

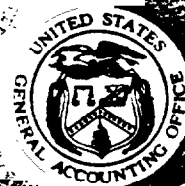
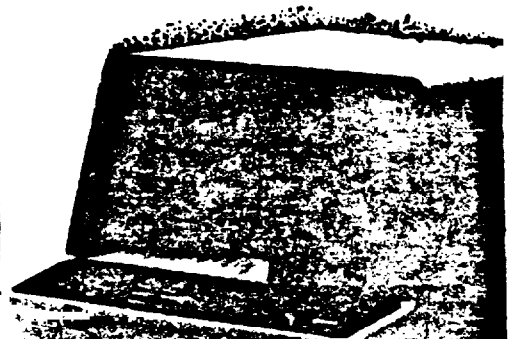
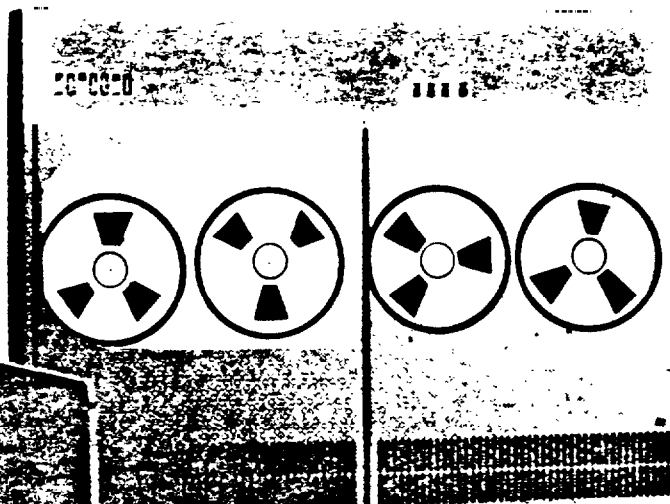
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GUIDE FOR EVALUATING AUTOMATED SYSTEMS

UNITED STATES GENERAL ACCOUNTING OFFICE

MARCH 1977



EXPOSURE DRAFT



UNITED STATES GENERAL ACCOUNTING OFFICE
WASHINGTON, D.C. 20548

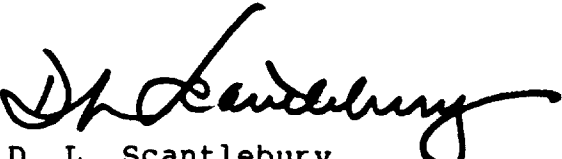
**DIVISION OF FINANCIAL AND
GENERAL MANAGEMENT STUDIES**

The Financial and General Management Studies Division prepared this audit guide for use on audits of automated or computerized systems. It should be used by the auditor once the decision has been made to review either an automated system or selected applications within a system.

The guide provides the auditor with a structured approach for evaluating the system from the initial gathering of background data and identification of controls, through analysis of system data flows and detailed conformance testing. It is designed to help the auditor identify systems problems and determine the related causes and effects which are necessary to support a finding. In other words, the guide contains detailed procedures for conducting a comprehensive review of an automated system or individual applications.

To review an automated system with this guide, or conduct a reliability assessment with a previously issued "Guide for Reliability Assessment of Controls in Computerized Systems (Financial Statement Audits)", the auditor must gather general background information and identify control points. For consistency in conducting this part of a review, we included identical background and control questionnaires in both guides.

Although this guide is being issued as an exposure draft, we encourage its use on any ADP system review. Your comments and suggested revisions should be forwarded to J. L. Boyd, Assistant Director, Financial and General Management Studies Division.


D. L. Scantlebury
Director

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INTRODUCTION

These guidelines were developed to provide the auditor with a structured approach for evaluating an automated or computerized system. This "system approach" places primary emphasis on determining the reliability of the automated system, including the information and reports it produces.

This guide contains audit procedures for reviewing a complete system including an evaluation of controls and detailed conformance testing. It differs from the previously issued draft, "Guide for Reliability Assessment of Controls in Computerized Systems (Financial Statement Audits)," which was designed to help the auditor make a brief survey at the beginning of a financial statement audit to determine the degrees and types of risks involved in relying on computer-processed information.

The following guidelines are discussed in the order that an auditor would normally follow in reviewing a system.

- Collect general system information to find out what the system does and generally how it works, and briefly evaluate data processing department controls.
- Review the system or part of the system (individual application) to evaluate the network of internal controls.

- Prepare a detailed data flow diagram to help evaluate documentation, document controls, computer program efficiency, and usefulness of output reports.
- Conduct detailed conformance tests. Methods of testing include evaluations of samples of agency records, computerized data retrieval and analysis, and test decks.

A brief overview of this "system approach" follows.

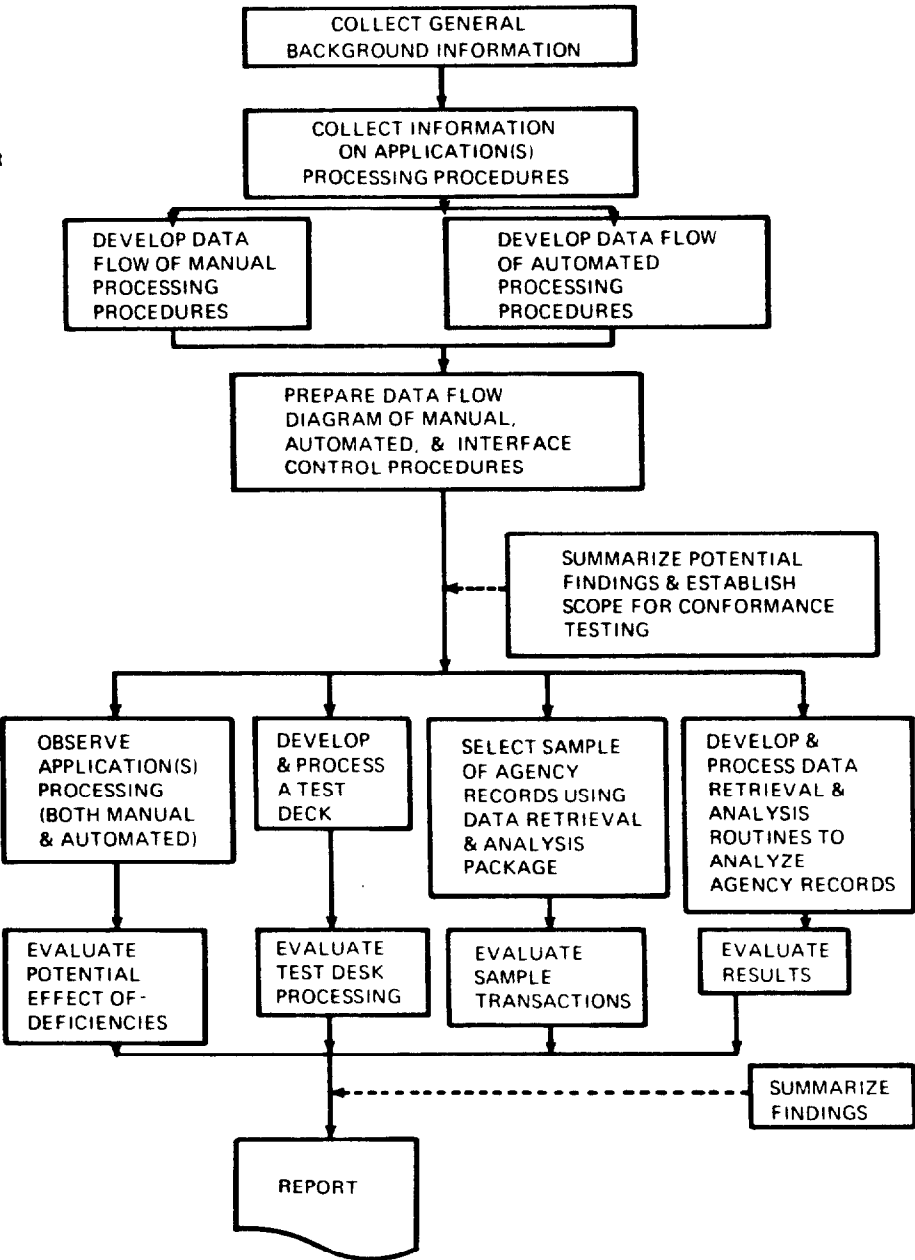
OVERVIEW OF A SYSTEMS APPROACH TO AUDITING
AN AUTOMATED SYSTEM

SECTION: I
GENERAL SYSTEM
INFORMATION

SECTION: II
REVIEW OF COMPUTER
APPLICATION(S)

SECTION: III
ANALYSIS OF DATA
FLOWS THROUGH
THE SYSTEM

SECTION: IV
DETAILED
CONFORMANCE
TESTING



SECTION I

GENERAL SYSTEM INFORMATION

BACKGROUND INFORMATION

The auditor should obtain an orientation and general understanding of the system being reviewed, including the data processing department where the system's computer programs are processed, so that he can plan a detailed audit. Reviewing agency documentation that provides a general description of the system and interviewing agency personnel should provide the necessary knowledge.

SYSTEMS APPROVAL

The accounting systems of all executive departments and agencies are subject to the Comptroller General's approval, with the exception of Government corporations subject to the Government Corporation Control Act (31 U.S.C. 841) and certain quasi-governmental entities that, by law, are subject to that act.

1. Determine if the system design has been approved by GAO where applicable. If not applicable, go to ORGANIZATION below.
2. If the system has been approved, obtain and review the system design documentation package retained by the Financial Management Group in the Financial and General Management Studies Division, Washington, D.C.

3. If the system design has been approved, it should have been implemented as designed. Any significant deviations from the approved design should be reported to the Financial Management Group.

ORGANIZATION

1. Obtain applicable agency organization charts.
(See exhibit 2, item 1.)
2. Interview key agency officials to determine how the system works. Summarize individual functions and responsibilities of key officials.

INTERNAL/EXTERNAL AUDITS AND STUDIES

Audits or studies of the system and the data processing department should be reviewed to help determine the audit coverage necessary and preclude unnecessary duplication. The auditor should try to identify control strengths and weaknesses, evaluate offsetting or compensating controls where weak controls are identified, and, in general, assess the audit coverage.

1. Interview agency internal audit personnel and complete the internal audit questionnaire in exhibit 1A.
2. Obtain applicable internal audit reports covering the data processing department and the system being

reviewed. Review the reports to identify strengths or weaknesses in the system and assess audit coverage.

3. Obtain, review and comment briefly on other applicable studies or reports prepared by consultants, outside auditors, etc.

ADP STEERING COMMITTEE

An ADP steering committee can be a valuable asset to top management in its efforts to monitor the quality and reliability of computer-produced information. The auditor should determine whether the ADP steering committee has been given enough responsibility and authority to effectively oversee the data processing function.

1. Obtain a description of the ADP steering committee's duties and functions.
2. Obtain minutes of the ADP steering committee's meetings.
3. Interview ADP steering committee personnel and complete the steering committee questionnaire in exhibit 1B.

DATA PROCESSING DEPARTMENT

1. Obtain a copy of the computer center organization chart and complete the background questionnaire in exhibit 2.
2. Agency manuals needed include
 - computer operations policies and procedures,
 - computer operator instructions, and
 - data processing user's manual.

3. Review copies of reports of user complaints to identify potential problems.
4. Tour the data processing center.
5. Evaluate the ADP departments' day-to-day operating procedures, computer center physical conditions, and general approaches to control.
 - Complete questionnaire on data processing department controls in exhibit 4.
6. Exhibit 5, computer center controls profile, is intended to provide information and can be used by the auditor at his discretion. Reliability assessment and use of this profile is discussed in GAO's "Guide For Reliability Assessment of Controls In Computerized Systems (Financial Statement Audits)."

EXHIBIT 1A

INTERNAL AUDIT

	<u>Yes</u>	<u>No</u>
1. Does the agency's internal auditing department audit the ADP function?	_____	_____
2. Does the auditing department have an ADP section within its staff?	_____	_____
3. Does the department have a continuing program for ADP education?	_____	_____
4. Does it participate with data processing personnel in developing ADP systems?	_____	_____
5. Do any ADP personnel participate or assist auditors in ADP audits?	_____	_____
6. Are copies of operating computer programs maintained under control of the auditing department for the principal ADP applications?	_____	_____
7. Are the control copies of operating computer programs compared with production programs at least annually?	_____	_____
8. Are test decks used by the auditing department to test operating programs?	_____	_____
9. Are specially written computer programs used for audits?	_____	_____
10. Are test decks and/or computer audit programs stored under audit department control?	_____	_____
11. Does the audit department supervise the running of the audit programs and/or test decks?	_____	_____
12. Does the internal audit department verify data on ADP output reports against related source documents?	_____	_____
13. Does the internal audit department review test procedures for all changes to ADP programs and systems?	_____	_____

EXHIBIT 1A

14. Explain any "No" answers. Note alternate control procedures, and, if none, describe how the lack affects overall system reliability.

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

EXHIBIT 1B

STEERING COMMITTEE

	<u>Yes</u>	<u>No</u>
1. Does the agency have an ADP steering committee? (Attach a copy of the committee's organization.)	_____	_____
2. Does a representative of top management chair the committee?	_____	_____
3. Are major users of computer-produced information represented on the committee?	_____	_____
4. Does the steering committee:		
--Approve agency policies for ADP?	_____	_____
--Approve short and long range plans to develop and implement new computer systems, considering user priorities?	_____	_____
--Evaluate the needs for new computer equipment and help make sure it is acquired expeditiously?	_____	_____
5. Explain any "No" answers. Note alternate control procedures, and, if none, describe how the lack affects overall system reliability.		

EXHIBIT 2

BACKGROUND QUESTIONNAIRE

Organizational

Workpaper index

1. Obtain:

Agency organization chart

ADP department and/or computer center organization chart

* 2. Identify key officials in ADP department.

Section and
section head

Location
and telephone

Major duties and responsibilities

.....

.....

.....

* See note on last page of exhibit.

EXHIBIT 2

Computer Hardware System

* CPU manufacturer _____
* CPU model number _____
* Date CPU installed _____
* CPU physical location _____
* Internal storage capacity _____
* Direct access storage capacity _____
Console typewriter model number _____
Number of peripherals:
 Magnetic tape drives:
 7 track _____
 9 track _____
 Magnetic disk drives:
 2311 series _____
 2314 series _____
 3330 series _____
 Magnetic drum units _____
 Other mass storage units _____
 Card Readers _____
 Card Punches _____
 Card Reader/Punches _____
 Line Printer #1 _____
 (Lines per minute _____)
 Line Printer #2 _____
 (Lines per minute _____)
* Online terminals _____
* Remote batch terminals _____
* Communications controllers (note a) _____
* Optical scanners _____
* MICR readers _____
* Mark sense readers _____
* Key-to-tape units _____
* Key-to-disk units _____
* Key punch/verify _____
 Card sorters _____
 Card collators _____
 Card accounting machines _____
 Other (specify) _____

a/ Attach schematic of data communications network.

*See note on last page of exhibit.

EXHIBIT 2

Computer Software and Utilization

Facility software

- * Operating system: Name _____
Version _____
Release number _____
- * Operational efficiency software
(HASP, GRASP, POWER, etc.) _____
- * Data base/data communications
software: (CICS, TOTAL, etc.) _____
- * Specialized software designed by
installation (describe) _____

System utilization

Number of scheduled 8-hour shifts per day _____

Number of scheduled days per week _____

Average number of jobs per day _____

Monthly averages for past 3 months

 Total hours scheduled _____

 Actual hours:

 Production _____

 Testing _____

 Rerun _____

 Maintenance _____

 Idle _____

 Other _____

 Total actual _____

Multiprograming factor (average number
of programs running concurrently) _____

* See note on last page of exhibit.

EXHIBIT 2

- ADP costs

Total budgeted

Current fiscal year _____

Next fiscal year _____

Actual costs for most recently ended

fiscal year _____:

Rental of leased CPUs (note a) _____

Rental of other leased hardware
(note a) _____

Cost of purchased equipment:

CPUs _____

All other _____

Hardware maintenance _____

Personnel:

ADP general management _____

Data entry _____

Computer operations _____

Systems design _____

Applications programing _____

Technical support _____

Library/control, etc. _____

Clerical and administrative _____

Supplies (cards, printer paper, etc.) _____

Contracts:

Data conversion _____

Other services _____

Facility costs:

Space _____

Utilities _____

Other annual costs (specify)

a/ Names of lessors:

EXHIBIT 2

	<u>ADP staffing</u>		<u>Name of section supervisor</u>
	<u>Authorized</u>	<u>Assigned</u>	
ADP general management	_____	_____	_____
Systems analysts	_____	_____	_____
Applications programmers	_____	_____	_____
Systems programmers	_____	_____	_____
Other technical support	_____	_____	_____
Computer operators	_____	_____	_____
Data entry operators	_____	_____	_____
Control clerks	_____	_____	_____
Schedulers	_____	_____	_____
Librarians	_____	_____	_____
Secretarial/clerical	_____	_____	_____
Other	_____	_____	_____
Totals	_____	_____	

Anticipated staffing additions and deletions during the next 2 years:

EXHIBIT 2

NOTE: Questions preceded by an * deal with accounting controls which should be asked about during each visit to the agency. Other questions deal with the day-to-day operations of the agency's computer center and the design of computerized financial systems. These questions should be asked during the first visit to the agency, after a new computer system has been implemented, and every 3 years.

EXHIBIT 3

Intentionally Left Blank

EXHIBIT 3

Intentionally Left Blank

DATA PROCESSING DEPARTMENT CONTROLSOrganizational Controls

- | | <u>Yes</u> | <u>No</u> |
|---|------------|-----------|
| 1. Is the ADP department independent from other agency operations? | _____ | _____ |
| 2. Are all the following functions performed by different individuals?
(adequate separation of duties) | _____ | _____ |
| a. Systems design | _____ | _____ |
| b. Programing | _____ | _____ |
| c. Acceptance testing | _____ | _____ |
| d. Authorizing program changes | _____ | _____ |
| e. Accepting programs and program changes | _____ | _____ |
| f. Handling source documents
(keypunching, etc.) | _____ | _____ |
| g. Machine operations | _____ | _____ |
| h. File maintenance (librarian for
data and programing files) | _____ | _____ |
| 3. Are operators denied access to programmer run books and other systems design and programing documentation? | _____ | _____ |
| 4. Explain any "No" answers. Note alternate control procedures, and, if none, describe how the lack affects overall system reliability. | | |

EXHIBIT 4

System Documentation

	<u>Yes</u>	<u>No</u>
* 1. Does a procedures manual cover the preparation of all source documents?	_____	_____
* 2. Does this manual:		
a. Include control procedures?	_____	_____
b. Define data preparation responsibility?	_____	_____
* 3. Is there a data entry/conversion manual?	_____	_____
* 4. If the answer to question 3 is yes, does the manual:		
a. Include instructions for entering data?	_____	_____
b. Identify all fields subject to key verification?	_____	_____
* 5. Is there an overall narrative description of the system?	_____	_____
* 6. Is there an overall flow chart of the system?	_____	_____
* 7. Are there program run books for each application program?	_____	_____
b. Does program documentation include:		
a. General narrative description of program?	_____	_____
b. Specifications - both original and modifications?	_____	_____
c. Detailed narrative description of program?	_____	_____
d. Detailed logic diagram or decision table?	_____	_____
e. Input record formats?	_____	_____
f. Input record descriptions?	_____	_____
g. Output record formats?	_____	_____
h. Output record descriptions?	_____	_____
i. Master file formats?	_____	_____
j. Master file description?	_____	_____
k. List of constants, codes, and tables used?	_____	_____
* See note on last page of exhibit.		

EXHIBIT 4

	<u>Yes</u>	<u>No</u>
l. Source program listing?	_____	_____
m. Object program listing?	_____	_____
n. Operating instructions?	_____	_____
o. Description of test data used to test program?	_____	_____
 * 9. Is access to program documentation restricted to persons who do not operate the equipment?	 _____	 _____
*10. Are there computer operations run manuals?	_____	_____
*11. Are these run manuals provided to computer operators?	_____	_____
*12. Do operator's run manuals:		
a. Define input data, source, and format?	_____	_____
b. Describe setup procedures?	_____	_____
c. Characterize all halt conditions and actions to be taken?	_____	_____
d. Delineate expected output data and format?	_____	_____
e. Formulate output and file disposition at completion of run?	_____	_____
f. Include copy of normal console sheets for run?	_____	_____
*13. Do operator's run manuals exclude:		
a. Program logic charts or block diagrams?	_____	_____
b. Copy of program listing?	_____	_____
*14. Are program listings inaccessible to computer operators?	_____	_____
*15. Are copies of all documentation stored off the premises?	_____	_____
16. If so, is stored program documentation periodically compared with that being used?	_____	_____
17. Is there written evidence of who performed the systems and programing work?	_____	_____

* See note on last page of exhibit.

EXHIBIT 4

Computer Operations Controls

	<u>Yes</u>	<u>No</u>
* 1. Have documented procedures been established covering the operations of the data center?	_____	_____
2. Are daily equipment operating logs maintained?	_____	_____
3. Is downtime shown and explained?	_____	_____
* 4. Is there an error log or report for each such run?	_____	_____
* 5. Are these logs reviewed daily by the ADP operations manager:		
a. Input/output?	_____	_____
b. Equipment?	_____	_____
c. Error?	_____	_____
* 6. Does the ADP manager initial each log to indicate that the review has been performed?	_____	_____
7. Are all processes and operator decisions recorded in a daily log?	_____	_____
8. If the system does not have a console typewriter, does the method used afford adequate control and record the activities performed by the computer and by the operator?	_____	_____
* 9. Is the console typewriter used to list:		
a. Date?	_____	_____
b. Job name and/or number?	_____	_____
c. Program name and/or number?	_____	_____
d. Start/stop times?	_____	_____
e. Files used?	_____	_____
f. Record counts?	_____	_____
g. Halts (programed and unscheduled)?	_____	_____
*10. Is all time accounted for from the time the computer is turned on each day until it is shut down?	_____	_____

* See note on last page of exhibit.

EXHIBIT 4

	<u>Yes</u>	<u>No</u>
*11. Are disposition notes entered on the console log showing corrective actions taken when unscheduled program halts occur?	_____	_____
*12. Are reruns shown on the console log?	_____	_____
*13. Is the reason for each rerun recorded?	_____	_____
*14. Are console sheets sequentially numbered?	_____	_____
*15. Is the log reviewed and signed at the end of the day by the supervisor and filed as a permanent record?	_____	_____
*16. Are the console printouts independently examined to detect operator problems and unauthorized intervention?	_____	_____
*17. Does the authorized person initial console sheets to show that they have been reviewed?	_____	_____
*18. Are provisions adequate to prevent unauthorized entry of program changes and/or data through the console or any other device?	_____	_____
*19. Does some form of printout indicate every operating run performed?	_____	_____
*20. Is there a procedure to prevent superseded programs from being used by mistake?	_____	_____
*21. Are only the current program decks maintained?	_____	_____
*22. Are programs revised only after written requests approved by user department management?	_____	_____
23. Do these written requests describe the proposed changes and reasons for them?	_____	_____
*24. Are changes in the master file or in program data factors authorized in writing by initiating departments?	_____	_____

* See note on last page of exhibit.

EXHIBIT 4

Access Control

	<u>Yes</u>	<u>No</u>
* 1. Is access to the computer area limited to necessary personnel?	_____	_____
2. Do combination locks, security badges, or other means restrict access to the computer room?	_____	_____
* 3. Are combination locks or similar devices periodically changed?	_____	_____
* 4. Are account codes, authorization codes, passwords, etc., controlled to prevent unauthorized usage?	_____	_____
* 5. If terminals provide access to the system, are they adequately secured to prevent unauthorized usage?	_____	_____
* 6. Is the responsibility for issuing and storing magnetic tapes and/or disk packs assigned to a tape librarian?	_____	_____
* 7. Is this duty the librarian's chief responsibility?	_____	_____
* 8. Are library procedures documented?	_____	_____
* 9. Is access to the library limited to the responsible librarian(s)?	_____	_____
*10. Does the agency use automated methods (e.g., a file management system) to restrict access to computerized files?	_____	_____
*11. Are all data files logged in and out to prevent release to unauthorized personnel?	_____	_____
*12. Are inventory records of tapes and disks maintained?	_____	_____
*13. Are status records of tapes and disks maintained?	_____	_____
*14. Have external labeling procedures been documented?	_____	_____

* See note on last page of exhibit.

EXHIBIT 4

	<u>Yes</u>	<u>No</u>
*15. Are external labels affixed to all active tapes and/or disks?	_____	_____
*16. Do labels tie in with inventory records?	_____	_____
*17. Are work or scratch tapes or disk packs kept in a separate area of the library?	_____	_____
*18. Are there documented procedures for controlling computer programs?	_____	_____
*19. Are programs protected from unauthorized access?	_____	_____
20. Does the agency use automated methods (e.g., a program management system) to restrict access to applications programs?	_____	_____
21. Explain any "No" answers. Note alternate control procedures, and, if none, describe how the lack affects overall system reliability.		

* See note on last page of exhibit.

EXHIBIT 4

Disaster Recovery Controls

	<u>Yes</u>	<u>No</u>
1. Have procedures been documented for disaster control and recovery?	_____	_____
2. Do these procedures protect against fire and other hazards for the data center, data files, and programs?	_____	_____
3. Are these procedures implemented as defined?	_____	_____
4. Are there provisions for retaining and/or copying master files and a practical means of reconstructing a damaged or destroyed file?	_____	_____
5. Are sufficient generations of files maintained to facilitate reconstruction of records (grandfather-father-son tape routine)?	_____	_____
6. Is at least one generation maintained in a location other than the tape storage area?	_____	_____
7. Are copies of critical files stored at a remote location and restricted from unauthorized access?	_____	_____
8. Are copies of operating programs stored outside the computer room?	_____	_____
9. Are duplicate programs maintained at a remote location and restricted from unauthorized access?	_____	_____
10. Are related transaction media pertaining to critical files and programs maintained?	_____	_____
11. Have documented backup procedures been established with another compatible data center to cover a natural disaster or other emergency situations?	_____	_____
12. Explain any "No" answers. Note alternate control procedures, and, if none, describe how the lack affects overall system reliability.		

EXHIBIT 4

NOTE: Questions preceded by an * deal with accounting controls which should be asked about during each visit to the agency. Other questions deal with the day-to-day operations of the agency's computer center and the design of computerized financial systems. These questions should be asked during the first visit to the agency, after a new computer system has been implemented, and every 3 years.

COMPUTER CENTER CONTROLS PROFILE

Preparer: _____
 Date: _____
 Reviewer: _____

Department: _____ Exhibits 2 and 4 W/P index: _____
 Agency: _____ Computer center: _____
 Code: _____ Location: _____

SIGNIFICANT CHARACTERISTICS	INDICATIVE OF HIGH RISK	INDICATIVE OF MEDIUM RISK	INDICATIVE OF LOW RISK	INDEX TO COMMENTS
Organizational strength	Inadequate to handle present workload and that scheduled for development in next year.	Adequate but tight-- little or no margin of safety.	Sufficient, with reasonable margin to spare.	
Organizational structure and administrative practices:				
a) Division of duties (acceptability from standpoint of internal control-- see appendix I)	Inappropriate mix- ture of duties in at least one major instance.	Appropriate in major respects; reasonably well compensated for in some other manner when division violates control principles.	Appropriate in almost all respects; appropriately compensated for when necessary.	
Management (as applied to planning, sched- uling, supervising, and exercising control)	Inadequate prac- tices or ineffec- tive application of good practices.	Good practices applied with average effectiveness or average practices effectively applied.	Good practices effectively applied.	

Based on material provided by Price Waterhouse & Co., certified public accountants.

SIGNIFICANT CHARACTERISTICS	INDICATIVE OF HIGH RISK	INDICATIVE OF MEDIUM RISK	INDICATIVE OF LOW RISK	INDEX TO COMMENTS
Certain aspects of systems/program development				
a) User approval of system design specifications	Cursory, essentially uninformed.	Informed as to general, but not detailed, specifi- cations; approval apt to be informal.	Written approval based on informed judgment and precise specifications.	
b) Project control and work methods	Poorly organized without standards.	Well organized but without standards.	Well organized using effective standard procedures.	
c) System test practices	Some transaction paths tested.	Each transaction path tested individually.	Each transaction path tested in combination with all others.	
d) documentation practices	Poor or no stand- ards; uneven adher- ence; not part of system and program development.	Adequate practices not uniformly ad- hered to; documen- tation done "after the fact."	Excellent standards closely adhered to and carried out as part of system and program development.	
Physical conditions	<u>Unsuitable</u>	<u>Suitable</u>	<u>More than satisfactory</u>	
a) Physical safeguards against destruction or alteration of records, equipment, etc.	Easy access; little or no fire detection equipment.	Limited access; adequate fire detection equipment.	Physical isolation; severely limited access; adequate fire detection equipment, good fire-fighting equipment.	

Based on material provided by Price Waterhouse & Co., certified public accountants.

SIGNIFICANT CHARACTERISTICS	INDICATIVE OF HIGH RISK	INDICATIVE OF MEDIUM RISK	INDICATIVE OF LOW RISK	INDEX TO COMMENTS
b) Alternate facilities	No arrangements.	Practices casual, or their use could be improved.	Formal arrangements; machine compatibility assured by actual tests.	
c) Records management	Poor magnetic file library control, no off-premises storage.	Effective magnetic library control, some off-premises storage.	Effective magnetic file library control; copies of programs, master files, and important data stored off-premises.	
d) Housekeeping discipline relative to input data, tape and disk files, cards, etc.	Procedures are poor or not followed.	Procedures could be improved or followed more closely.	Good practices carried out well.	
General approach to control	Willing to take risks to lower costs or unwilling to enforce good control procedures.	Sound control techniques (include most generally accepted types of control).	Very control conscious; EDP department has excellent knowledge of control techniques and soundly controls new application systems.	
a) input control and data validation --tie-in with external control --use of critical fields --computer editing --rejects --key transcriptions				
b) Computer processing --protection against processing of incorrect files --run-to-run controls				

Based on material provided by Price Waterhouse & Co., certified public accountants.

SIGNIFICANT CHARACTERISTICS	INDICATIVE OF HIGH RISK	INDICATIVE OF MEDIUM RISK	INDICATIVE OF LOW RISK	INDEX TO COMMENTS
c) Output control --tie-in with input controls --output tests --"common sense", review	Willing to take risks to lower cost or unwilling to enforce good control proce- dures.	Sound control techniques (include most generally accepted types of control).	Very control conscious; EDP department has excellent knowledge of control techniques and soundly controls new application systems.	
d) Data security --program valid- ation of mes- sage header --maintenance of filer suspense --recovery and re- trieval of rec- ords				
e) computer room operation	Relatively little supervision; few established pro- cedures for deal- ing with prob- lems.	Supervisors observe operators to see if run-book instructions are followed; sound procedures for nonroutine situa- tions are gener- ally understood.	Supervisors observe operators and check console and utili- zation logs to see that each operation was carried out according to run- book instructions; excellent proce- dures established for dealing with problems.	
f) Access to time- sharing systems and responsibility for data security	Data security not provided for.	Data security pro- vided for without specific schedule for changing authorization codes.	Data security part of front-end control program; specific schedules control authoriza- tion code changes.	

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SECTION II
REVIEW OF COMPUTER APPLICATION(S)

GENERAL

The auditor should review the system or part of the system (individual application) to evaluate the network of internal controls. This means reviewing agency documentation and interviewing agency personnel. This segment of the audit provides detailed information on controls used by the agency to make sure that no data is added, lost, or altered during application processing.

APPLICATION/SYSTEM INFORMATION

1. Obtain agency manuals applicable to the computer application being reviewed. On a payroll audit, for example, obtain personnel, payroll, and timekeepers' policies and procedures manuals.
2. Review applicable manuals and interview agency personnel to determine what procedures are followed--both manual and automated--to process transactions. For payroll, include the following:
 - a. Personnel/payroll transactions (changes to the personnel/payroll master files, i.e., adding employees, separating employees, or updating existing employee records).

- b. Time and attendance documents.
 - c. Cancellation of paychecks.
 - d. Collection of overpayments.
 - e. Supplemental paychecks (checks not issued through the normal automated payroll system).
3. Determine why checks were cancelled and why supplemental checks were issued. Evaluate the adequacy of adjustment procedures to make sure that master files and related records are updated accordingly.
 4. Discuss application processing with data processing department personnel and obtain a copy of the processing schedule.
 5. Obtain copies of application system documentation, including system flow charts.
 6. Obtain copies of reports on user complaints and/or suggested application modifications and review them to identify potential problems.
 7. Evaluate the adequacy of specific controls by completing the following controls questionnaires:
 - Application systems inventory (exhibit 6A).
 - Data input controls (exhibit 6C).
 - Data error controls (exhibit 6D).
 - Application batch data processing controls (exhibit 6E).

--Telecommunications processing controls
(exhibit 6F).

--Data output controls (exhibit 6G).

The questions contained in these questionnaires are not all-inclusive; however, they are comprehensive enough to indicate the level of control over the application system. All "no" responses should generally be considered potential deficiencies, requiring review by the audit staff.

8. A computer applications controls profile is included as exhibit 7 to provide information. It can be used at the auditor's discretion.

EXHIBIT 6A

APPLICATION SYSTEMS INVENTORY

Major System in Use 1/

System name and ID number _____

Date of implementation _____

Is system a. a standard system or
 b. locally designed? _____

System type (administrative,
 engineering, process control,
 scientific, other (specify)) _____

Batch or on-line? _____

Number of programs _____

Size of largest program _____

Programing language _____

Was system tested with--a. test data or
 b. live data? _____

Are system test results available? _____

Number of parallel processing cycles _____

Number of system modifications
 in last 2 years _____

Date last modification tested _____

Date of last audit or evaluation
 (attach report) _____

Processing frequency _____

Total monthly processing hours _____

1/ Complete a separate schedule for each application system.

EXHIBIT 6A

Principal Users 1/

Principal users of system output--name, organizational element, address	User functions				
	Initi- ates trans- ac- tions	Trans- cribes date	Oper- ates com- puter	Main- tains data con- trols	Designs/ programs appli- cation
1. _____ _____	_____	_____	_____	_____	_____
2. _____ _____	_____	_____	_____	_____	_____
3. _____ _____	_____	_____	_____	_____	_____
4. _____ _____	_____	_____	_____	_____	_____
5. _____ _____	_____	_____	_____	_____	_____
6. _____ _____	_____	_____	_____	_____	_____

Comments: _____

1/ Index to following questionnaire on user satisfaction
with computer-produced reports.

Intentionally Left Blank
Exhibit 6B Included in Section III

EXHIBIT 6C

DATA INPUT CONTROLS

	<u>Yes</u>	<u>No</u>
* 1. Have procedures been documented to insure that all source data is entered, processed, and feedback and that no data is added erroneously or manipulated?	_____	_____
* 2. Do the initiating departments independently control data submitted for processing?	_____	_____
a. turnaround transmittal document	_____	_____
b. record counts	_____	_____
c. predetermined control totals	_____	_____
* 3. Is responsibility appropriately separated to make sure that an individual does not perform more than one phase of preparing input data (e.g., establishing new master records plus changing or updating all master records)?	_____	_____
* 4. Are source documents retained long enough in a manner which allows identification of both related output records and documents?	_____	_____
5. Is information transcribed from the source document to some other document before being sent to the ADP department input control group?	_____	_____
6. Does the transcription department, if separate from other offices, independently control data submitted for processing?	_____	_____
a. turnaround transmittal documents	_____	_____
b. record counts	_____	_____
c. predetermined control totals	_____	_____
Are these control totals balanced with those of the initiating department and are all discrepancies reconciled?	_____	_____
* See note on last page of exhibit.		

EXHIBIT 6C

Yes No

- * 7. Are source documents and coding sheets controlled once they are turned over to the transcribing department? -----
- * 8. Are the functions of coding, keypunching and verifying the same document performed by different individuals? (Separation of duties.) -----
9. Is turnaround rapid enough to identify and correct errors? -----
10. Explain any "No" answers. Note alternate control procedures, and, if none, describe how the lack affects overall system reliability.

* See note on last page of exhibit.

EXHIBIT 6D

DATA ERROR CONTROLS

	<u>Yes</u>	<u>No</u>
* 1. Are there adequate controls over the process of identifying, correcting, and reprocessing data rejected by the computer programs?	_____	_____
* 2. Are record counts and predetermined control totals used to control these rejected transactions?	_____	_____
* 3. Are all corrections and resubmissions performed promptly?	_____	_____
* 4. Are all error corrections reviewed and approved by persons outside the data processing department?	_____	_____
* 5. Do initiating departments review error listings affecting their data?	_____	_____
6. Are unmatched transactions (no master record corresponding to transaction record or vice versa) rejected and written on a suspense file?	_____	_____
7. Explain any "No" answers. Note alternate control procedures, and, if none, describe how the lack affects overall system reliability.		
	_____	_____
	_____	_____
	_____	_____
	_____	_____
	_____	_____
	_____	_____
	_____	_____

* See note on last page of exhibit.

APPLICATION BATCH DATA PROCESSING CONTROLS

	<u>Yes</u>	<u>No</u>
* 1. Does the data processing department independently control data submitted and processed?	_____	_____
a. turnaround transmittal documents	_____	_____
b. record counts	_____	_____
c. predetermined control totals	_____	_____
Are these control totals balanced with those of the initiating department and are all discrepancies reconciled?	_____	_____
* 2. Are run-to-run control totals used to check for completeness of processing?	_____	_____
* 3. Do the computer operating instructions for each program clearly identify data files to be used as input?	_____	_____
* 4. Do the operating instructions for each program clearly identify output files and storage requirements?	_____	_____
* 5. Do all programs include routines for checking file labels before processing?	_____	_____
* 6. Are operators prohibited from circumventing instructions?	_____	_____
* 7. Are internal trailer labels containing control totals (record counts, dollars, hash totals, etc.) generated for all magnetic tapes and tested by the computer program to determine that all records have been processed?	_____	_____
* 8. Do computer programs include the following types of tests for validity:		
a. Code?	_____	_____
b. Character?	_____	_____
c. Field?	_____	_____
d. Transaction?	_____	_____
* See note on last page of exhibit.		

EXHIBIT 6E

	<u>Yes</u>	<u>No</u>
e. Combinations of fields?	-----	-----
f. Missing data?	-----	-----
g. Check digit?	-----	-----
h. Sequence?	-----	-----
i. Limit or reasonableness test?	-----	-----
j. Sign?	-----	-----
k. Crossfooting of quantitative data?	-----	-----

9. Explain any "No" answers. Note alternate control procedures, and, if none, describe how the lack affects overall system reliability.

TELECOMMUNICATIONS PROCESSING CONTROLS

	<u>Yes</u>	<u>No</u>
* 1. Are there documented procedures for using the telecommunications network?	-----	-----
* 2. Are authorization codes required to:		
a. Access the computer system?	-----	-----
b. Access the applications programs?	-----	-----
c. Perform transactions?	-----	-----
* 3. Are different authorization codes required to perform different transactions?	-----	-----
* 4. Are authorization codes controlled to restrict unauthorized usage?	-----	-----
* 5. Are authorization codes periodically changed?	-----	-----
* 6. Is a nonprinting or obliteration facility used when keying in authorization codes?	-----	-----
* 7. Is a terminal identification check performed by the computer during polling so that various transaction types can be limited to authorized data entry stations?	-----	-----
* 8. Is the polling/dial-up program used to:		
a. Send acknowledgement to terminal?	-----	-----
b. Periodically test line and terminal operating status with standardized test messages and responses?	-----	-----
* 9. Is the message header used to identify:		
a. Source, including proper terminal and operator identification codes?	-----	-----
b. Message sequence number, including total number of message segments?	-----	-----
c. Transaction type code?	-----	-----
d. Transaction authorization code?	-----	-----

* See note on last page of exhibit.

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EXHIBIT 6F

	<u>Yes</u>	<u>No</u>
*10. Is the message header validated for:		
a. Proper sequence number from the identified terminal?	-----	-----
b. Proper transaction code or authorization code for terminal or operator?	-----	-----
c. Number of message segments received equal to count indicated in header?	-----	-----
d. Proper acknowledgement from terminal at end of transmission?	-----	-----
e. Balancing of debit/credit totals derived from adding all message segments and comparing with corresponding totals in message header?	-----	-----
*11. Are the transaction records (i.e., message segments) validated by:		
a. A check for proper authorization/approval codes of each individual supervisor against stored authorization codes that are periodically reissued?	-----	-----
b. Check digits on all identification keys?	-----	-----
c. Check digits at the end of a string of numeric data that is not subjected to balancing?	-----	-----
d. Range and/or limit tests based on statistical analysis of input data values?	-----	-----
e. Numeric or alpha-only data field tests?	-----	-----
f. Extensive relationship tests that determine if data values are consistent with other input data fields or master file contents?	-----	-----
*12. Are there either accumulators in the terminal for keeping input totals or terminal-site logging procedures that record details of transactions?	-----	-----

* See note on last page of exhibit.

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EXHIBIT 6F

- | | <u>Yes</u> | <u>No</u> |
|--|------------|-----------|
| *13. Does the program or programs maintain running totals of: | | |
| a. Number of transactions? | _____ | _____ |
| b. Credit value? | _____ | _____ |
| c. Debit value? | _____ | _____ |
| *14. Does the program summarize all transaction values processed each day as a separate record segment on the master file and on the journal file to provide an audit trail? | _____ | _____ |
| *15. Are error messages returned to originating terminal, indicating type of error detected and requesting correction? | _____ | _____ |
| *16. Is a block of characters automatically retransmitted when an error is detected (which implies some form of buffer at the terminal)? | _____ | _____ |
| *17. Are detected error transactions entered into memo/suspense accounts including: | | |
| a. A code indicating error type? | _____ | _____ |
| b. Date, time, and transaction type, plus terminal ID? | _____ | _____ |
| c. Debit/credit value of transaction (if any)? | _____ | _____ |
| *18. Are known error correction transactions matched (using supplementary ID) against memo/suspense account entries? | _____ | _____ |
| *19. Are periodic printout or error memo/suspense account entries produced? | _____ | _____ |
| *20. Does an end-of-transmission trailer include: | | |
| a. Message and segment counts? | _____ | _____ |
| b. Value totals, including debit and credit? | _____ | _____ |
| c. An ending symbol? | _____ | _____ |

* See note on last page of exhibit.

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EXHIBIT 6F

	<u>Yes</u>	<u>No</u>
*21. Is there a control trailer record main-storage resident while file is open for processing?	_____	_____
*22. Is each field of the control trailer record updated as each transaction processing sequence is completed?	_____	_____
*23. Is a control trailer record written at the end of file or subfile at end of processing day?	_____	_____
*24. Is a transaction log of sequence-numbered and/or time-of-day-noted transactions maintained in addition to periodic dump/copy of the master file?	_____	_____
*25. Is the transaction data log used to provide:		
a. Part of the audit trail, including originating terminal and message ID, transaction type code, time of day that the transaction is logged, and copy of transaction record?	_____	_____
b. Transaction record for retrieval from terminal?	_____	_____
*26. At the end of the processing day, is the master file balanced, via programed routine, by subtracting current totals from start-of-day totals and comparing the remainder to transaction log values?	_____	_____
*27. Are all master file records periodically processed to balance machine-derived totals against control trailer record totals?	_____	_____

* See note on last page of exhibit.

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EXHIBIT 6F

Yes No

*28. Is the master file data log used to provide:

- | | | |
|--|-------|-------|
| a. File restructuring capability? | _____ | _____ |
| b. Restart points and indicators of valid data flow? | _____ | _____ |
| c. Storage for partial dump of vital tables, including message queue allocation, polling table contents, transaction route tables, etc.? | _____ | _____ |

*29. Explain any "No" answers. Note alternate control procedures, and, if none, describe how the lack affects overall system reliability.

*See note on last page of exhibit.

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EXHIBIT 6G

DATA OUTPUT CONTROLS

	<u>Yes</u>	<u>No</u>
* 1. Does the initiating department balance control totals generated during computer processing with those originally established and reconcile all discrepancies?	_____	_____
* 2. Can all transactions be traced forward to a final output control?	_____	_____
* 3. Can all transactions be traced back to the original source document?	_____	_____
* 4. Is there some means of verifying master file content; i.e., are samples periodically drawn from those records being printed and reviewed for accuracy?	_____	_____
* 5. Is someone assigned to review output for general acceptability and completeness?	_____	_____
6. Is a schedule maintained of the reports and documents to be produced by the ADP system?	_____	_____
7. Is there a control procedure for the distribution of reports?	_____	_____
8. Is responsibility appropriately separated to make sure that one individual does not perform more than one phase of a transaction?	_____	_____
For:		
a. Initiating data?	_____	_____
b. Transcribing data?	_____	_____
c. Feeding data?	_____	_____
d. Processing data?	_____	_____
e. Correcting errors and resubmitting data?	_____	_____
f. Distributing output?	_____	_____

* See note on last page of exhibit.

EXHIBIT 6G

9. Explain any "No" answers. Note alternate control procedures, and, if none, describe how the lack affects overall system reliability.

NOTE:

Questions preceded by an * deal with accounting controls which should be asked about during each visit to the agency. Other questions deal with the day-to-day operations of the agency's computer center and the design of computerized financial systems. These questions should be asked during the first visit to the agency, after a new computer system has been implemented, and every 3 years thereafter.

COMPUTER APPLICATIONS CONTROLS PROFILE

Preparer _____
 Date _____
 Reviewer _____

Department _____
 Agency _____
 Code _____
 Application _____

Exhibit 2 W/P index _____
 Exhibit 6 W/P index _____
 Computer center _____
 Location _____

SIGNIFICANT CHARACTERISTICS	INDICATIVE OF HIGH RISK	INDICATIVE OF MEDIUM RISK	INDICATIVE OF LOW RISK	INDEX TO COMMENTS
--------------------------------	----------------------------	------------------------------	---------------------------	----------------------

System scope and
complexity

a) organizational breadth

1. important functions	Must meet important conflicting needs of several organizational units.	Meets limited conflicting requirements of cooperative organizational units.	No significant conflicting needs, serves primarily one organizational unit.	
2. unrelated organizational units deeply involved	Dependent upon data flowing from many organizational units not under unified direction.	Dependent upon data from a few organizational units with a common interest, if not unified control.	Virtually all input data comes from a small group of sections under unified control.	

b) Data processing
breadth

1. number of transaction types	more than 25	6 to 25	less than 6
--------------------------------	--------------	---------	-------------

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INDICATIVE OF MEDIUM RISK	INDICATIVE OF LOW RISK	INDEX TO COMMENTS
4 to 6	less than 4	
10 to 20	less than 10	
Realistically demanding.	Comfortable margin.	

<u>Moderate</u>	<u>Conservative</u>	
20 to 35	less than 20	
10 to 20	less than 10	

25K to 60K	less than 25K	
Can surmount problems with adequate talent and effort.	Relatively high; program straight- forward, modular, roomy, relatively unpatched, well documented, etc.	

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EXHIBIT 7