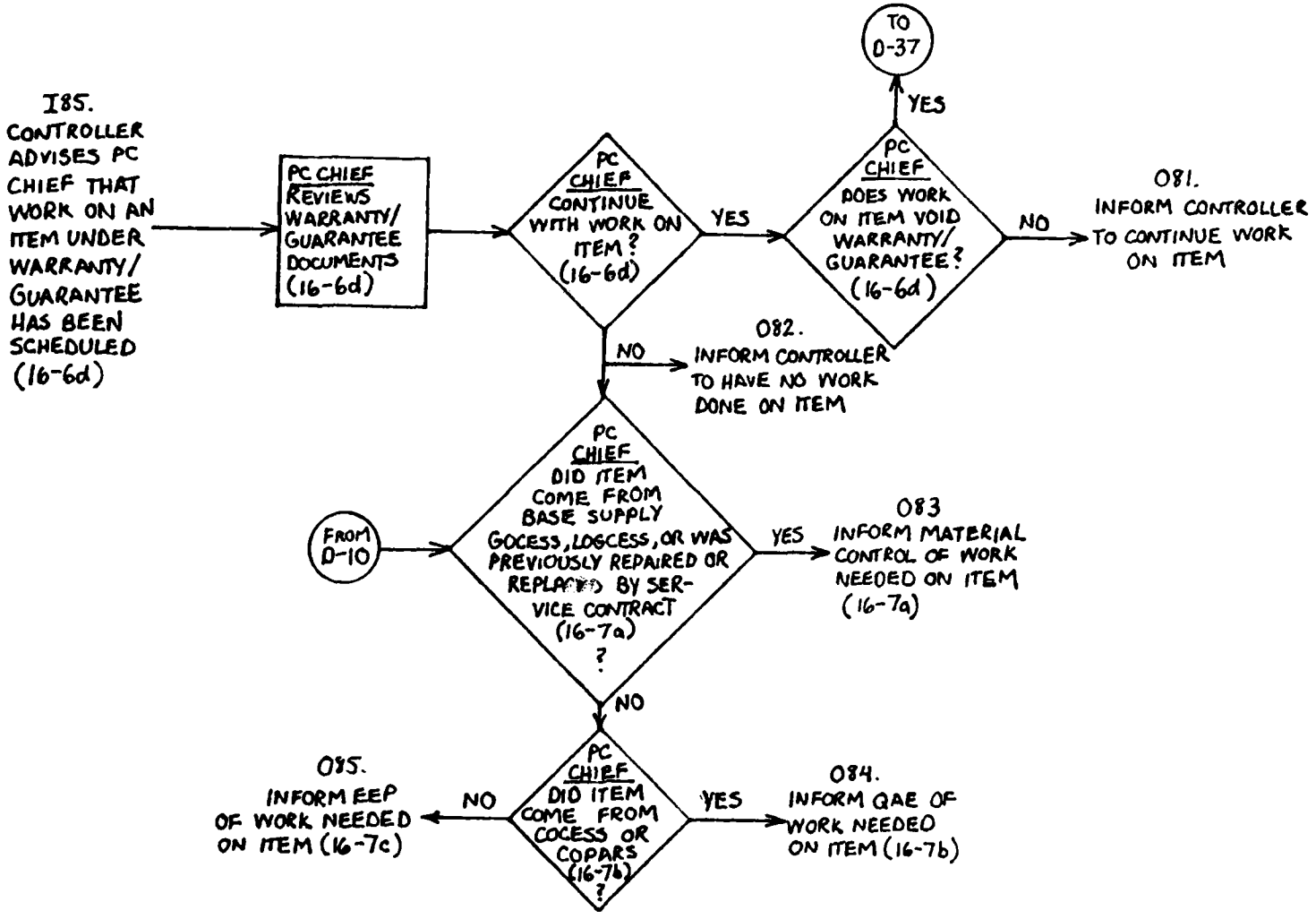


Fig D-38. Warranty/Guarantee System Process (cont.)

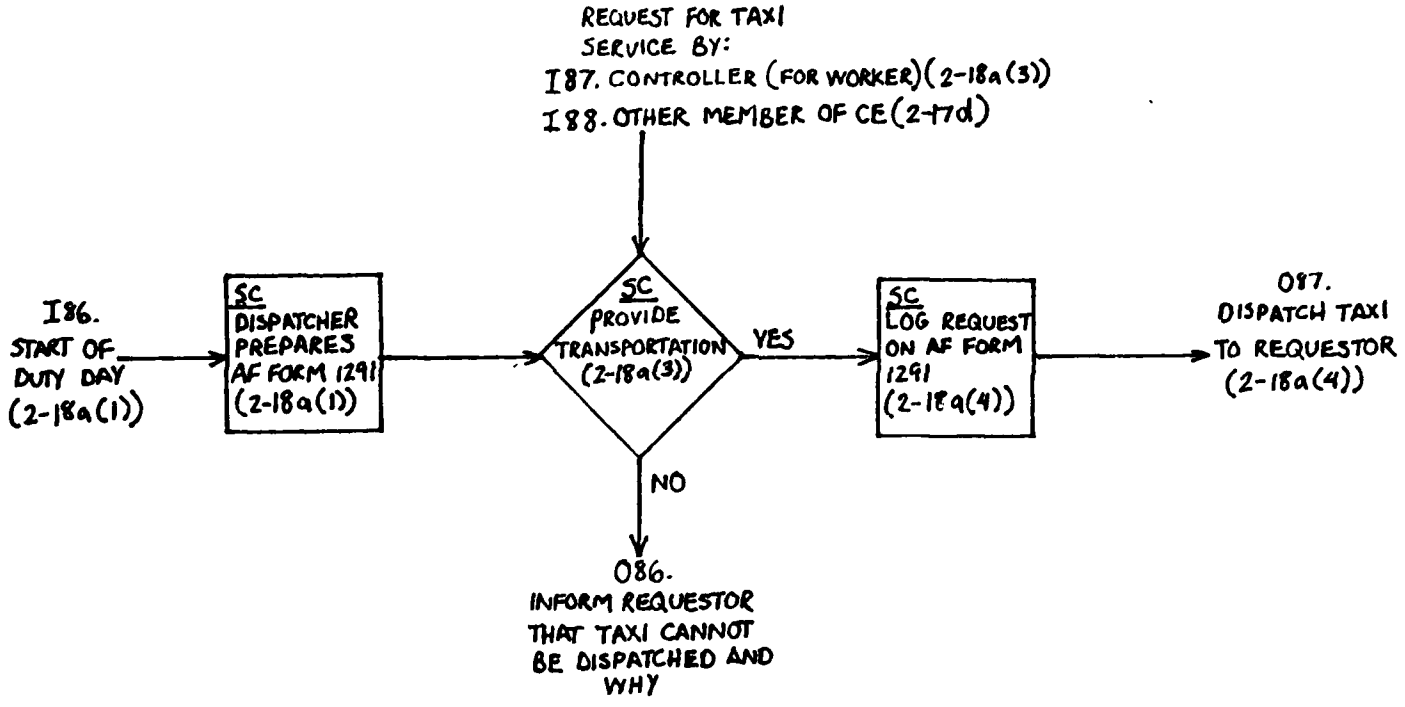


Fig D-39. Transportation (Taxi) System Process

APPENDIX E

LIST OF PCU INFORMATIONAL INPUTS BY PROCESS

A. Work Request (AF Form 332) Approval Process (Figures D-1, D-2, and D-3)

1. AF Form 332 from customer
2. Guidance from AFR 85-1, paragraph 4-6, 9-4, and figure 4-2.
3. Guidance from AFR 85-10
4. Contract program from EEP
5. Advice from planning (on work method)
6. Advice from EEP (on work method)
7. Guidance from AFR 86-1, paragraph 2-3
8. Advice from planning (estimates)
9. Advice from EEP (estimates)
10. Guidance from AFM 171-200, Volume II, Section 8
11. Guidance from AFR 86-1, figure 2-1
12. Local delegation of authority
13. DD Form 1391 from EEP
14. AF Form 332 (and DD Form 1391) from approval authority

B. Authorization Document Decision Process (Figures D-4 and D-5)

15. Verbal request (telephone call or walk-in) from customer

C. Work Request (AF Form 1135) Approval Process (Figures D-6 and D-7)

4. Contract program from EEP

7. Guidance from AFR 86-1, paragraph 2-3.

16. AF Form 1135 from customer

17. AF Form 1135 from planning

18. AF Form 1135 from shop supervisor

19. AF Form 1135 from MFH management office

20. Guidance from AFR 85-1, paragraph 4-2 and figure 4-4

D. Job Order Classification Decision Process (Figure D-8)

No Inputs

E. Routine Job Order Process (Figure D-9)

21. Planned AF Form 1879 (and AF Forms 1445 if applicable) from planning

22. AF Form 1879 from material control when all materials are available

F. Emergency and Urgent Job Order Process (Figures D-10 and D-11)

22. AF Form 1879 from material control when all materials are available

23. AF Form 1879 from controller with material requirements listed

24. AF Form 1879 from controller when job is completed.

G. In-Service Work Order Process (Figure D-12 and D-13)

25. Work order folder from planning with work planned

26. BEAMS product PCN SF 100360

27. Work order folder from chief, R & R

28. Work order folder from material control when

materials are available

29. 10 days before the end of the month

H. Self-Help Work Order Authorization Document Decision Process (Figure D-14)

30. Guidance from AFR 86-1

31. Guidance from AFR 91-1

32. Guidance from Base Housing Brochure

I. Self-Help Work Order (AF Form 332) Process (Figure D-15)

33. AF Form 332 and AF Forms 1445 from material control

34. AF Form 332 and AF Form 103 from planning

J. Self-Help Work Order (AF Form 327) Process (Figure D-16)

35. Notification from customer when work is completed

36. Notification from shop supervisor when inspection of self-help work is completed

K. Recurring Maintenance Program Development Process (Figure D-17)

37. AF Form 1406 from shop supervisor

38. Information on an item installed, repaired, or removed by contract from EEP

39. Guidance from AFM 171-200, Volume II, section 20

L. CWON and WAL Development Process (Figures D-18 and D-19)

40. Annually before 1 October

41. New operations and services work requirements from shop supervisors

42. Examples in AFR 85-1, paragraph 5-5a(4)

43. Guidance and examples in AFR 85-1, paragraph 5-5a(5)

44. AFM 171-200, Volume II

45. BEAMS product PCN SF 100367

46. Approved and signed CWON list and WAL from chief, R & R

M. SMART Schedule Preparation Process (Figure D-20)

47. Date selected by PC chief

48. Guidance in AFR 85-1, paragraph 6-7c

N. SMART Job Order Process (Figure D-20)

49. AF Form 1219 from SMART inspector

O. MFH Renovation Job Order Process (Figure D-21)

50. AF Form 1219 from MFH housing inspector

51. AF Form 1219 from shop supervisor - showing work not done during renovation

P. Weekly Scheduling Process (Figures D-22 and D-23)

52. AF Forms 561, part I from shop supervisors

53. BEAMS product PCN SF 100252

54. BEAMS product PCN SF 100131, part II (RMP)

55. Local travel time method

56. BEAMS product PCN SF 100131, part I (RMP)

57. Recurring maintenance completion cards (CWK)

58. Work packages from shop supervisors after review with potential problems noted

59. AF Forms 561 approved and signed by operations chief

60. Last work day of week before week being scheduled

Q. Job stoppage/Change Order Process (Figure D-24)

61. Work order folder from shop supervisor when work has stopped before work is completed

62. Guidance from AFM 171-200, Volume II

R. Work Order Cancellation Process (Figure D-25)

63. Notice to cancel work order from proper authority

S. Work Order Close-Out Process (Figure D-26 and D-27)

64. Signed AF Form 327 when work is completed from shop supervisors

65. Signed AF Forms 327 from operations chief

66. BEAMS product PCN SF 100358

67. Guidance from AFM 170-27

68. BEAMS product PCN SF 100356

69. Work order folder from IE after real property record changes

70. Work order folder from EEP after record drawing changes

T. Job Order Close-Out Process (Figure D-28)

71. AF Form 1879 (Hard Copy) from controllers

U. Weekly Schedule Close-Out Process (Figure D-28)

72. Original AF Forms 561 from controllers

V. Daily Schedule Close-Out Process (Figure D-28)

73. AF Forms 1734 from IE after labor transactions are made

W. Contract Work Order Status Process (Figure D-29)

74. Contract project number and any action taken from EEP

75. Notification from funds manager to close out original work request number

X. In-Service Work Plan Process (Figures D-30, D-31, D-32, D-33, and D-34)

53. BEAMS product PCH SF 100252

55. Local travel time method

76. End of the month

77. Man-hour projections from shop supervisors of ATA shops

78. Total number authorized in each ATA shop

79. Local method for IWP approval

80. BEAMS product PCN SF 100688

81. Operations and services lists from shop supervisors

Y. Warranty/Guarantee System Process (Figures D-35, D-36, D-37 and D-38)

82. Warranty/Guarantee documents from material control

83. Warranty/Guarantee documents from EEP

84. End of the quarter

85. Controller notifies PC chief that work on an item under warranty/guarantee has been scheduled

Z. Transportation (Taxi) System Process (Figure D-39)

86. Start of duty day

87. Request for taxi service by controller

88. Request for taxi service by any member of CE

AA. Communications System Process

89. Request for communications equipment or support from

any one in CE

90. Guidance (requirements) in AFR 85-1, paragraph 2-7

BB. Command Post/Communications Center Operations Process

91. Guidance in AFR 85-1, paragraph 7-6e

CC. Briefings Preparation Processes

92. Guidance (requirements) in AFR 85-1, paragraphs 1-6j(6), 1-6k(2), 2-6

DD. Customer Assistance Process

93. Inquiries for status from customers

APPENDIX F

LIST OF PCU INFORMATIONAL INPUTS BY MEDIUM

A. AF or DD Form:

1. AF Form 332 from customer

13. DD Form 1391 from EEP

14. AF Form 332 (and DD Form 1391) from approval authority

16. AF Form 1135 from customer

17. AF Form 1135 from planning

18. AF Form 1135 from shop supervisor

19. AF Form 1135 from MFH management office

21. Planned AF Form 1879 (and AF Forms 1445 if applicable from planning

22. AF Form 1879 from material control when all m materials are available

23. AF Form 1879 from controller with material requirements listed

24. AF Form 1879 from controller when job is completed

25. Work order folder from planning with work planned

27. Work order folder from chief, R & R

28. Work order folder from material control when materials are available

33. AF Form 332 and AF Forms 1445 from material control

34. AF Form 332 and AF Form 103 from planning

37. AF Form 1406 from shop supervisor

49. AF Form 1219 from SMART inspector

50. AF Form 1219 from MFH inspector

51. AF Form 1219 from shop supervisor showing work not done during renovation

52. AF Forms 561, part I, from shop supervisors

58. Work packages from shop supervisors after review with potential problems noted

59. AF Forms 561 approved and signed by operation chief

61. Work order folder from shop supervisor when work has stopped before work is completed

64. Signed AF Form 327 when work is completed from shop supervisors

65. Signed AF Form 327 from operations chief

69. Work order folder from IE after real property record changes

70. Work order folder from EEP after record drawing changes

71. AF Form 1879 (hard copy) from controllers

72. Original AF Forms 561 from controllers

73. AF Forms 1734 from IE after labor transactions are made

B. Guidance from directives:

2. Guidance from AFR 85-1, paragraph 4-6, 9-4, and figure 4-2

3. Guidance from AFR 85-10

7. Guidance from AFR 86-1, paragraph 2-3

10. Guidance from AFM 171-200, Volume II, section 8

11. Guidance from AFR 86-1, figure 2-1

12. Local delegation of authority

20. Guidance from AFR 85-1, paragraph 4-2 and figure 4-4

30. Guidance from AFR 86-1

31. Guidance from AFR 91-1

32. Guidance from Base Housing Brochure

39. Guidance from AFM 171-200, Volume II, section 20

42. Examples in AFR 85-1, paragraph 5-5a(4)

43. Guidance and examples in AFR 85-1, paragraph 5-5a(5)

44. AFM 171-200, Volume II

48. Guidance in AFR 85-1, paragraph 6-7c

62. Guidance from AFM 171-200, Volume II

67. Guidance from AFM 170-27

90. Guidance (requirements) in AFR 85-1, paragraph 2-7

91. Guidance in AFR 85-1, paragraph 7-6e

92. Guidance (requirements) in AFR 85-1, paragraph 1-6j(6), 1-6k(2), 2-6

C. Verbal:

15. Verbal request (telephone call or walk-in) from customer

85. Controller notifies PC chief that work an item under warranty/guarantee has been scheduled

87. Request for taxi service by controller

88. Request for taxi service by any member of CE

D. Time:

29. 10 days before the end of the month

40. Annually before 1 October

47. Date selected by PC chief

60. Last work day of week before week being scheduled

76. End of the month

84. End of the quarter

86. Start of the duty day

E. Written (other than AF or DD Form):

77. Man-hour projections from shop supervisors of ATA shops

81. Operations and services lists from shop supervisors

82. Warranty/guarantee documents from material control

83. Warranty/guarantee documents from EEP

F. Unspecified:

4. Contract program from EEP

5. Advice from planning (on work method)

6. Advice from EEP (on work method)

8. Advice from planning (estimates)

9. Advice from EEP (estimates)

35. Notification from customer when work is complete

36. Notification from shop supervisor when inspection of self-help work is completed

38. Information on an item installed, repaired, or removed by contract from EEP

41. New operations and services work requirements from shop supervisors

55. Local travel time method

63. Notice to cancel work order from proper authority

74. Contract project number and any action taken from EEP

75. Notification from funds manager to close out original work request number

78. Total number authorized in each ATA shop

79. Local method for IWP approval

89. Request for communications equipment or support from anyone in CE

93. Inquiries for status from customers

G. BEAMS Product:

26. BEAMS product PCN SF 100360

45. BEAMS product PCN SF 100367

46. Approved and signed CWON list and WAL from chief, R & R

53. BEAMS product PCN SF 100252

54. BEAMS product PCN SF 100131, part II (RMP)

56. BEAMS product PCN SF 100131, part I (RMP)

57. Recurring Maintenance completion cards (CWK)

66. BEAMS product PCN SF 100358

68. BEAMS product PCN SF 100356

80. BEAMS product PCN SF 100688

APPENDIX G

LIST OF PCU INFORMATIONAL INPUTS BY SOURCE

A. Customers:

1. AF Form 332

15. Verbal request (telephone call or walk-in)

16. AF Form 1135

35. Notification that self-help work is complete

93. Inquiries for status (of work and work requests)

B. Chief of operations branch:

59. AF Forms 561 approved and signed

65. Signed AF Forms 327

C. Chief of R & R section:

27. Work order folder

46. CWON list and WAL approved and signed

D. Planning:

5. Advice on work method

8. Advice on estimates

17. AF Form 1135

21. Planned AF Form 1879 (and AF Forms 1445 if applicable)

25. Work order folder with work planned

34. AF Form 332 and AF Form 103 (for self-help work)

E. Material control:

22. AF Forms 1879 when all materials are available

28. Work order folder when all materials are available

33. AF Form 332 and AF Forms 1445 (for self-help work)

82. Warranty/guarantee documents

F. Shop supervisors:

18. AF Form 1135

36. Notification when self-help inspection is completed

37. AF Form 1406

41. New operations and services work requirements

51. AF Form 1219 showing work not done during renovation

52. AF Form 561, part I

58. Work packages after review with potential problems noted

61. Work order folder when work has stopped before work is completed

64. Signed AF Form 327 when work is completed

77. Man-hour projections

81. Operations and services lists

G. SMART:

49. AF Form 1219

H. Controllers:

23. AF Form 1879 with material requirements listed

24. AF Form 1879 when work is completed (urgent or emergency job order)

71. AF Form 1879 (hard copy) when work is completed (routine job orders)

72. Original AF Form 561

85. Notification that work on an item under warranty/ guarantee has been scheduled

87. Request for taxi service (for a worker)

I. EEP:

4. Contract program

6. Advice on work method

9. Advice on estimates

13. DD Form 1391

38. Information on an item installed, repaired, or removed by contract

70. Work order folder after record drawing changes

74. Contract project number and any action taken (on a work request)

83. Warranty/guarantee documents

J. IE:

69. Work order folder after real property record changes

73. AF Forms 1734 after labor transactions are made

K. Funds manager:

75. Notification to close out original work request number

L. MFH management office:

19. AF Form 1135

50. AF Form 1219

M. Other members of CE:

88. Request for taxi service

89. Request for communications equipment or support

N. Approval authority:

14. AF Form 332 (and DD Form 1391 if applicable)

63. Notice to cancel work order

0. Directives:

2. Guidance from AFR 85-1, paragraph 4-6, 9-4, and figure 4-2

3. Guidance from AFR 85-10

7. Guidance from AFR 86-1, paragraph 2-3

10. Guidance from AFM 171-200, Volume II, section 8

11. Guidance from AFR 86-1, figure 2-1

12. Local delegation of authority

20. Guidance from AFR 85-1, paragraph 4-2 and figure 4-4

30. Guidance from AFR 86-1

31. Guidance from AFR 91-1

32. Guidance from Base Housing Brochure

39. Guidance from AFM 171-200, Volume II, section 20

42. Examples in AFR 85-1, paragraph 5-5a(4)

43. Guidance and examples in AFR 85-1, paragraph 5-5a(5)

44. AFM 171-200, Volume II

48. Guidance in AFR 85-1, paragraph 6-7c

62. Guidance from AFM 171-200, Volume II

67. Guidance from AFM 170-27

90. Guidance (requirements) in AFR 85-1, paragraph 2-7

91. Guidance in AFR 85-1, paragraph 7-6e

92. Guidance (requirements) in AFR 85-1, paragraphs 1-6j(6), 1-6k(2), and 2-6

P. Time:

29. 10 days before the end of the month

40. Annually before 1 October

47. Date selected by PC chief

60. Last work day of week before week being scheduled

76. End of the month

84. End of the quarter

86. Start of the duty day

Q. Unspecified:

55. Local travel time method

78. Total number authorized in each ATA shop

79. Local method for IWP approval

R. BEAMS:

26. Product PCN SF 100360

45. Product PCN SF 100367

53. Product PCN SF 100252

54. Product PCN SF 100131, part II

56. Product PCN SF 100131, part I

57. Recurring maintenance completion cards (CWK)

66. Product PCN SF 100358

68. Product PCN SF 100356

80. Product PCN SF 100688

APPENDIX H

LIST OF PCU INFORMATIONAL OUTPUTS BY PROCESS

A. Work Request (AF Form 332) Approval Process (figures D-1, D-2, and D-3)

1. AF Form 332 returned to customer with explanation why returned

2. Work request information into BEAMS WCM file with indicator "D"

3. AF Form 332 to chief, R & R

4. AF Form 332 (and DD Form 1391 if applicable) to approval authority

5. AF Form 332 (and DD Form 1391 if applicable) to EEP

B. Authorization Document Decision Process (figures D-4 and D-5)

1. AF Form 332 returned to customer with explanation why returned

6. AF Form 1135 returned to customer with explanation why returned

C. Work Request (AF Form 1135) Approval Process (figures D-6 and D-7)

6. AF Form 1135 returned to customer with explanation why returned

7. AF Form 1135 and AF Form 332 to customer with status

8. AF Form 1135 (first copy) to requester

D. Job Order Classification Decision Process (figure D-8)

No Outputs

E. Routine Job Order Process (figure D-9)

9. AF Form 1879 to planning

10. AF Forms 1879 and 1445 to material control

F. Emergency and Urgent Job Order Process (figures D-10 and D-11)

11. Notify customer of job order cancellation

12. AF Form 1879 (soft copy) to material control with material requirements listed

13. Work is done for customer

14. DIN worker's man-hour report by CWON and LUC to controller

15. AF Form 1879 (soft copy) to controller

16. AF Form 1879 is filed

G. In-service Work Order Process (figure D-12 and D-13)

17. AF Form 327 and supporting documents to planning to plan work

18. BEAMS WCM file updated

19. BEAMS WCN file created for each involved shop

20. Estimated start date for a work order into BEAMS file

21. Work order folder to chief, R & R

22. Chief, R & R kept informed of backlog of work orders on funds hold

23. BEAMS updated (funds hold)

24. Work order folder to chief, R & R when funds are available

25. BEAMS updated (in material control)

26. Work order folder to material control for material processing

27. BEAMS updated (material complete)

28. BEAMS updated (to be scheduled)

H. Self-Help Work Order Authorization Document Decision Process (figure D-14)

29. Return self-help request to customer with explanation why returned

I. Self-Help Work Order (AF Form 332) Process (figure D-15)

30. AF Form 332 to material control for material processing

31. AF Form 332 to planning

32. Signed original AF Form 332 to MFH management office

33. Signed AF Form 332 to customer authorizing self-help work

J. Self-Help Work Order (AF Form 327) Process (figure D-16)

34. Update BEAMS WCM file with indicator "Y"

35. Copy of signed AF Form 327 to customer authorizing self-help work

36. Notification to shop supervisors to arrange final inspection of self-help work

K. Recurring Maintenance Program Development Process (figure D-17)

37. Information into BEAMS RMP file

L. CWON and WAL Development Process (figure D-18 and D-19)

38. Information entered into BEAMS files

39. Changes to BEAMS files

40. CWON List and WAL, BEAMS product PCN SF 100367 to chief, R & R for approval and signature

41. BEAMS product PCN SF 1--367 to controllers

42. BEAMS product PCN SF 100367 to material control

43. BEAMS product PCN SF 100367 to IE

44. BEAMS product PCN SF 100367 to EEP

M. SMART Schedule Preparation Process (figure D-20)

45. SMART schedule to building custodians (of facilities on SMART schedule)

46. SMART schedule to SMART

N. SMART Job Order Process (figure D-20)

47. AF Form 1219 to SMART to do work

48. Other job orders to SMART to do work

O. MFH Renovation Job Order Process (figure D-21)

49. AF Form 1219 to MFH management office

P. Weekly Scheduling Process (figures D-22 and D-23)

50. Work packages to shop supervisors for review

51. Contacts customer for access to job site

52. Coordination with key agencies affected by any planned utility outages

53. Item for base wide announcement indicating planned utility outages or traffic flow interruptions

54. Informs fire department when fire protection is

needed

55. Informs security police when a security alarm or physical security is involved, or when rerouting or traffic control is necessary

56. AF Forms 561 to operations chief for approval and signature

57. Recurring maintenance completion cards (CWK) to controllers

58. Labor estimates by LUC into BEAMS file from AF Form 561, part II

59. Work packages to shop supervisors to do work

60. Work packages to controllers

Q. Job Stoppages/Change Order Process (figure D-24)

61. Work order entered in BEAMS job stoppages report file

62. Work order folder to planning

63. Work order folder to material control

R. Work Order Cancellation Process (figure D-25)

64. Contacts each activity and advises them to discontinue work on work order

65. Notifies customer of work order cancellation

66. Work order folder filed (after cancellation)

S. Work Order Close-Out Process (figure D-26 and D-27)

67. AF Forms 327 to operations chief for signature

68. Date work order completed into appropriate BEAMS work order shop record

69. Enter information into BEAMS WCM file

70. Work order folder to IE

71. Work order folder to EEP

72. Work order folder filed (after completion)

T. Job Order Close-Out Process (figure D-28)

73. AF Form 1879 (hard copy) filed

U. Weekly Schedule Close-Out Process (figure D-28)

No Outputs

V. Daily Schedule Close-Out Process (figure D-28)

74. AF Forms 1734 to superintendents

W. Contract Work Order Status Process (figure D-29)

No Outputs

X. In-service Work Plan Process (figures D-30, D-31, D-32, D-33, and D-34)

No Outputs

Y. Warranty/Guarantee System Process (figures D-35, D-36, D-37, and D-38)

75. Warranty/guarantee evaluation letter and documents to contracting officer

76. Warranty/guarantee information to appropriate shop supervisors for AF Forms 1841 and 1406 preparation

77. Warranty/guarantee documents filed

78. Warranty/guarantee list to controllers

79. Warranty/guarantee list to EEP

80. Item is deleted from BEAMS RMP file

81. Informs controller to continue work on item

82. Informs controller to have no work done on item

83. Informs material control of work needed on item

84. Informs COCESS or COPARS QAE of work needed on item

85 . Informs EEP of work needed on item

Z. Transportation (Taxi) System Process (figure D-39)

86. Inform requester that taxi cannot be dispatched and why

87. Dispatch taxi to requester

AA. Communications System Requirements

No Outputs

BB. Command Post/Communications Center Operations Process

No Outputs

CC. Briefings Preparation Process

88. Briefing to chief, R & R on all aspects of PCU activity

89. Briefs work on job stoppage

90. Briefs/informs chief, R & R of backlog of work orders awaiting funds

DD. Customer Assistance Process

91. Status information to customers

APPENDIX I

LIST OF PCU INFORMATIONAL OUTPUTS BY MEDIUM

A. AF or DD Forms:

1. AF Form 332 returned to customer with explanation why returned

3. AF Form 332 to chief, R & R

4. AF Form 332 (and DD Form 1391 if applicable) to approval authority

5. AF Form 332 (and DD Form 1391 if applicable) to EEP

6. AF Form 1135 returned to customer with explanation why returned

7. AF Form 1135 and AF Form 332 to customer with status

8. AF Form 1135 (first copy) to requester

9. AF Form 1879 to planning

10. AF Form 1879 and AF Forms 1445 to material control

12. AF Form 1879 (soft copy) to material control with material requirements

15. AF Form 1879 (soft copy) to controller

16. AF Form 1879 is filed

17. AF Form 327 and supporting documents to planning to plan work

21. Work order folder to chief, R & R

24. Work order folder to chief, R & R when funds are available

26. Work order folder to material control for material processing

29. Return self-help request (AF Form 332) to customer with explanation why returned

30. AF Form 332 to material control for material processing

31. AF Form to planning

32. Signed original AF Form 332 to MFH management office

33. Signed AF Form 332 to customer authorizing self-help work

35. Copy of signed AF Form 327 to customer authorizing self-help work

47. AF Form 1219 to SMART to do work

49. AF Form 1219 to MFH management office

50. Work packages to shop supervisors for review

56. AF Form 561 to operations chief for approval and signature

59. Work packages to shop supervisors to do work

60. Work packages to controllers

62. Work order folder to planning

63. Work order folder to material control

66. Work order folder filed (after cancellation)

67. AF Form 327 to operations chief for signature

70. Work order folder to IE

71. Work order folder to EEP

72. Work order folder filed (after completion)

73. AF Form 1879 (hard copy) filed

74. AF Form 1734 to superintendents

B. Verbal:

11. Notify customer of job order cancellation

51. Cantacts customer for access to job site

81. Inform controller to continue work on item

82. Inform controller to have no work done on item

86. Inform requester that taxi cannot be dispatched and why

88. Briefing to chief, R & R on all aspects of PCU activity

89. Briefs work on job stoppage

90. Briefs/informs chief, R & R of backlog of work orders awaiting funds

C. Action:

13. Work is done for customer

87. Dispatch taxi to requester

D. Written (other than AF or DD Form):

45. SMART schedule to building custodians (of facilities on SMART schedule)

46. SMART schedule to SMART

75. Warranty/guarantee evaluation letter and documents to contracting officer

77. Warranty/guarantee documents filed

78. Warranty/guarantee list to controllers

79. Warranty/guarantee list to EEP

E. Unspecified:

14. DIN worker's man-hour report by CWON and LUC to

controller

22. Chief, R & R kept informed of backlog or work orders on funds hold

36. Notification to shop supervisors to arrange final inspection of self-help work

48. Other job orders to SMART to do work

52. Coordination with key agencies affected by any planned utility outages

53. Item for base wide announcement indicating planned utility outages or traffic flow interruptions

54. Informs fire department when fire protection is needed

55. Informs security police when a security alarm or physical security is involved, or when rerouting or traffic control is necessary

64. Contacts each activity and advises them to discontinue work on work order

65. Notifies customer of work order cancellation

76. Warranty/guarantee information to appropriate shop supervisors for AF Form 1841 and AF Form 1406 preparation

83. Informs material control of work needed on item

84. Informs COCESS or COPARS QAE of work needed on item

85. Informs EEP of work needed on item

91. Status information to customers

F. BEAMS transactions or products:

2. Work request information into BEAMS WCM file with

indicator "D"

18. BEAMS WCM file updated

19. BEAMS WCN file created for each involved shop

20. Estimated start date for a work order into BEAMS file

23. BEAMS updated (funds hold)

25. BEAMS updated (in material control)

27. BEAMS updated (material complete)

28. BEAMS updated (to be scheduled)

34. Update BEAMS WCM file with indicator "Y"

37. Information into BEAMS RMP file

38. Information entered into BEAMS files

39. Changes to BEAMS files

40. CWON list and WAL, BEAMS product PCN SF 100367 to chief, R & R for approval and signature

41. BEAMS product PCN SF 100367 to controllers

42. BEAMS product PCN SF 100367 to material control

43. BEAMS product PCN SF 100367 to IE

44. BEAMS product PCN SF 100367 to EEP

57. Recurring maintenance completion cards (CWK) to controllers

58. Labor estimates by LUC into BEAMS file from AF Form 561, part II

61. Work order entered in BEAMS job stoppage report file

68. Date work order completed into appropriate BEAMS work order shop record

69. Enter information into BEAMS WCM file

80. Item is deleted from BEAMS RMP file

APPENDIX J

LIST OF PCU INFORMATIONAL OUTPUTS BY RECIPIENT

A. Customer:

1. AF Form 332 returned with explanation why returned

6. AF Form 1135 returned with explanation why returned

7. AF Form 1135 and AF Form 332 with status

8. AF Form 1135 (first copy)

11. Notification of job order cancellation

13. Work is done

29. Self-help request (AF Form 332) returned with explanation why

33. Signed AF Form 332 authorizing self-help work

35. Copy of signed AF Form 327 authorizing self-help work

51. Contacted for access to job site

65. Notification of work order cancellation

91. Status information (on work or work request)

B. Chief of operations branch:

56. AF Form 561 for approval and signature

67. AF Form 327 for signature

C. Chief, R & R section:

3. AF Form 332

21. Work order folder

22. Information on backlog of work orders on funds hold

24. Work order folder when funds are available

40. CWON list and WAL, BEAMS product PCN SF 100367 for

approval and signature

88. Briefings on all aspects of PCC activity

90. Briefings/information on backlog of work orders awaiting funds

D. Planning:

9. AF Form 1879

17. AF Form 327 and supporting documents to plan work

31. AF Form 332

62. Work order folder

E. Material control:

10. AF Form 1879 and AF Forms 1445

12. AF Form 1879 (soft copy) with material requirements listed

26. Work order folder for material processing

30. AF Form 332 for material processing

42. BEAMS product PCN SF 100367

63. Work order folder

83. Informed of work needed on item under warranty/ guarantee

F. Superintendents:

74. AF Forms 1734

G. Shop supervisors:

36. Notification to arrange final inspection of self-help work

50. Work packages for review

59. Work packages to do work

76. Warranty/guarantee information for AF Form 1841 and AF Form 1406 preparation

H. SMART:

46. SMART schedule

47. AF Form 1219 to do work

48. Other job orders to do work

I. Controllers:

14. DIN worker's man-hour report by CWON and LUC

15. AF Form 1879 (soft copy)

41. BEAMS product PCN SF 100367

57. Recurring maintenance completion cards (CWK)

60. Work packages

78. Warranty/guarantee list

81. Notification to continue work on item under warranty/guarantee

82. Notification to have not work done on item under warranty/guarantee

J. EEP:

5. AF Form 332 (and DD Form 1391 if applicable)

44. BEAMS product PCN SF 100367

71. Work order folder

79. Warranty/guarantee list

85. Notification that work on item under warranty/guarantee is needed

K. IE:

43. BEAMS product PCN SF 100367

70. Work order folder

L. MFH management office:

32. Signed original AF Form 332

49. AF Form 1219

M. Fire department:

54. Notified when fire protection is needed

N. Other members of CE:

86. Notified that taxi cannot be dispatched and shy

87. Taxi dispatched to provide transportation

O. Approval authority:

4. AF Form 332 (and DD Form 1391 if applicable)

P. Building custodians:

45. SMART schedule

Q. Security police:

55. Notification when work involving a security alarm or physical security or when rerouting or traffic control is necessary

R. Contracting Officer:

75. Warranty/guarantee evaluation letter and documents

S. COCESS or COPARS QAE:

84. Notified that work on an item under warranty/ guarantee is needed

T. Files:

16. AF Form 1879

66. Work order folder (after cancellation)

72. Work order folder (after completion)

73. AF Form 1879 (hard copy)

77. Warranty/guarantee documents

U. Unspecified:

52. Coordination with key agencies affected by any planned utility outages

53. Item for base wide announcement indicating planned utility outages or traffic flow interruptions

64. Contacts activities involved to notify them of work order cancellation

89. Briefings on work or job stoppage

V. BEAMS:

2. Work request information into WCM file with indicator "D"

18. WCM file updated

19. WCN file created for each involved shop

20. Estimated start date for work order

23. Update (funds hold)

25. Update (in material control)

27. Update (material complete)

28. Update (to be scheduled)

34. Update WCM file with "Y" indicator

37. Information into RMP file

38. Information on CWONs and WAL into files

39. Changes to CWONs or WAL into file

58. Labor estimates by LUC from AF Form 561, part II

61. Work order on job stoppage entered

68. Completion date of a work order entered into the appropriate shop record

69. Information into WCM file

80. Item deleted from RMP file

APPENDIX K

SAMPLE FORMS

BASE CIVIL ENGINEERING WORK CLEARANCE REQUEST

DATE PREPARED: 21 Oct. 1978

1. CLEARANCE IS REQUESTED TO PROCEED WITH WORK AT CORNER OF DAVIS AVE. & FIRST BLVD. ON WORK ORDER/~~JOB ORDER~~ NO. 16921, CONTRACT NO. NA, INVOLVING EXCAVATION OR UTILITY DISTURBANCE PER ATTACHED SKETCH. THE AREA INVOLVED [X] HAS [ ] HAS NOT BEEN STAKED OR CLEARLY MARKED.

2. TYPE OF FACILITY/WORK INVOLVED

✓	A. PAVEMENTS	✓	B. DRAINAGE SYSTEMS		C. RAILROAD TRACKS		D. FIRE DETECTION AND PROTECTION SYSTEMS		E. UTILITY ☐ OVERHEAD ☐ UNDERGROUND
	F. COMM. ☐ OVERHEAD ☐ UNDERGROUND	✓	G. VEHICULAR TRAFFIC FLOW		H. SECURITY		I. OTHER (Specify)		

3. INSTRUCTIONS. The BCE work clearance request is used for any work (contract or in house) that may disrupt aircraft or vehicular traffic flow, base utility services, protection provided by fire and intrusion alarm system, or routine activities of the installation. This form is used to coordinate the required work with key base activities and keep customer inconvenience to a minimum. It is also used to identify potentially hazardous work conditions in an attempt to prevent accidents. The work clearance request is processed just prior to the start of work. If delays are encountered and the conditions at the job site change (or may have changed) this work clearance request must be reprocessed.

4. DATE CLEARANCE REQUIRED	5. DATE CLEARANCE TERMINATED
29 Oct. 1978	1 NOV. 1978

6. REQUESTING OFFICIAL (Signature)	7. PHONE NO.	8. ORGANIZATION
J. Adams	2133	BCE

CLEARANCE REVIEW

	ORGANIZATION	REMARKS	REVIEWERS NAME & INITIALS
9. BASE CIVIL ENGINEERING	A. ELECTRICAL DISTRIBUTION	UNDERGROUND PRIMARY IN AREA CALL BEFORE D.G.G.N.G	J. M. Hundley JMH
	B. STEAM DISTRIBUTION	AREA IS CLEAR	J. M. Adams JMA
	C. WATER DISTRIBUTION	AREA IS CLEAR	
	D. POL DISTRIBUTION	AREA IS CLEAR	JMA (Initial)
	E. SEWER LINES	AREA IS CLEAR	J
	F. DRAINAGE SYSTEMS	TO BE REPAIRED	
	G. PAVEMENTS, GROUNDS, RAILROADS	BARRACADE AND CLEARLY MARK WITH WARNING LIGHTS	R. Blue RB
	H. FIRE DEPARTMENT	N/A	JMA
	I. ENGINEERING & ENVIRONMENTAL PLANNING	N/A	JMA
	J. OTHER	N/A	JMA
10. SECURITY POLICE		WILL CHECK BARRACADES AND LIGHTS AT NIGHT	B. Kuykendall BK
11. SAFETY		OK	S. McCallon SM
12. COMMUNICATIONS		UNDERGROUND LINES IN THE AREA. AREA HAS BEEN STAKED	W. Black WB
13. BASE OPERATIONS		N/A	JMH
14. COMMERCIAL UTILITY COMPANY (Telephone, Gas, Electrical, etc.)		N/A	JMA
15. OTHER (Specify)		N/A	JMA

AF FORM MAY 78 103 PREVIOUS EDITION IS OBSOLETE.

Fig K-1. AF Form 103, Base Civil Engineering Work Clearance Request [12:p.11-6]

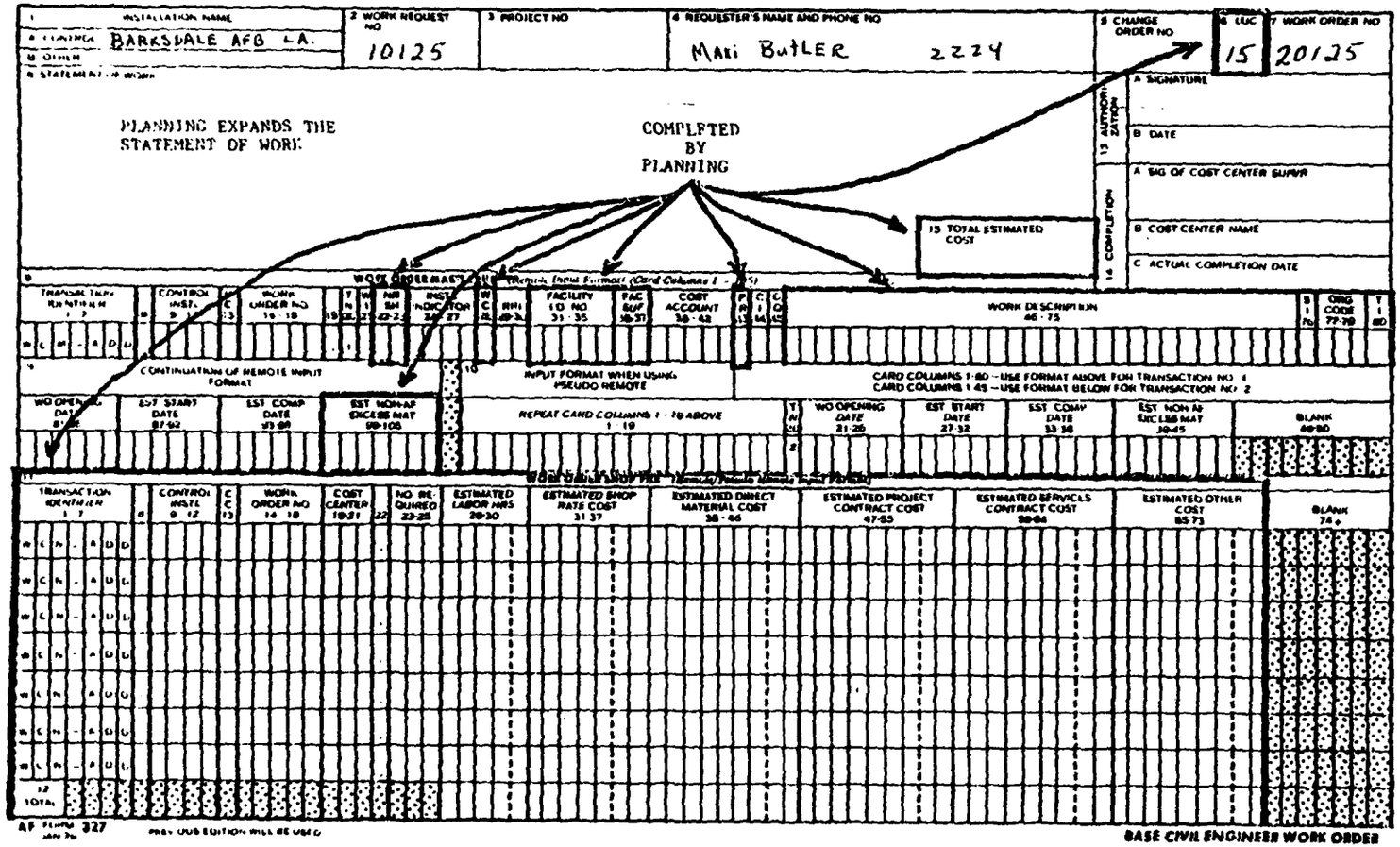
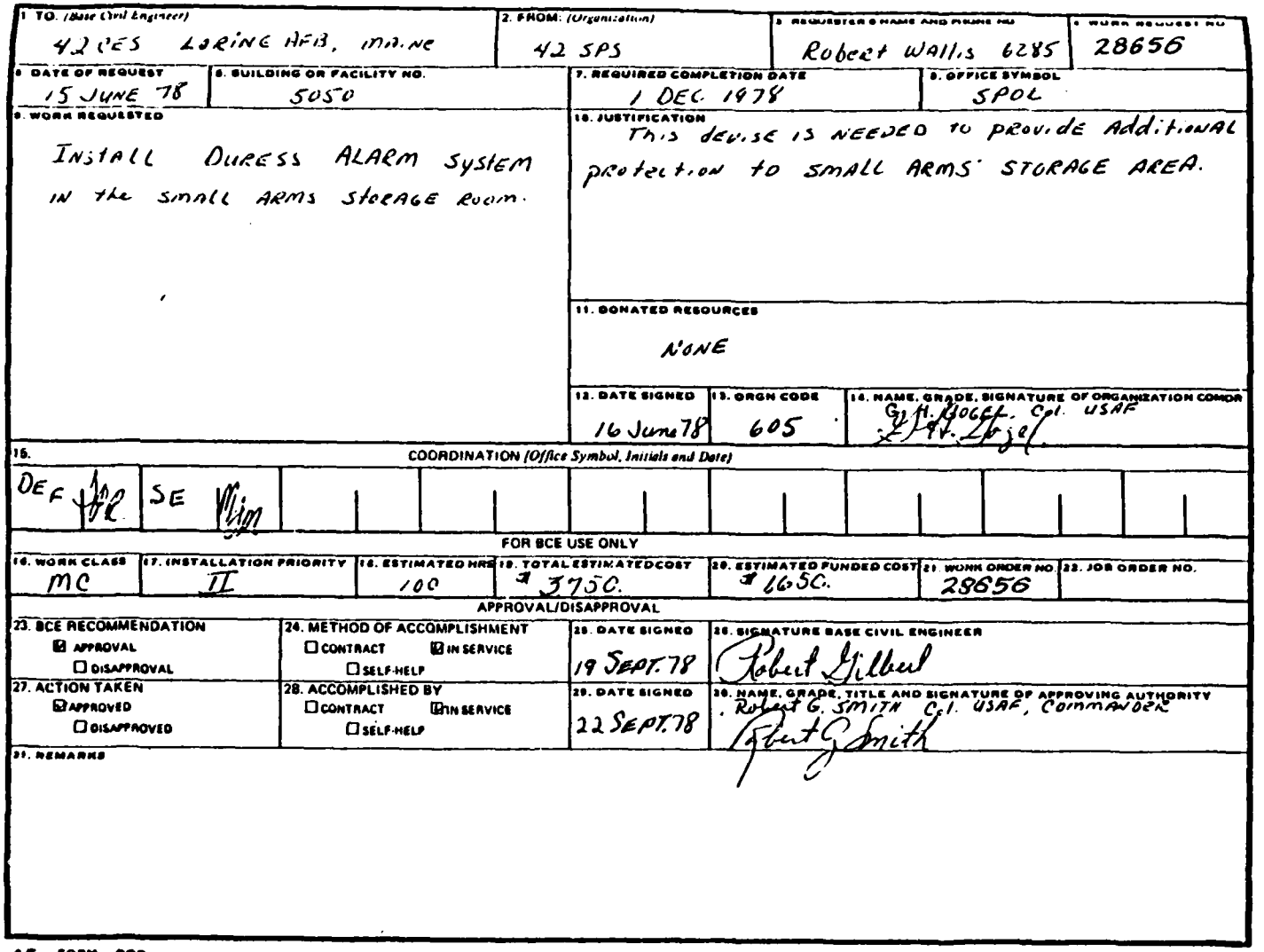


Fig K-2. AF Form 327, Base Civil Engineering Work Order [12:p.11-7]



1. TO. (Base Civil Engineer): 42 CES LORING AFB, MAINE
2. FROM: (Organization): 42 SPS
3. REQUESTER'S NAME AND PHONE NO: Robert Wallis 6285
4. WORK REQUEST NO: 28656
5. DATE OF REQUEST: 15 JUNE 78
6. BUILDING OR FACILITY NO.: 5050
7. REQUIRED COMPLETION DATE: 1 DEC. 1978
8. OFFICE SYMBOL: SPOL
9. WORK REQUESTED: INSTALL DURESS ALARM SYSTEM IN THE SMALL ARMS STORAGE ROOM.
10. JUSTIFICATION: THIS DEVISE IS NEEDED TO PROVIDE ADDITIONAL PROTECTION TO SMALL ARMS STORAGE AREA.
11. DONATED RESOURCES: NONE
12. DATE SIGNED: 16 June 78
13. ORGN CODE: 605
14. NAME, GRADE, SIGNATURE OF ORGANIZATION COMDR: G. H. BOGET, Col. USAF
15. COORDINATION (Office Symbol, Initials and Date): DEF; SE
FOR BCE USE ONLY
16. WORK CLASS: MC
17. INSTALLATION PRIORITY: II
18. ESTIMATED HRS: 100
19. TOTAL ESTIMATED COST: $ 3750.
20. ESTIMATED FUNDED COST: $ 1665.
21. WORK ORDER NO.: 28656
22. JOB ORDER NO.:
APPROVAL/DISAPPROVAL
23. BCE RECOMMENDATION: ☑ APPROVAL ☐ DISAPPROVAL
24. METHOD OF ACCOMPLISHMENT: ☐ CONTRACT ☑ IN SERVICE ☐ SELF-HELP
25. DATE SIGNED: 19 SEPT. 78
26. SIGNATURE BASE CIVIL ENGINEER: Robert Gilbert
27. ACTION TAKEN: ☑ APPROVED ☐ DISAPPROVED
28. ACCOMPLISHED BY: ☐ CONTRACT ☑ IN SERVICE ☐ SELF-HELP
29. DATE SIGNED: 22 SEPT. 78
30. NAME, GRADE, TITLE AND SIGNATURE OF APPROVING AUTHORITY: Robert G. SMITH C.I. USAF, COMMANDER
31. REMARKS

AF FORM 332 MAY 78 PREVIOUS EDITION IS OBSOLETE. **BCE WORK REQUEST** (Use AF Form 1135 for Maintenance and Repair Requests)

Fig K-3. AF Form 332, BCE Work Request [12:p.4-5]

BASE CIVIL ENGINEER WEEKLY WORK SCHEDULE (PART I)

WEEK ENDING: 8 DEC 78 | COST CENTER: 451 | APPROVED: Riley

LINE NO.	DESCRIPTION A	LABOR UTIL CODE (LUC) B	MAN HRS. C	MANHOUR ALLOCATIONS MON SCHED	MON ACT	TUES SCHED	TUES ACT	WED SCHED	WED ACT	THU SCHED	THU ACT	FRI SCHED	FRI ACT	SAT SCHED	SAT ACT	SUN SCHED	SUN ACT
1	ASSIGNED		400	80		80		80		80		80					
2	BORROWED																
3	OVERTIME	38	16											16			
4	TOTAL AVAILABLE (total of items 1,2, and 3)		416	80		80		80		80		80		16			
5	SUPERVISION	31	40	8		8		8		8		8					
6	TRAINING	32	16							8		8					
7	LEAVE	33	24	8		8		8									
8	ALL OTHER	34															
9	LOANED LABOR	39															
10	TOTAL INDIRECT (total of items 5 through 9)		80	16		16		16		16		16					
11	AVAILABLE FOR WORK (item 4 minus item 10)		336	64		64		64		64		64		16			
	PART II (RESERVED MAN-HOURS)																
12	EMERGENCY JOB ORDERS	12	24														
13	DIRECT SCHEDULED WORK	16	130														

THE ITEMS BELOW COMPETE FOR AVAILABLE MAN HRS (SCHEDULED WORK)

WORK ORDER JOB ORDER NUMBER	DESCRIPTION A	(LUC) B	MAN HRS REQ. C	MON SCHED	MON ACT	TUES SCHED	TUES ACT	WED SCHED	WED ACT	THU SCHED	THU ACT	FRI SCHED	FRI ACT	SAT SCHED	SAT ACT	SUN SCHED	SUN ACT
	RECURRING MAINTENANCE	11															
	OPERATIONS AND SERVICES	19															
14456	CONST. CONTROL CENTER BLDG 50	15	94	16		16		16		16		16					
10769	REPR WALLS & FLOORS BLDG 53	18	173	16		16		16		16		16					
10883	REPR WALLS BLDG 1200	18	57							4		8					
A4341	ASSIST MASON SHOP CONST FORMS BLDG 1551	16	16											16			
A4603	REPR DOOR BLDG 51	16	7					7									
	Shop Loaded Job Orders																
	A-1586 A-4495																
	A-1504 A-4611																
	A-1743																
	A-3542																
	A-3949																
	A-4021																
	A-4032																
	A-4076																
	A-4099																
	A-4487																
	A 4491																

AF FORM 561 MAY 78 PREVIOUS EDITION IS OBSOLETE

Fig K-4. AF Form 561, Base Civil Engineer Weekly Work Schedule [12:p.14-7]

BCE JOB ORDER LOG

JOB ORDER NUMBER	TYPE E	U	R	S	H	C	FAC NO	SHOP	DATE REC'D	DESCRIPTION	PLANNING TO	PLANNING FROM	HOLD	MAT CONT TO	MAT CONT FROM	ZONE	TO SHOP	DATE COMP	REMARKS
A-1001			✓				256	451	7 Sep	Repl Floor tile Room 203						2	15 Sep	20 Sep	
A-1002			✓				256	453	7 Sep	Repl Faucet Handles Room 9						2	19 Sep	20 Sep	
A-1003			✓				383	451	7 Sep	Repr. wall in Room 6	7 Sep	8 Sep		8 Sep	14 Sep	3	15 Sep	22 Sep	
A-1004						✓	V210A	432	7 SEP	MHF Renovation						12	18 SEP		Key in Scheduler
A-1005						✓	538	451	7 SEP	Install part; RM 110	7 SEP	7 SEP				4	18 SEP		
A-1006			✓				225	452	7 SEP	Paint ext. door; S entrance						2	15 SEP		
A-1007			✓				637	457	7 Sep	Repl Exit Light Fixture						7			Give to SMART
A-1008																			
A-1009																			
A-1010																			
A-1011																			
A-1012																			
A-1013																			
A-1014																			
A-1015																			

AF FORM MAY 70 637 PREVIOUS EDITION IS OBSOLETE

TYPE: E EMERGENCY U URGENT R ROUTINE S SMART(1219) H HOUSING(1219) C MINOR CONSTRUCTION

Fig K-5. AF Form 637, BCE Job Order Log [12:p.6-9]

BCE IN-SERVICE WORK PLAN WORK SHEET

INSTALLATION: TYNDALL AFB, FLA

APPROVAL SIGNATURE: Burton T. Schultz

MONTH AND YEAR: OCTOBER 1978

OPERATIONS SHOPS

ITEM DESCRIPTION	432 HOUSING	441 EQUIPMENT	442 PAVEMENT	443 GROUNDS	451 STRUCTURE	452 PROT COAT	453 PLUMBING	454 METAL	461 REFRIG	462 LIQUID FUEL	463 HEATING	471 INT ELEC	472 EXT ELEC	486 POWER	493 ENT.	457 SAMM	TOTAL
1 TOTAL AUTHORIZED	10	8	9	11	10	8	7	6	9	5	6	10	7	7	6	6	
2 PROJECTED ASSIGNED (numbers)	16 50	13 44	15 12	18 48	16 80	13 44	11 76	10 08	15 12	8 40	10 08	16 80	11 76	11 76	10 06	10 06	
3 LOANS BORROWS OVERHIRES (numbers)		-3 36		+3 36		-6 2										+62	
4 NET TOTAL (item 2 ± item 3)	16 80	10 08	15 12	21 84	16 80	12 82	11 76	10 08	15 12	8 40	10 08	16 80	11 76	11 76	10 06	10 68	
5 PERCENT AVAILABLE (decimal)	.68	.72	.73	.80	.65	.65	.68	.70	.71	.73	.67	.69	.65	.71	.70	.81	
6 PROJECTED AVAILABLE DIRECT (item 4 X item 5 numbers)	11 42	7 26	11 03	17 47	10 92	8 33	8 00	7 06	10 74	6 13	6 75	11 59	7 64	8 35	7 04	8 65	
RESERVED MAN-HOURS																	
7 EMERGENCY JOB ORDERS (FUC 12)		21	17				216		84	22		128	39	7			
8 DIRECT SCHEDULED (FUC 10)	11 42				620	467	301	356	210		121	661	107	29	49	865	
PROGRAMMED MAN-HOURS (THESE CATEGORIES OF WORK COMPETE WITH EACH OTHER FOR AVAILABLE MAN HOURS)																	
9 RECURRING MAINTENANCE (FUC 11)									618		374	86	342				
10 MINOR CONSTRUCTION (JOD JO) (FUC 13)		102	146	76	206	174	33	47				112					
11 MAINTENANCE AND REPAIR WORK ORDER (FUC 10)			87	72	72	46											
12 OPERATIONS AND SERVICES (FUC 19)		482	605	1340						510			56	609	498		
SUMMARY DATA																	
13 PROJECTED AVAILABLE DIRECT HOURS (item 6)	11 42	7 26	11 03	17 47	10 92	8 33	8 00	7 06	10 74	6 13	6 75	11 59	7 64	8 35	7 04	8 65	
14 TOTAL RESERVED AND PROGRAMMED HOURS (items 7-12)	11 42	605	855	1489	898	627	550	403	912	532	495	927	594	645	644	865	
15 DIFFERENCES	0	121	248	258	194	206	250	303	162	81	180	232	220	190	60	0	

AF FORM 919 MAY 78 PREVIOUS EDITION IS OBSOLETE

Fig K-6. AF Form 919, Inservice Work Plan Work Sheet [12:p.13-37]

BCE REAL PROPERTY MAINTENANCE REQUEST

Use to identify routine maintenance or repair requirements that do not meet the emergency criteria for a service call, or are not urgent in nature. Prepare and forward original and one copy to BCE for each facility on which work is requested.

TO: Base Civil Engineering	FROM: (Name, Grade, and Organization)	RETURN TO: (Office Symbol)
21ST CES	Louis Collachi, MSGT, 2SPS	SPOL

1. FACILITY NO. OR MFH STREET ADDRESS	2. PHONE NUMBER(S)
5050	2814

3. DESCRIPTION OF WORK REQUIREMENTS (A thorough description of maintenance requirement(s) will minimize the need for CE personnel to visit the job site to determine what work is requested and what tools, equipment, and materials are needed, thereby completing the work on the first attempt. Answer these questions: What? Where? How many? Type size? Color? Rate? Urgency? Time restrictions?)	FOR CE USE ONLY 9. DATE RECEIVED
Replace 24 S.F. OF LIGHT BLUE 12"X12" FLOOR TILE	11 SEPT 1978 10. ACTION JOB ORDER #A5659
IN Room 222	21 SEPT. 78
REPAIR WALL (SHEETROCK), HAS been damaged by	WORK ORDER NO. 15436
WATER IN ROOM 241. APPROX 150 SF.	
RELAMP 12 EA. OUTSIDE FLOODLIGHTS	JOB ORDER #A5660 21 Sept. 78
LOCK BINDING ON DOOR to Room 201	JOB ORDER #A5659 21 SEPT 78
DOOR WILL NOT SECURE PROPERLY, WEST	JOB ORDER #A5658 12 Sept. 78
END ENTRANCE.	(URGENT) DIN

4. DATE OF REQUEST	SIGNATURE OF REQUESTOR	
11 SEPT. 1978	Louis Collachi	
5. REVIEW ACTION BY CUSTOMER SERVICE	DATE: 11 SEPT. 78	SIGNATURE: P. Bentz
6. REVIEW ACTION BY CHIEF PRODUCTION CONTROL	DATE: 11 SEPT 78	SIGNATURE: Ed Hall
7. ASSIGNED FOR ACTION	A. FUNCTION/INDIVIDUAL: CS4 - BENTZ	B. ACTION REQUIRED: Cut WORK ORDER AND HAVE PLANNING CHECK ITEM # 2
8. CUSTOMER NOTIFIED	DATE: 12 SEPT. 78	SIGNATURE: P. Bentz

AF FORM MAY 78 1135 PREVIOUS EDITION IS OBSOLETE.

Fig K-7. AF Form 1135, BCE Real Property Maintenance Request
[12:p.3-3]

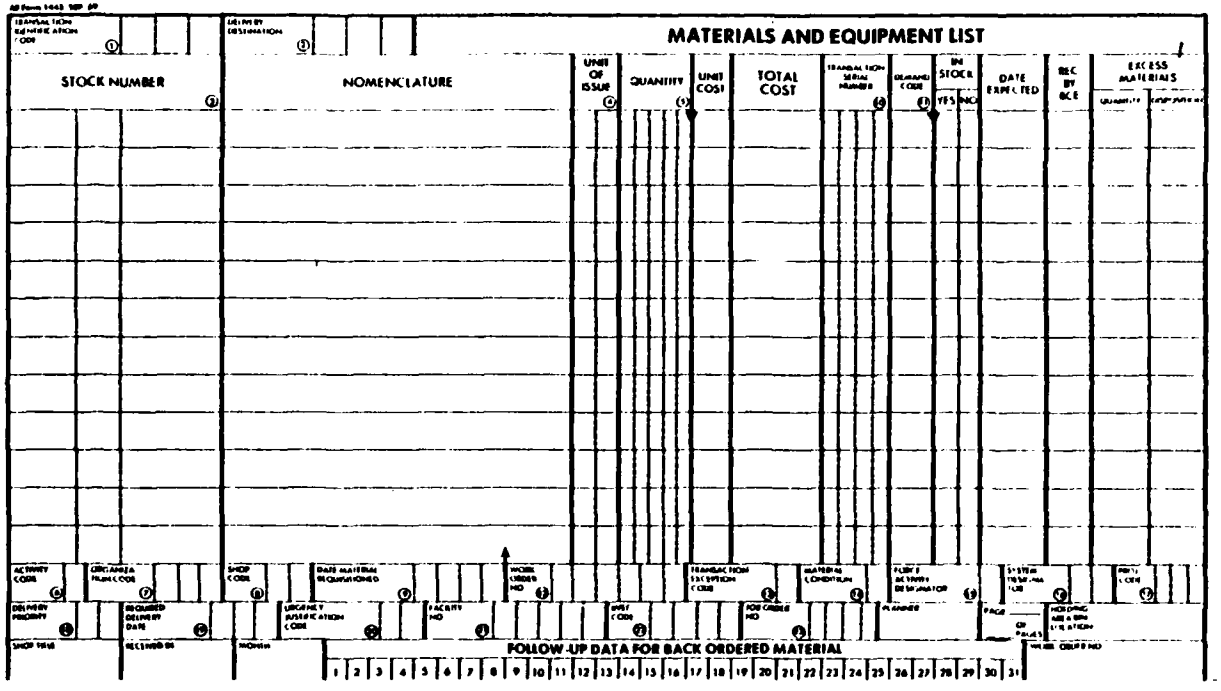


Fig K-8. AF Form 1445, Material and Equipment List

BCE MULTI-CRAFT JOB ORDER

JOB ORDER NO: D-5892

COST CENTER	COLLECTION WORK ORDER NO	FACILITY NO.	DATE PREPARED
457 SMART	00108	252	5 SEPT 78

NAME OF INSPECTOR	USING AGENCY	INDIVIDUAL TO CONTACT (Name & Phone No.)
N. Sims	3rd FMS	M. MILLER, 2492

WORK DESCRIPTION	LOCATION	MATERIALS ITEM	MATERIALS QNTY	MATERIALS U/M	M/HR. EST.	CRAFT	INCOMPLETE WORK
REPL. SAFETY STRIP	NORTH STAIRWELL	6" x 24" SAFE "T" STRIP	4	EA	1	CARP	
REPL. TORN WINDOW SCREEN	1ST FLOOR LATRINE	SCREEN	3	FT	½	CARP	
REPL. FLOOR TILE	1ST & 3RD FLOOR HALL	12" x 12" TILE, BLUE	120	EA	16	CARP	
REPL SIDING	EXTERIOR NORTH WALL	Autum Brown 1' x 2'	48	EA	6	CARP	
REPL. DRYER RECEPTACLE	LAUNDRY Room		1	EA	.5	Elect	
REPL EXIT LIGHT FIXT.	2ND FLOOR South END		1	EA	.5	Elect	
PAINT WALLS	Rooms 101, 102, AND 105	LATEX OFF-WHITE	2	BAL	3	PAINT	

AF FORM MAY 78 1219 PREVIOUS EDITION IS OBSOLETE

Fig K-9. AF Form 1219, BCE Multi-Craft Job Order [12:p.6-7]

WORK DESCRIPTION	LOCATION	MATERIALS			M/HR EST	CRAFT	INCOMPLETE WORK
		ITEM	QNTY	U/M			

TOTAL ESTIMATED MAN HOURS	CARP.	PLUMB.	ELEC	PAINT.	OTHER				TOTAL	TOTAL ACT HRS
	23.5		1	3					27.5	

REMARKS:

SIGNATURE OF INSPECTOR: Neal Sims

DATE ASSIGNED	AUTHORIZING SIGNATURE
10 SEPT 1978	Burl Farrar
DATE COMPLETED	SUPERVISORS SIGNATURE

Fig K-9. AF Form 1219, BCE Multi-Craft Job Order (cont.)
[12:p.6-8]

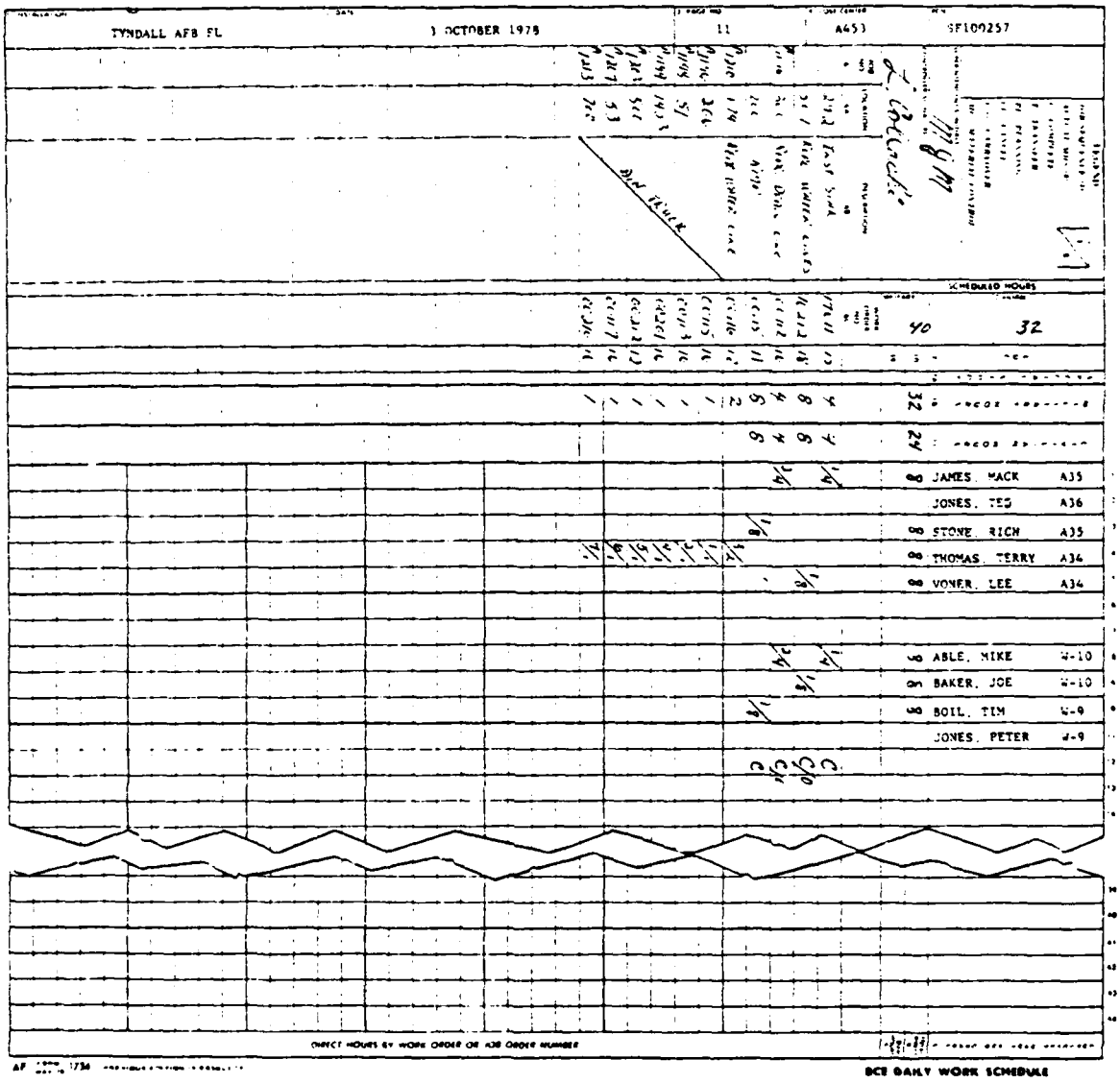


Fig K-10. AF Form 1734, BCE Daily Work Schedule (front side) [12:p.14-8]

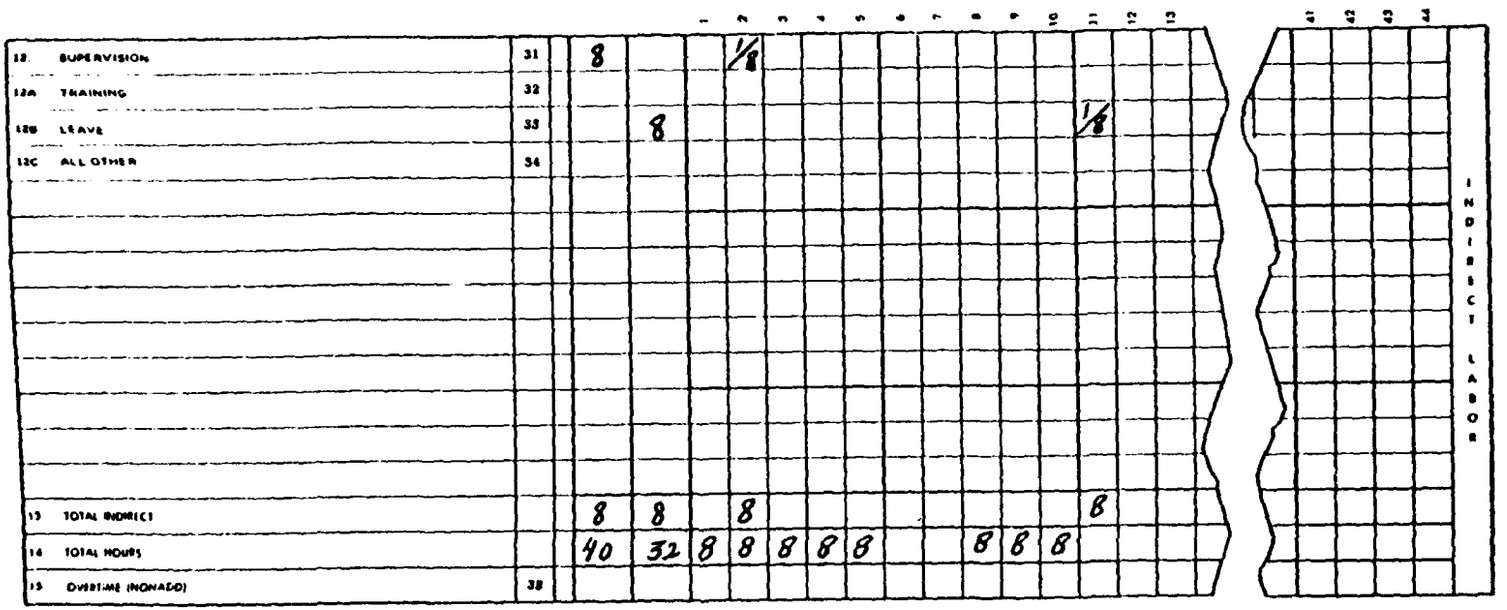


Fig K-11. AF Form 1734, BCE Daily Work Schedule (reverse side) [12:p.14-9]

MAINTENANCE ACTION SHEET	COST CENTER 461	DESCRIPTION ICE FLAKER		MAS NUMBER 017		
REQUIRED MAINTENANCE ACTIONS		REFERENCE	STANDARD HOURS	FREQ.	CREW SIZE	HEAVY EQP
1. Check parts for adequate lubrication. Lubricate when necessary		MFG. CAT.	0.5	W	1	2
2. Clean water freezing system.		MFG. CAT	2.0	M	1	2
3. Inspect evaporator drum for presence of scale and alignment. Clean and adjust as necessary.						
4. Measure clearance between ice cutter or remover blades and evaporator drum. Adjust as necessary.						
5. Measure clearance of scraper blade and evaporator drum of rotating-drum ice flaking machines. Adjust as necessary.						
DATE 2 Oct. 78	MCP INITIALS JBJ	DATE 3 Oct. 78	SUPERINTENDENTS INITIALS PB			

AF FORM 1841

Fig K-12. AF Form 1841, Maintenance Action Sheet [12:p.10-67]

MAS CONTINUATION (Additional Required Maintenance Actions)								
FACILITY NUMBER	EQUIPMENT NUMBER	DATE OF ACCOMPLISH-MENT	ACTUAL MAN-HOURS	DESCRIPTION OF TASK	CRAFTSMANS INITIALS	RECOMMENDATIONS (Add to required maintenance actions)		
						YES	NO	AS REQD.
				THIS SIDE OF THE M.A.S. IS				
				USED TO IDENTIFY ADDITIONAL				
				MAINTENANCE REQUIREMENTS				
				FOUND DURING THE SCHEDULED				
				VISIT.				

Fig K-12. AF Form 1841, Maintenance Action Sheet (cont.) [12:p.10-7]

255 FACILITY NO.	3rd SPS OPERATIONS ACTIVITY OR STREET ADDRESS	781024 DATE	0805 TIME	D1441 JOB ORDER NO.
NAME AND GRADE OF REQUESTOR J CARUSO, CMS		PHONE NO./ALTERNATE 3558/2692	COLLECTION WORK ORDER NO. 00058	

SERVICE REQUIRED

REPAIR SIDING. Approx 4 pieces NEED TO BE REPLACED

ZONE NO.	TYPE OF SERVICE			
8		EMERGENCY		SMART
		URGENT		MFH
	✓	ROUTINE		MC

ESTIMATED COMPLETION DATE: 781106

INDICATE WHEN WORK IS TO BE ACCOMPLISHED

CREW SIZE: 1

EST TOTAL TIME:

AREA/FACILITY WHERE JOB IS LOCATED: NORTHEAST SIDE OF Bldg.

REMARKS (Tools, equip, materials, special craftsman multi shop notes, etc.)

DANGEROUS CONDITIONS EXISTING (if any)

RESTRICTIONS (time, entry, security)

MAKE OF EQUIPMENT	TYPE/SIZE OF ITEM	COLOR OF ITEM
EXTERIOR SIDING		Autum GREEN

ASSIGNED TO: 451	DATE: 6 NOV	TIME: 1900	COMPLETED BY: GIANDOLF.	DATE: 6 NOV	TIME: 1100	INITIALS: LBC	LUC 17	LUC: 16
REFERRED TO	DATE	TIME	COMPLETED BY	DATE	TIME	INITIALS	LUC 12	LUC
DEFERRED TO	DATE	TIME	DISPOSITION		AUTHORIZED: Virgil Barnett			

AF FORM MAY 78 1879 PREVIOUS EDITION IS OBSOLETE.

BCE JOB ORDER RECORD

Fig K-13. AF Form 1879, BCE Job Order Record [12:p.6-67]

1 COMPONENT	FY 19 78 MILITARY CONSTRUCTION PROJECT DATA	2 DATE
AF (SAC)		15 Jun 1978

3 INSTALLATION AND LOCATION	4 PROJECT TITLE
MATHER AIR FORCE BASE, CALIFORNIA	ADDITION TO AND ALTER OFFICERS OPEN MESS

5 PROGRAM ELEMENT	6 CATEGORY CODE	7 PROJECT NUMBER	8 PROJECT COST ($000)
85794	740-618	78-5008(R-2) (NAF)	477.4 38.2 (AE DESIGN)

9 COST ESTIMATES

ITEM	U/M	QUANTITY	UNIT COST	COST ($000)
Addition to and Alter Officers Open Mess	LS	-	-	307.0
Addition	SF	3,877	68.55	(265.7)
Alteration	SF	3,100	13.30	(41.3)
Supporting Facilities				147.7
Demolition	LS			(9.8)
Site Improvement	LS			(8.0)
Roads, Parking & Walks	LS			(55.4)
Fire Protection (Sprinklers)	SF	28,997	2.60	(74.5)
Subtotal				454.7
Contingency (5%)				22.7
Total Funded Costs				477.4
Unfunded Costs (Incl. A-E Design)				50.0
Total Request				527.4
Excluded Costs			(non add)	(275.6)

10 DESCRIPTION OF PROPOSED CONSTRUCTION

ADDITION: Demolition of existing portion of building and construction of new west wing including concrete floor slab, masonry walls, built-up roof on metal deck, all mechanical, electrical, structural and fire protection systems to provide a completely useable facility.
ALTERATION: Partitions, finishes, electrical, mechanical, and fire protection systems necessary to provide a safe, economical, and functionally adequate facility.
AREA INCLUDES: Dining/meeting rooms, ballroom, lounge, lobby, kitchen, storage areas, administrative space, mechanical equipment rooms, restrooms, all utilitities and other necssary support items.
Air Conditioning - 14 tons.

11. REQUIREMENT: 36,000 SF ADEQUATE: 0 SF SUBSTANDARD: 37,262 SF
(Following the Guidelines in Chapter 4)

DD FORM 1 DEC 76 1391 — PREVIOUS EDITIONS MAY BE USED INTERNALLY UNTIL EXHAUSTED — PAGE NO

Fig K-14. DD Form 1391 [11:p.11-16]

WORK REQUEST/ WORK ORDER NUMBER	DESCRIPTION	FACILITY NUMBER	DATE RECEIVED	PLANNING		ENGINEERING & ENVMTL PLANNING		MATERIAL CONTROL		REMARKS
				TO	FROM	TO	FROM	TO	FROM	

THIS IS A SAMPLE OF THE LOCALLY DEVELOPED WORK REQUEST/WORK ORDER REGISTER. THE PURPOSE OF THE REGISTER IS TO CONTROL THE WORK REQUEST AND WORK ORDER NUMBERS. THE LEVEL OF DETAIL USED ON THE REGISTER IS DETERMINED LOCALLY.

GENERAL PURPOSE FORM

Fig K-15. Work Request/Work Order Register [12:p.4-4]

(Organizational Letterhead)

Civil Engineering

Warranty or Guarantee Evaluation

Procurement Officer

1. An evaluation of the warranty/guarantee on an item of RPIE/EAID/Real Property was conducted by Base Civil Engineering on the above date. As a result of this evaluation it was determined the warranty/guarantee (is) (is not) of value.

2. A complete description of the item follows:

a. Type _____ Manufacturer _____

b. Model _____ Serial No. _____ Style _____

Voltage _____ Cycles _____ Horsepower _____

Size _____ Frame _____ Other _____

c. Purchase Order No. _____ GSA Contract No. _____

d. Item Cost _____ Replacement Cost _____

e. Warranty/Guarantee Expiration Date _____

f. Replacement _____ New Installation _____

Location _____

3. Listed below are the names of personnel who conducted the evaluations:

a. _____

Name Grade Title Orgn.

b. _____

Name Grade Title Orgn.

c. _____

Name Grade Title Orgn.

d. _____

Name Grade Title Orgn.

(Signature Element of Chief of Operations)

Fig K-16. Warranty/Guarantee Evaluation Letter [12:p.16-37]

MAN-HOUR SHEET 1ST FUTURE MONTH (_____)

OPERATIONS SHOP _____

1. Number of Personnel Assigned _____
   Number of Personnel Gains (+) _____
   Number of Personnel Losses (−) _____

2. Estimated Indirect Hours
   Training _____
   Leave _____
   Supervision _____
   Other (specify) _____ Comment: _____

TOTAL ESTIMATED INDIRECT _____ (Man-hours)

Fig K-17. Shop Supervisor Man-Hour Projection
[12:p.13-4]

APPENDIX L

SAMPLE BEAMS PRODUCTS

PREPARED 77 MAR 17 13:25 RECURRING MAINTENANCE SCHEDULE AS OF 73 OCT 27 RCN SF100-331

PART I - CURRENT WEEK (WEEK OF OCT 27 THRU NOV 02)

INSTALLATION: GUNTER AFS CONTROL CENTER: A COMMAND: AUN

FACILITY NR	SUF	FREQ-DATE PERFORMED	INST	COST CNTR	EQUIPMENT TYPE	EQUIPMENT NR	MAS NR	DESCRIPTION	LOCATION	CRIT	STAND HOURS	CREW SIZE	HVY EQP	WORK ORDER	WARRANTY EXP-DT I	ZERO-HOURS/ OVERDUE
00112		M-731002	JUBJ	453	0001	0001	001	AIR COMPRESSOR	NORTH SIDE BY DOOR	YES	2.0	1		00106		2-ZERO-HOURS
00112		M-731020	JUBJ	453	0001	0007	001	AIR COMPRESSOR	NORTH SIDE BY DOOR	YES	1.0	1		00106		
00112		M-731021	JUBJ	453	0001	0008	001	AIR COMPRESSOR	NORTH SIDE BY DOOR		1.0	1		00106		
00112		M-731022	JUBJ	453	0001	0009	001	AIR COMPRESSOR	NORTH SIDE BY DOOR	YES	1.0	1		00106		
00112		M-730923	JUBJ	453	0001	0010	001	AIR COMPRESSOR	NORTH SIDE BY DOOR		2.0	1		00106		OVERDUE
00112		M-731024	JUBJ	453	0001	0011	001	AIR COMPRESSOR	NORTH SIDE BY DOOR	YES	1.0	1		00106		
00112		M-731025	JUBJ	453	0001	0012	001	AIR COMPRESSOR	NORTH SIDE BY DOOR		1.0	1		00106		
00112		M-731026	JUBJ	453	0001	0013	001	AIR COMPRESSOR	NORTH SIDE BY DOOR	YES	1.0	1		00106		
00112		M-730927	JUBJ	453	0001	0014	001	AIR COMPRESSOR	NORTH SIDE BY DOOR		2.0	1		00106		
00112		M-730928	JUBJ	453	0001	0015	001	AIR COMPRESSOR	NORTH SIDE BY DOOR	YES	2.0	1		00106		
00112		M-731001	JUBJ	453	0001	0016	001	AIR COMPRESSOR	NORTH SIDE BY DOOR		2.0	1		00106		
00112		M-731023	JUBJ	453	0001	0017	001	AIR COMPRESSOR	NORTH SIDE BY DOOR	YES	1.0	1		00106		
00112		M-731024	JUBJ	453	0001	0018	001	AIR COMPRESSOR	NORTH SIDE BY DOOR		1.0	1		00106		
00112		M-731018	JUBJ	453	0001	0019	001	AIR COMPRESSOR	NORTH SIDE BY DOOR	YES	1.0	1		00106	AWAITING*CORRECTED*CWR	
00112		M-731019	JUBJ	453	0001	0020	001	AIR COMPRESSOR	NORTH SIDE BY DOOR		1.0	1		00106	AWAITING*CORRECTED*CWR	
00112		M-730920	JUBJ	453	0001	0021	001	AIR COMPRESSOR	NORTH SIDE BY DOOR	YES	2.0	1		00106	AWAITING*CORRECTED*CWR	
00112		M-730921	JUBJ	453	0001	0022	001	AIR COMPRESSOR	NORTH SIDE BY DOOR		2.0	1		00106	AWAITING*CORRECTED*CWR	
00112		M-730922	JUBJ	453	0001	0023	001	AIR COMPRESSOR	NORTH SIDE BY DOOR	YES	2.0	1		00106		OVERDUE
00112		M-731023	JUBJ	453	0001	0024	001	AIR COMPRESSOR	NORTH SIDE BY DOOR		1.0	1		00106		
00112		M-731024	JUBJ	453	0001	0025	001	AIR COMPRESSOR	NORTH SIDE BY DOOR	YES	1.0	1		00106		
00112		M-731025	JUBJ	453	0001	0026	001	AIR COMPRESSOR	NORTH SIDE BY DOOR		1.0	1		00106		
00112		M-731026	JUBJ	453	0001	0027	001	AIR COMPRESSOR	NORTH SIDE BY DOOR	YES	1.0	1		00106		
00112		M-730927	JUBJ	453	0001	0028	001	AIR COMPRESSOR	NORTH SIDE BY DOOR		2.0	1		00106		
00112		M-730928	JUBJ	453	0001	0029	001	AIR COMPRESSOR	NORTH SIDE BY DOOR	YES	2.0	1		00106		
00112		M-731001	JUBJ	453	0001	0030	001	AIR COMPRESSOR	NORTH SIDE BY DOOR		2.0	1		00106		
00112		M-731001	JUBJ	453	0001	0031	001	AIR COMPRESSOR	NORTH SIDE BY DOOR	YES	2.0	1		00106		
00112		M-731002	JUBJ	453	0001	0032	001	AIR COMPRESSOR	NORTH SIDE BY DOOR		2.0	1		00106		
00112		M-731024	JUBJ	453	0001	0033	001	AIR COMPRESSOR	NORTH SIDE BY DOOR	YES	1.0	1		00106		
00112		M-731025	JUBJ	453	0001	0034	001	AIR COMPRESSOR	NORTH SIDE BY DOOR		1.0	1		00106		
00112		M-731026	JUBJ	453	0001	0035	001	AIR COMPRESSOR	NORTH SIDE BY DOOR	YES	1.0	1		00106		
00112		M-731020	JUBJ	453	0001	0036	001	AIR COMPRESSOR	NORTH SIDE BY DOOR		1.0	1		00106		
00112		M-731021	JUBJ	453	0001	0037	001	AIR COMPRESSOR	NORTH SIDE BY DOOR	YES	1.0	1		00106		
00112		M-731022	JUBJ	453	0001	0038	001	AIR COMPRESSOR	NORTH SIDE BY DOOR		1.0	1		00106		
00112		M-731023	JUBJ	453	0001	0039	001	AIR COMPRESSOR	NORTH SIDE BY DOOR	YES	1.0	1		00106		
00112		M-731015	JUBJ	453	0001	0051	001	AIR COMPRESSOR	NORTH SIDE BY DOOR		1.0	1		00106		OVERDUE
00112		M-730928	JUBJ	453	0123	0002	001	AIR COMPRESSOR	EAST END BLDG		2.5	1		00106		
00112		M-730928	JUBJ	453	0123	0003	001	AIR COMPRESSOR	EAST END BLDGG	YES	2.5	1		00106		
00112		M-730928	JUBJ	453	0123	0004	001	AIR COMPRESSOR	SO SIDE BLDG		2.5	1		00106		
*****		49.5 TOTAL STANDARD HOURS FOR FACILITY: 00112														
*****		49.5 TOTAL STANDARD HOURS FOR COST CENTER 453 TOTAL ITEMS = 34														

Fig L-1. Recurring Maintenance Schedule, Part I [9:p.20-55]

PREPARED 77 MAR 01 13:32 RECURRING MAINTENANCE SCHEDULE AS OF 77 OCT 27 PCN 58100-131

PART II - NEXT WEEK WEEK OF NOV 27 THRU 3 NOV 077

INSTALLATION: CENTER AFS COST CENTER: A COMMAND: ADN

FACILITY NR	SUF	REQ-DATE PERFORMED	INST	COST CNTR	EQUIPMENT TYPE	EQUIPMENT NR	MAS NR	DESCRIPTION	LOCATION	UNIT	STAND HOURS	CREW SIZE	DWY EQP	WORK ORDER	WARRANTY EXP-DT I	Z-RU-HOURS/ OVERDUE
00112		M-731023	JUBJ	453	0001	0001	001	AIR COMPRESSOR	NORTH SIDE BY DOOR	YES	1.0	1		00106		
00112		M-731025	JUBJ	453	0001	0017	001	AIR COMPRESSOR	NORTH SIDE BY DOOR	YES	1.0	1		00106		
00112		M-731024	JUBJ	453	0001	0018	001	AIR COMPRESSOR	NORTH SIDE BY DOOR		1.0	1		00106		
00112		M-731025	JUBJ	453	0001	0019	001	AIR COMPRESSOR	NORTH SIDE BY DOOR	YES	1.0	1		00106		
00112		M-731026	JUBJ	453	0001	0020	001	AIR COMPRESSOR	NORTH SIDE BY DOOR		1.0	1		00106		
00112		M-731020	JUBJ	453	0001	0021	001	AIR COMPRESSOR	NORTH SIDE BY DOOR	YES	1.0	1		00106		
00112		M-731021	JUBJ	453	0001	0022	001	AIR COMPRESSOR	NORTH SIDE BY DOOR		1.0	1		00106		
00112		M-731022	JUBJ	453	0001	0023	001	AIR COMPRESSOR	NORTH SIDE BY DOOR	YES	1.0	1		00106		
00112		M-731023	JUBJ	453	0001	0024	001	AIR COMPRESSOR	NORTH SIDE BY DOOR		1.0	1		00106		
00112		M-731024	JUBJ	453	0001	0025	001	AIR COMPRESSOR	NORTH SIDE BY DOOR	YES	1.0	1		00106		
00112		M-731025	JUBJ	453	0001	0026	001	AIR COMPRESSOR	NORTH SIDE BY DOOR		1.0	1		00106		
00112		M-731026	JUBJ	453	0001	0027	001	AIR COMPRESSOR	NORTH SIDE BY DOOR	YES	1.0	1		00106		
00112		M-731025	JUBJ	453	0001	0028	001	AIR COMPRESSOR	NORTH SIDE BY DOOR		1.0	1		00106		
00112		M-731026	JUBJ	453	0001	0029	001	AIR COMPRESSOR	NORTH SIDE BY DOOR	YES	1.0	1		00106		
00112		M-731022	JUBJ	453	0001	0030	001	AIR COMPRESSOR	NORTH SIDE BY DOOR		1.0	1		00106		
00112		M-731022	JUBJ	453	0001	0031	001	AIR COMPRESSOR	NORTH SIDE BY DOOR	YES	1.0	1		00106		
00112		M-731023	JUBJ	453	0001	0032	001	AIR COMPRESSOR	NORTH SIDE BY DOOR		1.0	1		00106		
00112		M-731003	JUBJ	453	0001	0033	001	AIR COMPRESSOR	NORTH SIDE BY DOOR	YES	2.0	1		00106		
00112		M-731004	JUBJ	453	0001	0034	001	AIR COMPRESSOR	NORTH SIDE BY DOOR		2.0	1		00106		
00112		M-731005	JUBJ	453	0001	0035	001	AIR COMPRESSOR	NORTH SIDE BY DOOR	YES	2.0	1		00106		
00112		M-731006	JUBJ	453	0001	0036	001	AIR COMPRESSOR	NORTH SIDE BY DOOR		2.0	1		00106		
00112		M-731007	JUBJ	453	0001	0037	001	AIR COMPRESSOR	NORTH SIDE BY DOOR	YES	2.0	1		00106		
00112		M-731008	JUBJ	453	0001	0038	001	AIR COMPRESSOR	NORTH SIDE BY DOOR		2.0	1		00106		
00112		M-731009	JUBJ	453	0001	0039	001	AIR COMPRESSOR	NORTH SIDE BY DOOR	YES	2.0	1		00106		
00112		M-731003	JUBJ	453	0002	0005	001	AIR COMPRESSOR	SU SIDE BLDG	YES	2.5	1		00106		
00112		M-731005	JUBJ	453	0002	0006	001	AIR COMPRESSOR	SU SIDE BLDG		2.5	1		00106		
*****		36.0 TOTAL STANDARD HOURS FOR FACILITY: 00112														
01411		M-731020	JUBJ	453	0169	0043	003	SUMP PUMP	NO END BLDG	YES	2.0	1		00116		
01411		M-731020	JUBJ	453	0169	0044	003	SUMP PUMP	NO END BLDG	YES	2.0	1		00116		
01411		M-731020	JUBJ	453	0169	0044	003	SUMP PUMP	NO END BLDG		2.0	1		00116		
01411		M-731020	JUBJ	453	0169	0045	003	SUMP PUMP	NO END BLDG	YES	2.0	1		00116		
01411		M-731020	JUBJ	453	0169	0046	003	SUMP PUMP	NO END BLDG		2.0	1		00116		
01411		M-731020	JUBJ	453	0169	0047	003	SUMP PUMP	NO END BLDG		2.0	1		00116		
*****		12.0 TOTAL STANDARD HOURS FOR FACILITY: 01411														
*****		48.0 TOTAL STANDARD HOURS FOR COST CENTER 453 TOTAL ITEMS =														

Fig L-2. Recurring Maintenance Schedule, Part II [9:p.20-56]

PREPARED 77 DEC 7 12:46 BCE MONTHLY IN-SERVICE WORK PLAN REPORT AS OF 77 NOV 30 PCN SF100-252

INSTALLATION: DOME AFB COST CENTER: A 451 - STRUCTURAL CMD BAC

WORK CATEGORY LOC	DESCRIPTION	CURRENT MONTH HRS EST.	ACT.	FACTORS % EST	% DIR	CURRENT QUARTERS HRS EST.	ACT.	FACTORS % EST	% DIR	YEAR TO DATE HRS EST.	ACT.	FACTORS % EST	% DIR
11	RECURRING MAINT	54.0	30.0	55.5	.9	121.0	52.0	42.9	.9	121.0	52.0	42.9	.9
12	EMERGENCY JOB ORDERS	112.0	106.0	94.6	3.1	206.0	241.0	116.9	4.1	206.0	241.0	116.9	4.1
15	MC WORK - J/O OR W/O	1,102.0	1,300.0	117.8	37.9	2,750.0	2,750.0	118.9	46.8	2,311.0	2,750.0	118.9	46.8
16	DIRECT SCHED WORK	1,340.0	1,659.0	123.8	48.4	2,415.0	2,120.0	87.8	36.1	2,415.0	2,120.0	87.8	36.1
18	OTHER WORK ORDERS	492.0	331.7	67.4	9.7	981.0	711.0	72.5	12.1	981.0	711.0	72.5	12.1
19	OPERATIONS & SERVICES	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	TOTAL DIRECT	3,100.0	3,426.7	110.5		6,034.0	5,874.0	97.3		6,034.0	5,874.0	97.3	
	TOTAL MC & % TO DIRECT		1,300.0		37.9		2,750.0		47.8		2,750.0		46.8
	INDIRECT	EST.	ACT.		% TOT	EST.	ACT		% TOT	EST.	ACT		% TOT
31	SUPERVISION	160.0	160.0		5.6	320.0	320.0		3.9	320.0	320.0		3.9
32	TRAINING	144.0	150.0		5.4	360.0	371.0		4.5	360.0	371.0		4.5
32	2PRIME BEEF TRAINING	98.0	110.0		2.5	200.0	180.0		2.2	200.0	180.0		2.2
33	LEAVE	520.0	485.0		10.9	1,250.0	1,175.0		14.5	1,250.0	1,175.0		14.5
34	ALL OTHER	115.0	109.0		2.4	260.0	240.0		2.9	260.0	240.0		2.9
	TOTAL INDIRECT	1,037.0	1,014.0		22.8	2,390.0	2,286.0		28.0	2,390.0	2,286.0		28.0
	TOTAL HOURS	4,137.0	4,440.7			8,424.0	8,160.0			8,424.0	8,160.0		
39	LOANED LABOR	0.0	150.0			0.0	750.0				750.0		
	AVAILABILITY RATE				77.2				72.0				72.0

Fig L-3. BCE Monthly Labor Analysis Report [2:12]

PREPARED 77 DEC 12 02:03 BCE WORK STOPPAGE REPORT PCN: SF100-354

INSTALLATION: HUME AFB CONTROL CENTER: A CMD: BAC

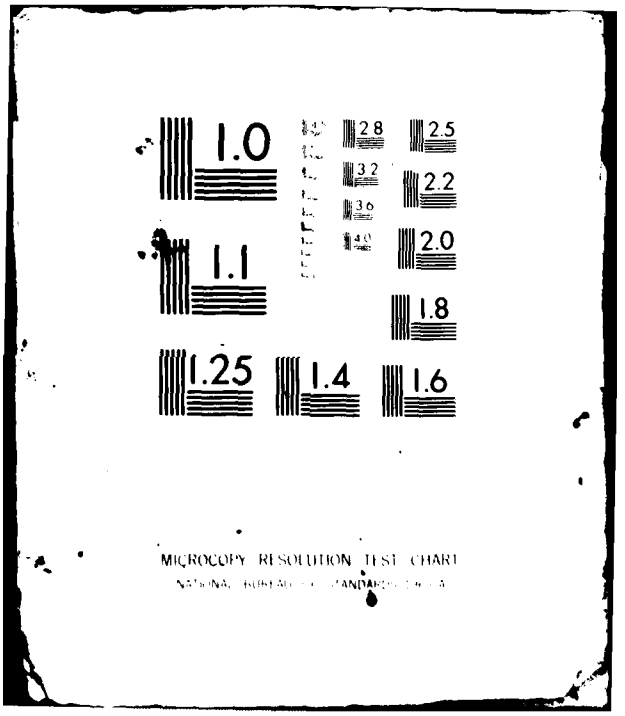
NO LABOR REPORTED FOR 10 CONSECUTIVE WORK DAYS

Locally Determined

W/O NUMBER	WK CLS	PRI	S-I CDE	WORK DESCRIPTION	ORG CDE	FACILITY NUMBER	ACT-ST DATE	DT LAST HRS RCVD	TOT-EST HOURS	TOT-ACT HOURS	% ACT TO EST
13421	M	3		RPR SOFT SUPPORT GRATES	900	92998	771120	771128	428.0	572.3	
15122	C	3		ALTER CMS AREA	302	00130	770919	771030	110.0	108.6	
15692	C	4		ALTER AMMO DOOR LOCKS	302	00446	770921	771127	221.0	26.0	
18542	R	3		REPAIR OVERHEAD DOOR-REIMB	610	03081	770701	770930	15.0	0.0	
18410	R	3	C	FURNISH CARPET - DCR	415		771011	771011	1.0	0.1	
18561	M	3	C	MAINT RPR OLD BX OFFICES	211	01080	771001	771016	164.0	17.0	
19461	C	2		MODIFY ELECTRICAL SYSTEM	210	01087	771110	771116	48.0	52.0	
19888	R	3	P	RESTRIPE PARKING LOTS	900	85222	991009	771028	40.0	63.0	
26002		1	D	DESIGN P-341 TXWY HOM 77-71	900	85010	770610				
26010		3	D	DESIGN PAINT-MFH HOM 74-86	900	MULTI	770617				
26019			D	SIOH-CONSTR MGT-WHERRY MCP	901	MULTI	761010				
28400	R	3	C	FURNISH CARPET-CBPO	610						

Fig L-4. Bce Work Stoppage Report [2:187]

AD-A109 881 AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OH SCHOOL--ETC F/G 5/2
THE PRESCRIBED INFORMATION SYSTEM OF PRODUCTION CONTROL UNITS I--ETC(U)
SEP 81 R A STROM
UNCLASSIFIED AFIT-LSSR-69-81 NL


1.0
1.1
1.25
2.8
3.2
3.6
4.0
2.5
2.2
2.0
1.8
1.4
1.6
MICROCOPY RESOLUTION TEST CHART

PREPARED 78 DEC 19 23:10 BCE COMPLETED WORK ORDER COST REPORT AS OF 78 DEC 20 PCN SF100-358

INSTALLATION: HOME AFB **FINAL** CONTROL CENTER: A CMD BAC

W/O NUMBER	WORK CLASS	COST ACCT	W/O IND	S-I CDE	WORK DESCRIPTION	FACILITY	INSTL CODE	CAP IND	ORG CODE	DATE OPEN	EST ST DATE	ACT ST DATE	EST CM DATE	ACT CM DATE
57562	R	51030	A		REPL MOTOR IN COND POST	01465	ABCD		900	770511	771110	771115	771120	771214

*** FUNDED COSTS ***

COST CENTER	LABOR HOURS	SHOP RATE COST	PROJECT CONT COST	SERVICES CONT COST	DIRECT MATL COST	OTHER COST	TOTAL FUNDED COST
461 EST	16.0	113.56	.00	.00	675.00	.00	788.56
ACT	8.0	55.40	.00	.00	703.00	.00	758.63
ZDIF	50.0-	51.20-	.00	.00	4.10	.00	3.70-
421 EST	9.0	57.92	.00	.00	.00	.00	57.92
ACT	8.0	56.24	.00	.00	.00	.00	56.24
ZDIF	11.1-	2.90-	.00	.00	.00	.00	2.90-
TOTAL EST	25.0	171.48	.00	.00	675.00	.00	846.48
ACT	16.0	111.64	.00	.00	703.00	.00	814.48
ZDIF	36.0-	34.80-	.00	.00	4.10	.00	3.70-

*** MULTI-FACILITY ***

FACILITY SUFFIX	COST

*** UNFUNDED COST ***

TYPE COST	ESTIMATED	ACTUAL
NON-AF-EXCESS EQUIP/MATERIAL	.00	.00
PLANNING AND DESIGN	.00	.00
NON-APPROPRIATED FUND	.00	.00
VEH/EQUIP DEPRECIATION	.00	.00
MILITARY FACTOR	101.52	67.72
TOTAL	101.52	67.72
% DIFFERENCE		33.2-

*** TOTAL COST ****
(FUNDED & UNFUNDED)

ESTIMATED	948.00
ACTUAL	882.59

Fig L-5. BCE Completed Work Order Cost Report (2:267)

PREPARED 79 MAR 21 20:53 BCE WORK ORDER BACKLOG REPORT AS OF 79 MAR 19 PCN SF100-360

PART IB PROGRAMMED WORK ORDER BACKLOG SEQUENCED BY MONTH

INSTALLATION: HOME AFB CONTROL CENTER: A CMD: BAC

WORK ORDER	S-I COE	PRI	WK CL	FACILITY NUMBER	W/O INP	WORK DESCRIPTION / EST-HRS	TOT-HRS	EST-ST DATE	COST CTR	CUR-MO EST-HRS	CUR-MO ACT-HRS	AWAITING SUPPLIES NR-REQD	NR-DIT	DATE MATL	TRK IND	CC COMP
21100		2	M	01133	A	REPLACE WATER LINE K-9 SECTION		790330				0	0	790201		
						36.0	7.9		441	36.0	7.2	0	0	790201		
						26.0	14.0		453	26.0	14.0	0	0	790110		
*22098		1	M	99801	A	REPAIR AIRFIELD PARKING RAMP		790330				0	0	781010		
						305.0	193.0		441	200.0	193.0	0	0	780603		
						401.0	160.0		442	250.0	160.0	0	0	781010		
						72.0	.0		451	36.0	.0	0	0	780930		
70833	C	2	C	00000	A	PROJ PAVE-SAFE COMM-ELEC SCH		880315				1	1	000000	COM	
						150.0	192.0		441	.0	.0	0	0	781128		X
						100.0	141.2		442	.0	.0	0	0	781216		X
						82.0	60.6		453	.0	.0	1	1	000000		
73081	A	2	C	06699	A	CONVERT CLOSET TO LATRINE		790330				3	2	000000	MAT	
						21.0	.0		452	.0	.0	0	0	790111		
						42.0	16.2		453	.0	.0	3	2	000000		
				TOTAL						3693.5	3064.7					
						***** BEGIN APRIL BACKLOG *****										
*72096		2	M	99716	A	REPLACE LEADS ON TRANSFORMER		790415				0	0	790116	PCC	
						72.0	.0		477	36.0	.0	0	0	790116		
72099		4	R	00101	A	REPAIR WINDOWS AND SIDING		790415				6	6	000000	PLN	
						128.0	8.0		451	120.0	.0	6	6	000000		
						40.0	.0		452	40.0	.0	0	0	790116		

Fig L-6. BCE Work Order Backlog Report [2:22]

PREPARED 77 MAR 17 13:25 RECURRING MAINTENANCE RESERVED MANHOURS AS OF 73 OCT 27 PCN SF100-688

INSTALLATION: GUNTER AFS CONTROL CENTER: A COMMAND AUM

COST CENTER	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	TOT SCHED MAN-HOURS
451	5	6	0	0	0	0	0	0	5	5	6	5	32
452	5	6	0	0	0	0	0	0	10	10	11	10	52
453	133	157	125	143	120	143	5	28	180	211	189	211	1,651
454	5	6	0	0	0	0	0	0	5	5	6	5	32
461	3	3	0	0	0	32	32	36	35	35	39	3	216
463	63	81	51	58	55	51	58	55	14	36	19	56	576
499	3	3	0	0	0	0	0	0	3	3	3	3	16
CTL-CNTR TOTAL	216	242	176	201	175	226	95	119	258	304	272	292	2,575

Fig L-7. Recurring Maintenance Reserved Man-Hours [9:p.20-75]

APPENDIX M

ILLUSTRATIONS OF IWP WALL CHARTS

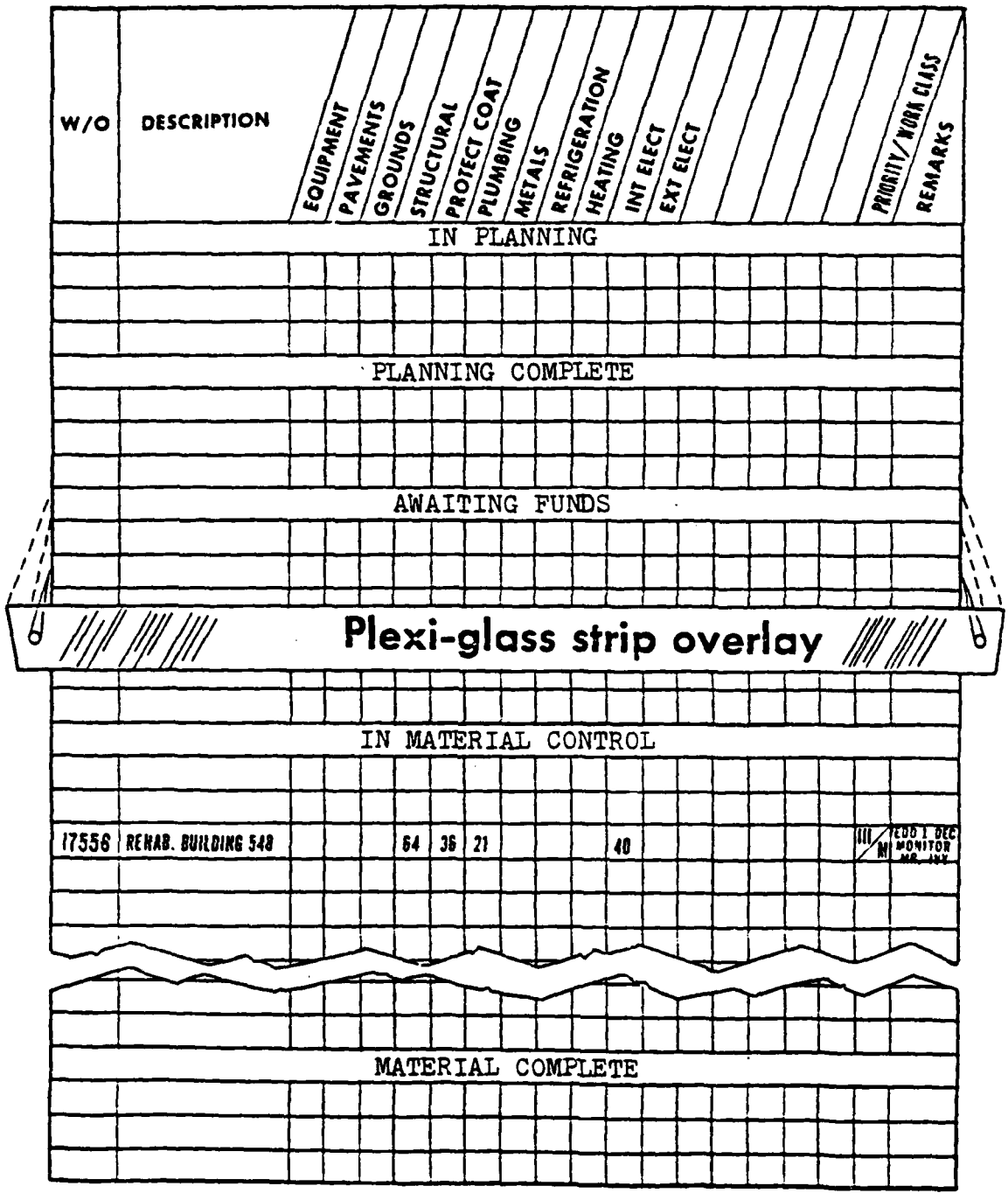


Fig M-1, IWP Wall Chart, Status Board

HEADER STRIP DETAIL

(CURRENT & FIRST FUTURE MONTH)

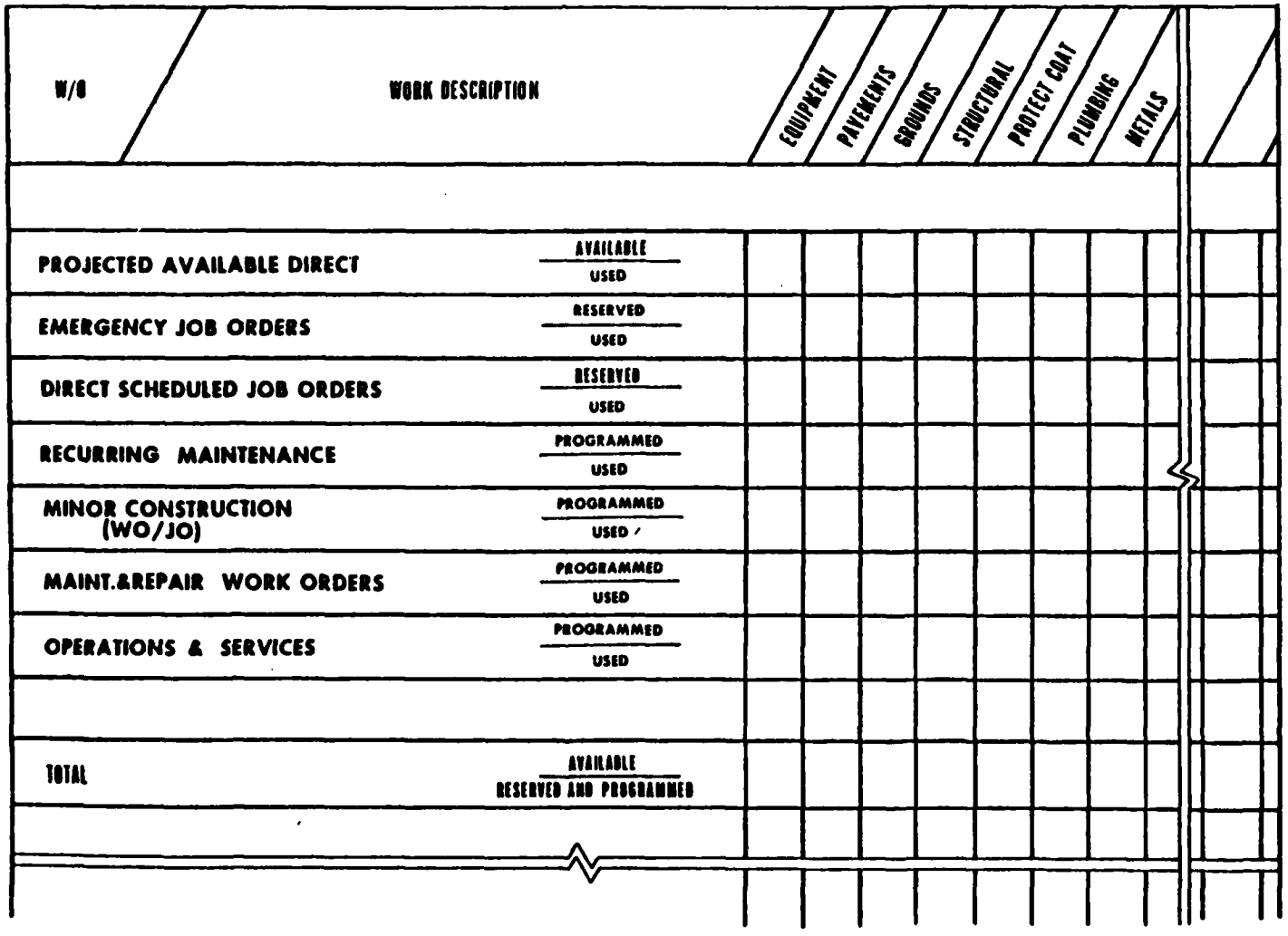


Fig M-2. IWP Wall Chart, Header Strip Detail [12:p.2-7]

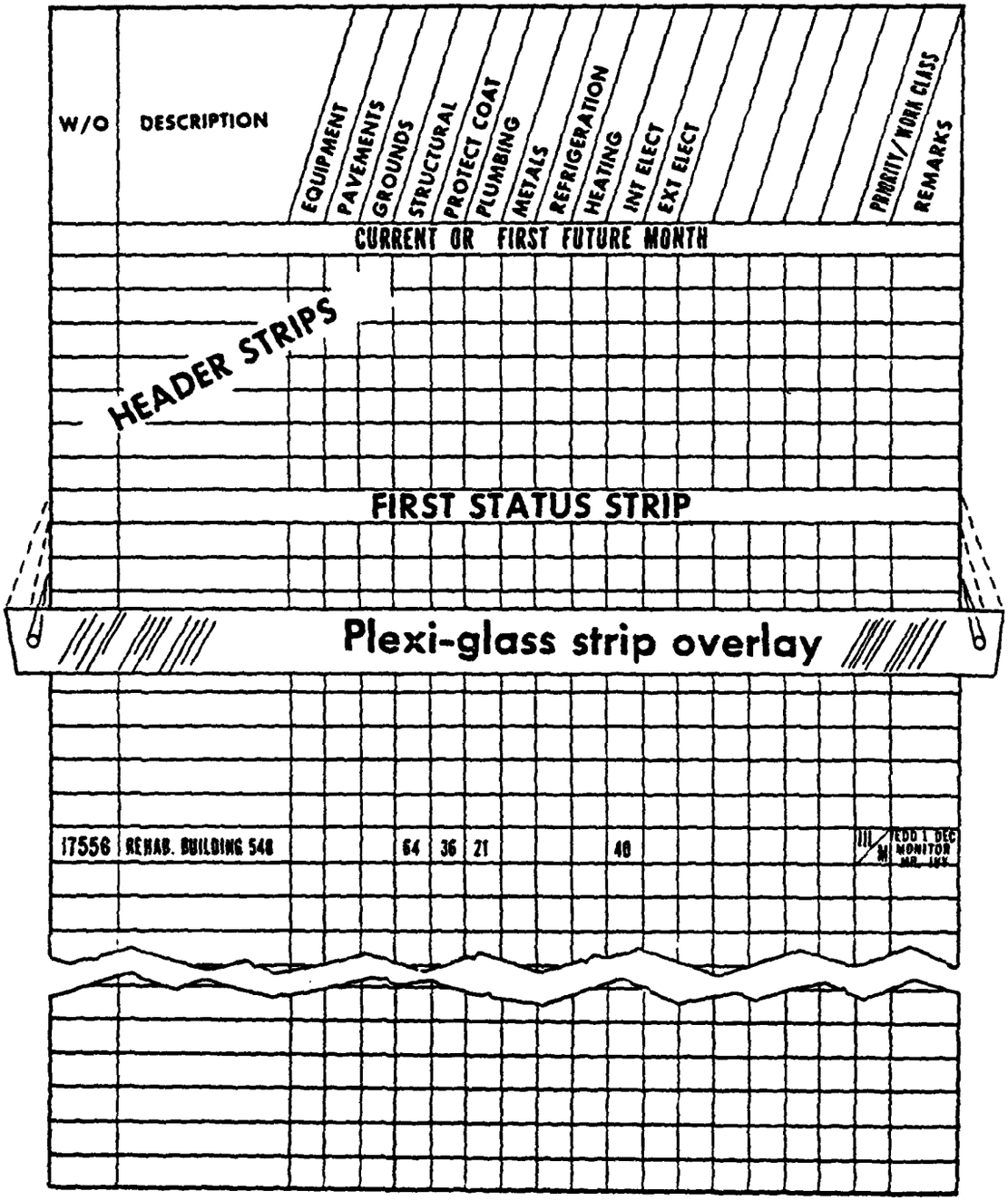


Fig M-3. IWP Wall Chart, Current or First Future Month
[12:p.2-8]

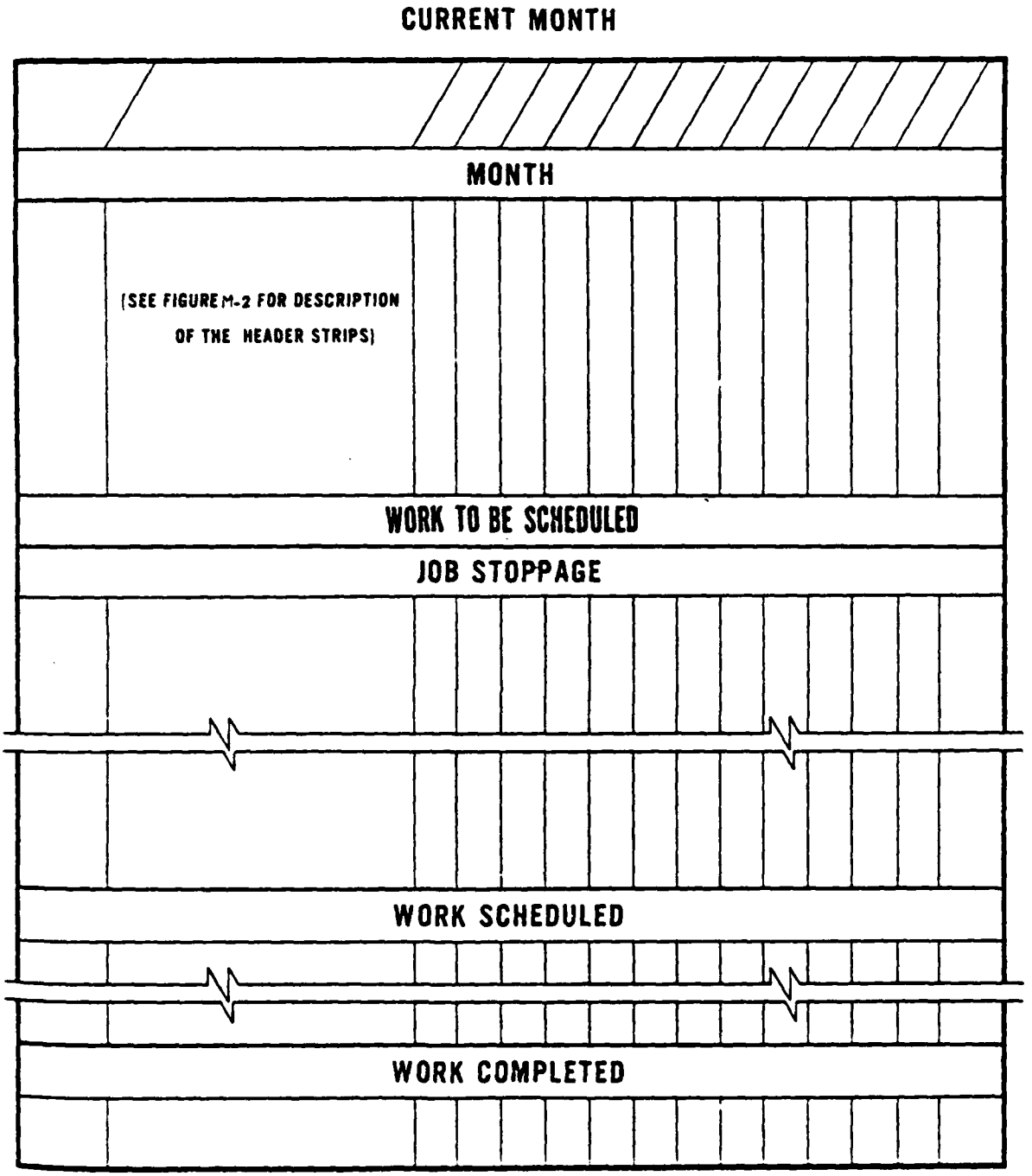


Fig M-4. IWP Wall Chart, Current Month with Status Divisions [12:p.2-9]

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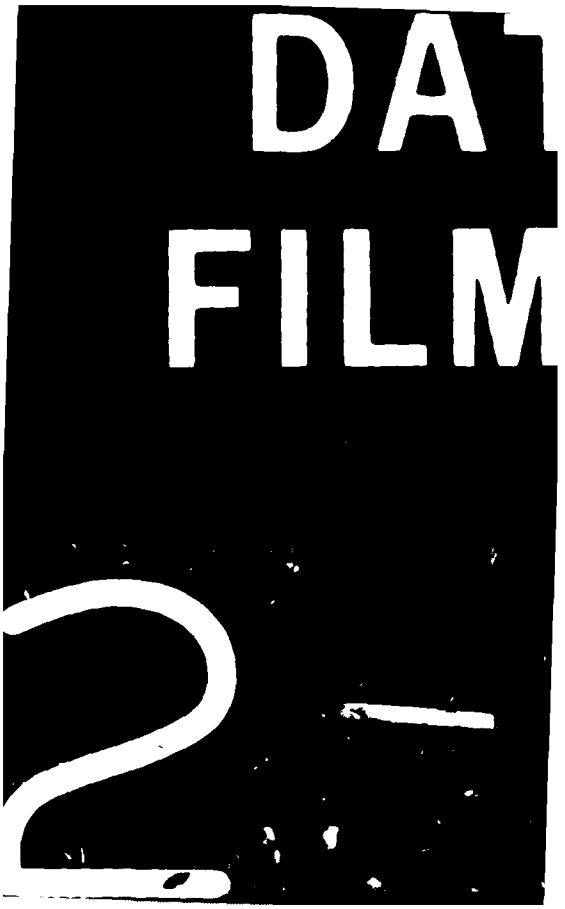
BIOGRAPHICAL SKETCH OF THE AUTHOR

First Lieutenant Randie A. Strom graduated from the United States Air Force Academy in May, 1978, with a Bachelor of Science Degree in Civil Engineering. He entered active duty immediately upon graduation and was assigned to the 379th Civil Engineering Squadron, Wurtsmith Air Force Base, Michigan. He served as a design engineer in the Engineering and Environment Planning Branch until June 1979, and then as Chief, Readiness and Logistics, until June 1980. Subsequent to graduation, he will be assigned to the Civil Engineering and Services Management Assistance Team at Headquarters, Strategic Air Command, Offutt Air Force Base, Nebraska. He and his wife, Jodi, have one daughter, Sara.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