GAO's economy and efficiency, and program results audits often involve computer-based systems that produce data used in analyzing a wide range of activities. Generally accepted government auditing standards require a review of both general and application controls in these data processing systems that support the activity being audited.

Even though situations may occur where compliance with these auditing standards is not feasible, GAO audit policy places responsibility on the auditor for performing sufficient evaluation work to provide reasonable assurance that computer-processed information is relevant, accurate, and complete. This validation responsibility applies whether the information is provided to us by the activity being audited or whether it is independently retrieved by GAO.

To help generalist auditors comply with this policy requirement, we developed a reliability assessment guide. It includes detailed procedures to help auditors assess the reliability of computer-processed information, or stated another way, it helps determine the degree of risk in using information that may be inaccurate. Terminology is generally nontechnical; however, this guide does require a base-level knowledge of automatic data processing.

Use of this guide will help provide minimum required audit coverage in situations where compliance with generally accepted government auditing standards is not feasible. GAO has developed other guides for more detailed reviews of computer-based systems. They include

--Audit Guide For Reliability Assessment of Controls In Computerized Systems (Financial Statement Audits), May 1978, and

--Evaluating Internal Controls In Computer-Based Systems, June 1981.

Suggestions for revising this guide are welcome and should be addressed to the Director and Chief Accountant, Accounting and Financial Management Division, U.S. General Accounting Office, 441 G Street, N.W., Washington, D.C. 20548.

Milton J. Forest
Acting Comptroller General of the United States
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INTRODUCTION

When computer-based systems are involved in GAO's economy and efficiency audits and program results audits, generally accepted government auditing standards published in a booklet on "Standards For Audit of Governmental Organizations, Programs, Activities, and Functions," 1981 revision, require the auditor to review both the general and application controls in data processing systems that support the activity being audited. There may be situations, however, where it is not feasible to comply with these standards. For example, the auditor may conclude that the audit can be performed more efficiently by some other means, or the auditor may be called upon to provide services other than audit, such as simply gathering information about an activity. Standards should be followed to the extent possible; however, in situations where it is not feasible, GAO audit policy places responsibility on the auditor for performing sufficient evaluation work to provide reasonable assurance that computer-processed information is relevant, accurate, and complete.

This audit guide presents an approach for complying with these GAO policy requirements. Detailed procedures included in the guide should help auditors assess the reliability of computer-processed information, or stated another way, help determine the degree of risk in using information that may be inaccurate.
In discussing automatic data processing (ADP), GAO's audit policy places responsibility for determining the extent of reliability assessment squarely on the auditor:

--When ADP is an important integral part of agency operations which we are auditing, our work should include an appropriate examination of the functioning of the ADP system.

--Further, if computer products or output are to be used in a report or in support of a finding, we should make an appropriate examination to provide reasonable assurance that the information is reliable consistent with its intended use.

--In determining the extent of examination, the auditor should consider the importance of the computer-processed information in relation to the point being developed, and the degree of risk in using information that may contain inaccuracies.

--On each assignment, the auditor must determine whether there would be a serious adverse effect on the accomplishment of our audit and reporting objectives if the information being used were incomplete or inaccurate in any material respect. The auditor is responsible for performing sufficient evaluation work to provide reasonable assurance that information, whether processed by computer or otherwise, is relevant, accurate, and complete.

On all audits, auditing objectives remain the same whether ADP is employed or not. Auditing procedures required to accomplish these objectives, however, may be changed by the method of data processing used and may require the auditor to employ specialized ADP expertise.

RISK OF USING COMPUTER PRODUCTS

Products of any information system, whether computerized or not, can be inaccurate or incomplete. There has been a tendency for some auditors to accept computer products as reliable simply because they are deceptively neat, which suggests
accuracy, and also because there is a perception that computers never make mistakes. Auditors should not accept computer products at face value for a number of reasons. First, alterations made to data in computer files are not readily apparent when reviewing a computer product. Second, computer product reliability is affected by data processing controls which are seldom consistently used in agency systems. Third, these products are produced by a technology in which continuous changes in equipment and techniques hinder long-term credibility of a system.

The reliability of computer-based products must, therefore, be evaluated to determine the risks in using such products. It should be remembered that reliability assessment helps determine only the potential for error; the actual dollar value or number of errors must still be determined through regular audit tests.

AUDIT APPROACH

The objective of a reliability assessment is to determine the degree of risk in using computer-processed data. Auditors must decide whether to test computer data for reliability whenever they find the data will be used in a GAO report. This approach does not mean that a reliability assessment should be performed on every audit involving computer output. Instead, a reliability assessment needs to be performed only when the accuracy or reliability of computer output is important in accomplishing assignment objectives.

Reliability tests

The auditor is encouraged to use data verification procedures similar to those used in audits that do not involve computers, and
to inquire into the functioning of computer controls only in sufficient depth to judge the reliability of the data processed.

This guide presents various tests for data reliability that should satisfy the auditor's data validation requirements without extensive, time-consuming work. Each succeeding section describes detailed work that is to be done only if necessary, depending on how the computer data will be used in the report. It usually will be necessary to

--identify computer data that will be used,
--determine the importance of the data to the audit,
--determine the source of the data and understand its flow through the system, and
--conduct brief tests for data reliability.

**Decision to do additional work**

After completing each section in this guide, the auditor must decide whether additional work is necessary. This decision will be based on

--the importance of computer-processed data to the audit,
--the potential for obtaining more reliable data from other sources,
--the practicality of performing additional work, in light of overall job objectives, and
--the need for information about systems controls to support a recommendation for conducting a separate computer system review.

**Working Papers**

GAO policy for documenting reliability assessments is as follows:
Work performed and the auditor's conclusions about the functioning of the ADP system and the reliability of computer processed data included in a GAO report or used in support of findings, conclusions, and recommendations should be recorded in the working papers. When work is performed by use of computerized techniques including data processing and statistical programs, the step-by-step process should be sufficiently documented to permit the process to be repeated.

The working papers should be prepared, indexed, and reviewed the same way as other audit working papers. They should also be a complete, self-contained file. Further, they should include

--specific computer-processed data used in a GAO report,
--descriptions of document flow used in processing,
--data that was tested,
--kinds of tests conducted,
--amount of testing,
--results of tests, and
--dates of tests.

Summary memorandum

When reliability assessment work is completed, the auditor should prepare a memorandum summarizing work done and conclusions. If data is not reliable or doubt still exists, limitations on its use must be included in the scope section of any report along with a clear explanation of the reasons for the limitations. Section VI includes an outline of a summary memorandum.

An overview of the reliability assessment approach is included as exhibit 1.
RELIABILITY ASSESSMENT APPROACH

SECTION I
IMPORTANCE OF COMPUTER PROCESSED DATA

SECTION II
PRIOR AUDITS AND EVALUATIONS

SECTION III
UNDERSTANDING HOW COMPUTER DATA IS PROCESSED

SECTION IV
TESTING DATA FOR RELIABILITY

SECTION V
EVALUATING INTERNAL CONTROLS IN COMPUTER BASED SYSTEMS

SECTION VI
SUMMARY MEMORANDUM ON RESULTS OF RELIABILITY ASSESSMENT
SECTION I

IMPORTANCE OF COMPUTER-PROCESSED DATA

The first steps in reliability assessment involve (1) identifying computer data that will be used during the audit, (2) determining the data's importance in relation to its intended use, and (3) deciding whether to continue reliability assessment. Computer-processed data, for example, may be extremely important in terms of audit significance and less error tolerant because it will be used to support a finding in a GAO report, or it may not be so important and therefore more error tolerant because it will be used simply as background information.

USING COMPUTER-PROCESSED DATA IN AUDIT REPORTS

Computer-processed data, as defined in this guide, falls into the following broad categories:

--- Output from automated accounting, benefit payment, inventory, payroll, and management information systems. This category includes routine or special agency reports, computerized data files, letters, forms, and checks.

--- Reports manually prepared from computer-generated information.

--- Special reports or information obtained by the agency or GAO using agency computerized data files and software packages, i.e., data retrieval.

Use of data and its importance to the final audit report will dictate how detailed a reliability assessment is needed. Generally, computer-processed data is used by GAO auditors as
background information, as a tool for audit planning, or as support for findings. The auditor must keep in mind how the audit report will be affected if computer data is incomplete or inaccurate.

**Background information**

Data used only for background or informational purposes may not be critical to the report. For example, a report may cite the number of recipients in a benefit payment program. In such a case, an exact figure is not needed, since inaccurate data would not lead to an erroneous finding or conclusion.

However, the audit staff should be alert for background data that indirectly supports a finding. For example, a report introduction may specify the total dollar expenditures for a medical program, while the report body shows total incorrect reimbursements. To place the misspent amount in proper perspective, it must be compared with the total spent. Thus inaccurate background data could significantly alter the impact of a finding.

**Audit tool for planning**

Computer data is often used in planning the direction of an audit or in setting its scope. Because the auditor may base critical decisions on such data, errors could lead to inefficient use of audit resources. For example, an analysis of computer data may show potential problems in agency management of medical payments. To preclude a review that turns out to be unnecessary, the auditor should assess the computer data's reliability before additional resources are committed to the review. Decisions based on inaccurate or incomplete data could prove very costly.
As another example, an agency may provide a computer listing of medical payments for a specified period. To evaluate management of the payment system, the auditor may select cases from the listing for detailed review. If the listing omits critical cases, the review may be biased. (Note: This category does not include random samples taken to project results for a universe. Computer data used for statistical sampling is considered support for a finding, as discussed below.)

Support for findings

Analyses of computer data or figures taken directly from agency computer reports or files often support GAO audit findings. Such data is extremely sensitive; inaccuracies or unreliability would significantly weaken the final audit product. For example, a GAO report may cite data from an agency's computer system to show the status of a worker protection program. Inaccurate or incomplete data could portray a distorted picture of program results.

In other instances, statistical estimates based on a sample of agency computer records may be used to support a finding. Usually such estimates support criticisms of agency management. For example, an analysis of welfare payments to ineligible recipients might demonstrate procedural problems. Unreliable data could cause the auditor to reach invalid conclusions.

Analysis of cost-benefit data used to justify a new program is another example. Often, such data will employ a computer model to project program effects. Therefore, the reliability of such data becomes important to the auditor's evaluation.
On some audits, GAO staff may retrieve data from agency computer files. In these cases, the auditor is still responsible for assessing the reliability of the agency's data base from which the data was extracted.

AUDIT PROCEDURES

1. Identify and describe the specific computer-processed data to be used during the audit.

2. Identify computer systems (accounting, payroll, management information, etc.) which process the data.

3. Determine how data will be used in the final audit report.

4. Determine what impact data accuracy and reliability have on its use in a planned GAO report.

ACCEPT RISK OR CONTINUE RELIABILITY ASSESSMENT

Having determined the audit significance of computer data, the auditor must decide whether reliability assessment will be continued. Reasons for decisions made should be explained and documented. The auditor has the following options:

--If data is not significant and there is little or no risk in relying on it, prepare the summary memorandum outlined in Section VI and stop.

--If data is significant, go to the next section.
SECTION II
PRIOR AUDITS AND EVALUATIONS

The results of previous audits and evaluations of computer-processed data may satisfy the auditor's data validation requirements included in GAO audit policy and preclude the need for further reliability assessment work. Accordingly, previous work should be reviewed by the auditor.

REVIEWING PRIOR AUDITS AND EVALUATIONS

The auditor should first determine if prior audits and evaluations are sufficiently current to satisfy data validation requirements. If sufficiently current, the auditor must carefully consider limitations of these studies. For example, previous studies may not have included an evaluation of the same computer-processed data that is currently in question, or the same computer-processed data may have been evaluated, found to be risky, and a qualified GAO report issued. GAO approvals of accounting systems do not guarantee data reliability because GAO bases these approvals on evaluations of planned system design and documentation, not on actual operations and data. Further, system evaluations by consulting firms must be carefully reviewed for content and objectivity because these firms are employed by the agency under audit. This review may require the assistance of an ADP auditor or computer specialist if the consultant's study is highly technical.

AUDIT PROCEDURES

1. Identify and obtain copies of pertinent reliability assessments, summary memoranda, and reports, or
system evaluations that have previously been prepared by GAO, internal auditors, external auditors, or consulting firms.

2. Review these reports and evaluations to verify that they are pertinent to the computer-processed data in question.

3. Determine if previous audits and evaluations satisfy current data validation requirements.

ACCEPT RISK OR CONTINUE RELIABILITY ASSESSMENT

Having determined whether previous audits and evaluations satisfy data reliability requirements, the auditor must decide if reliability assessment will be continued. Reasons for decisions made should be explained and documented. The auditor has the following options:

--If previous reliability assessments satisfy GAO's data reliability requirements, prepare the summary memorandum outlined in Section VI and stop.

--If previous reliability assessments do not satisfy data validation requirements or were not conducted at all, and it is impossible or impractical to assess reliability (whether due to staffing or time constraints, overall job objectives, or audit conditions), the auditor should

--prepare the summary memorandum outlined in Section VI including reasons for not testing data reliability, and
--report the limitations on use of the data in the scope section of any report along with a clear explanation of the reasons for the limitations.

--If a decision is made to continue reliability assessment, go to the next section.

--If the auditor has gathered specific knowledge about major computer systems problems, include in the summary memorandum outlined in Section VI appropriate recommendations for a separate review of the computer system.
SECTION III
UNDERSTANDING HOW COMPUTER DATA IS PROCESSED

To continue with reliability assessment, the auditor should obtain an understanding of how the computer system generates the data—from preparation of source documents through final distribution and use of output. While learning how the system works, the auditor should identify potential areas for testing, using familiar audit techniques such as

--reviewing agency documentation including system documentation files, input preparation instructions, and users' manuals;

--interviewing agency personnel including users, systems analysts, and programmers; and

--inspecting, comparing, and analyzing agency records.

PREPARING DOCUMENT FLOW

To understand document flow, certain background information must be obtained through discussions with agency officials, from previous audits or evaluations, or from system documentation files. Because this information may not be current or complete, it should be verified with the responsible programmer or analyst. The auditor will need to obtain

--name (title) of the computer product,

--purpose of the product,

--system name and identification number,

--date the system was implemented,

--type of computer used (manufacturer's model) and location,
--frequency of processing and type of processing
(batch, online), and

--person(s) responsible for the computer application
and data base which generates the computer product.

An agency user or other person in the computer center may already have a document flow diagram showing the origin of data and how it flows to and from the computer. (This diagram should not be confused with either a system flow chart which shows detailed computer processing of data, or a program flow chart which describes a computer program.) More often than not, the auditor will have to develop document flow in a familiar format, whether it is a narrative description, a block diagram using simple symbols, a flow chart using standard symbols, or some combination. The document flow diagram or narrative description should show

--each source document by title and ID number (copies should be attached),
--the point of origin for all source documents,
--each operating unit or office through which data passes,
--the destination of each copy of the source document and action taken (i.e., document filed, audited, keypunched),
--actions taken by each unit or office through which the data passes (i.e., items recorded in a ledger, unit prices added and extensions computed, control numbers recorded and checked),
controls over the transfer of source documents between units or offices to assure none are lost, added, or changed (i.e., record counts, control totals, arithmetic totals of important data, etc.), and

recipients of computer outputs.

Document flow should not describe the actual computer processing inside the "black box": this is beyond the scope of reliability assessment. If computer output is the product of more than one input, this condition should be clearly noted in the document flow description.

Document flow in a typical payroll system is shown in Appendix I which is a block diagram with rectangular symbols; Appendix II shows the same document flow in narrative form.

DEFINE DATA TO BE EVALUATED

The auditor must clearly understand what is being recorded by the agency information system; therefore, the individual elements of data must be defined. Titles can be deceptive. For example, is a cost amount the current period or cumulative cost? Is the cost accrued or incurred? What are the components of the cost amount? Has the composition of cost changed during the fiscal periods covered by our reviews?

The agency's data element dictionary is a good source for these definitions; however, if one is not available, a record layout may contain the needed definitions. Appendix III includes a simple record layout.

In many instances there is no one-to-one relationship between data elements and the data in a computer-processed report or file. Some common differences are shown in Appendix IV.
AVAILABILITY OF DATA FOR TESTING

To test reliability, the auditor must have access to input source documents and the system which produced the computer-processed data or other corroborative information. Many ADP systems, however, are not centrally located. For example,

--input source documents may be located in another region or headquarters,

--source documents may be processed at centers scattered throughout the country, and

--data may be input into a regional online system via computer terminals connected to a headquarters computer which produces the report.

In dealing with these logistics problems, the auditor has several alternatives: (1) perform tests at other regions or headquarters, (2) request GAO regional or headquarters assistance, (3) test a sample of records at various processing centers, (4) request that data be transmitted to the audit staff for testing, if feasible, (5) develop some other method to test reliability, (6) use the computer information with a qualifier that logistics problems prevented testing data reliability, or (7) substitute other known reliable data in place of computer data. The approach selected will depend on the ease and timeliness with which the auditor can perform adequate tests for reliability, consistent with the data's intended use.

The auditor may also encounter situations where an agency obtains data processing from a private service center or other source. After GAO's authority to review such data is determined
(we generally have access if the program being audited is federally funded), the auditor should (1) determine what the service center or outside source does to assure itself of reliable data, (2) verify those assurances by following, to the extent possible, the work steps in this guide, and (3) decide whether the assurances are adequate to support the data's reliability for GAO's use.

**AUDIT PROCEDURES**

1. Identify and obtain background information on the specific computer application that generates the data being reviewed.

2. Prepare a document flow diagram or narrative description of computer processing.

3. Verify document flow accuracy and completeness by "walking" typical transactions through the system and observing actions actually performed on the documents. Any discrepancies identified between the previously prepared document flow and actual operations should be resolved with agency personnel.

4. Define data elements in data files used to generate the computer product being reviewed.

5. Determine if the computer product is generated by computing data (additions, multiplications, etc.), summarizing data (totals, averages, etc.), or by some other form of data manipulation.

6. Determine if sufficient information or other corroborative data is available for testing.
ACCEPT RISK OR CONTINUE RELIABILITY ASSESSMENT

Having determined the availability of sufficient information to permit testing or that other corroborative data is available, the auditor must decide whether reliability assessment will be continued. Reasons for decisions made should be explained and documented. The auditor has the following options:

--If sufficient information is not available to permit testing, if other corroborative data is unavailable, or if it is impossible or impractical to assess reliability (whether due to staffing or time constraints, overall job objectives or audit conditions), the auditor should

  --prepare the summary memorandum outlined in Section VI including reasons for not testing data reliability, and
  --report the limitations on use of the data in the scope section of any report along with a clear explanation of the reasons for the limitations.

--If a decision is made to continue reliability assessment, go to the next section.

--If the auditor has gathered specific knowledge about major computer systems problems, include in the summary memorandum outlined in Section VI appropriate recommendations for a separate review of the computer system.
The procedures described in this section provide the auditor with a systematic approach for testing the data's reliability. Although the suggested procedures are presented in logical sequence, there is no requirement that all work steps be completed. The auditor should do only what is necessary to satisfy data validation requirements.

Some suggested tests for data reliability are listed below. The auditor may use any or all of these tests or develop some other means to test the computer data. The key is to perform enough tests to support an opinion on the data's reliability.

CONFIRMATION TESTS

On economy and efficiency, and program results reviews, the internal controls evaluation will usually follow confirmation tests. (Controls are evaluated in a separate review of the agency's computer system.) Since the auditor must select elements of data to be confirmed without knowing internal control strengths and weaknesses, emphasis should be placed on selecting data which, if found to be incomplete or inaccurate, would distort audit conclusions. Confirmation sources include the following.

Regular users of computer data

The auditor should begin confirmation tests with principal users because they use the information often and are directly affected by inaccuracies in the information. Exhibit 2, on page 30, should help identify names and locations of principal users.
Typically, users of computer products have varying knowledge about the product's quality. To obtain confidence in confirmation responses, the auditor should interview enough users, using Exhibit 3, User Satisfaction Questionnaire, on page 31, to develop a general idea about the computer output's usefulness.

When there are a large number of principal users or several users at different locations, it may be impractical to interview each one personally. In these cases the auditor may (1) select a sample of users based on number, location, or some other suitable criteria, (2) interview users by telephone, or (3) distribute the questionnaire for users to complete. If users complete questionnaires, the auditor must maintain control over the questionnaires and conduct some followup to assure accurate responses.

When conducting interviews, it is especially important to obtain evidence of incomplete or inaccurate data mentioned by users. The auditor should

-- identify the nature of the problem. Look for overstated or understated amounts, incorrect totals, incomplete data fields and negative balances which should be positive.

-- determine the frequency of errors. They may be isolated instances or recurring.

-- determine if users can explain why errors are occurring. Since data errors affect users, they may have conducted studies to show the magnitude and cause of errors.
--determine if users keep manual records for use in lieu of computer reports or other output. Manually maintained records in a computer environment can mean poor quality of computer output and unnecessary expenditures for duplicate recordkeeping. The auditor may also find that manual records better satisfy the need for reliable audit evidence.

Internal auditors

A number of internal auditors are reviewing the development of new systems to determine whether necessary audit trails and controls have been incorporated to assure the reliability of processing. This review ordinarily includes testing of computer products and requires detailed knowledge of system design and operation. Thus, internal auditors may have the best overall knowledge of the system and its products.

If internal auditors recently audited the data, this work can minimize reliability tests. If internal auditors have not recently audited the data, they can help evaluate computer products by

--identifying personnel who have the best ability to confirm the contents of a report--not necessarily the current user of a report,

--identifying information sources against which the data can be compared--other files, reports, studies, manual records, etc., and

--helping with "common sense tests" discussed in detail in a later section. What may appear incorrect to an
external reviewer can sometimes be explained by an internal auditor without extra work.

Third parties

Confirming data with third parties is beneficial because the third party is often independent of the information system which generated the data. Some examples include the following:

--Banks - cash balances on hand, numbers or amounts of loans.
--Warehouses - assets stored, volume of transfers.
--Training institutions - number of students serviced, dollar volume of contracts.
--Common carriers - rates for freight shipments, volume of passengers between selected locations.
--Medical facilities - daily rates for patient care, types of outpatient services available.
--Private business concerns - billings for utility services, wholesale prices of generic drugs.
--Other Government agencies - checks cancelled by a U.S. Treasury Department disbursing center, statistics on another agency's use of GSA automobiles.

Suppliers of input data

Persons or organizations supplying input to the computer system were identified earlier in the document flow diagram. If they are not the same as regular users of the system output, they may be contacted to confirm the accuracy and completeness of the data they prepared for system processing.
ADP department personnel

The auditor should contact ADP department personnel to determine the history and number of errors associated with a specific application or product of a system.

Computers are almost always programmed to edit data that is entered for processing. These edits help determine whether the data is acceptable. If the data contains errors or fails to meet established edit criteria, it is rejected. A computer record of rejected transactions should be available from the control group responsible for reviewing output. Errors shown on this record can be related directly to the application being processed.

The auditor should exercise care in reaching conclusions about edit tests because a system with many rejected transactions may produce reliable information. For example, a system with insufficient computer edits may routinely accept erroneous data and print out few rejected transactions, while a system with extensive edits may reject many transactions but actually produce a far more accurate final product.

The point is that the auditor can use these edit reports to identify problems that users are having with the system and the length of time users are taking to correct these errors.

COMMON SENSE TESTS

Through discussions with internal auditors and data users, the auditor should have developed criteria to judge the data's reasonableness. For instance, the following kinds of questions help:
--Are amounts too small? (cost per mile to operate a 1-ton truck = $0.004; 3 universities in the State of New York)

--Are amounts too large? (accrued annual leave balance for 1 employee = 3,000 hours; a single student loan for $150,000)

--Are data fields complete? (social security payments listed for only 46 States; all 9 Federal census regions listed but no program enrollment data shown for 2 of them; checks listed in numerical order but one group of checks within the series not accounted for)

--Are calculations correct? (columns of data include 4-digit items but the column total includes only 3 digits; unit cost extension for 1,200 items which should be for only 120 items)

These common sense tests can be done quickly and can alert the auditor to data reliability problems.

**COMPARISON TESTS**

GAO audits are usually "first-time" investigations, which precludes comparing current period data with previous data collected by the auditor. Certain comparisons, however, can be useful. This is especially true if the data being compared comes from independent sources. Some of the more typical sources of information against which the auditor may compare data include the following:
**Source documents**

Any time information in a computer-processed report, listing, or file can be compared with data on the original source documents, the auditor should consider doing so. However, because of computation, summarization, and other data manipulation which may occur as the data passes through the system, the end product may not be readily compared with the raw data which entered the system. One example is salary check. Source data for a salary check will usually consist of (1) a time and attendance record for hours worked, (2) a W-4 form for tax exemptions, (3) other forms authorizing various payroll deductions, and (4) personnel forms showing employment grade, promotion actions, etc. Obviously, the net amount of a salary check cannot be directly compared to any one of these source documents.

**Physical counts and inspections**

A physical count can be made to verify information concerning the quantities, types, or conditions of any tangible assets. When this technique is used, the comparison should be made both ways—from the record to the physical count and from the physical count to the record.

**Computed amounts**

This test requires an independent calculation of an amount which can then be compared with the amount shown in the computer report or file. Examples include computations of

--benefit payments for selected categorical grant recipients,

--investment repayment balances on government construction projects.
--loan balances and delinquent amounts, and
--resale prices of foreclosed and repossessed properties.

Records, files, and reports from other sources

The validity of recorded data may also be checked by com-
paring it with the same type of information obtained from another
independent source. Reports on government programs and activities
issued by outside contractors, universities, internal audit groups,
privately funded foundations, and others may contain useful infor-
mation.

If these third party reviewers, however, obtained information
from activities they are evaluating, it may be the same infor-
mation which the auditor has chosen to review for reliability. This
precludes its use for data comparison purposes unless the third
party organization has itself evaluated the reliability of the
information. Experience has shown that this type of reliability
testing is seldom done, and the auditor should never assume it
has been done.

AUDIT PROCEDURES

1. Confirm computer-processed data with independent sources
   such as regular users of the data, internal auditors,
   third parties, suppliers of input data, and ADP depart-
   ment personnel.

2. Review the computer-processed data for reasonableness.

3. Compare the data with independent sources, such as source
documents, physical counts and inspections, computed
amounts, and other records, files, or reports.
ACCEPT RISK OR CONTINUE RELIABILITY ASSESSMENT

Having completed the above reliability tests, the auditor should be able to decide whether or not the data is sufficiently reliable for its intended use. This decision depends, however, upon the results of tests, extent of tests performed, and the significance of computer-processed data in relation to its intended use. If the auditor determines the problems to be insignificant in light of the data's use in the report, further evaluation may not be necessary. If the problems are significant, an evaluation of the computer system may be necessary. In any event, the auditor's evaluations of the risk in using the data and his willingness to accept the risk determines the course of action.

When computer-processed data is used only as background information or for planning purposes, it is generally less sensitive or more error tolerant than data used for other purposes. However, the auditor must determine whether there would be an adverse impact on the planned product if the data is incomplete or inaccurate. In any case, the auditor must make sure the scope and type of reliability tests were sufficient to reveal any discrepancies. When computer-processed data is used to support a finding or is itself a finding, further evaluation is generally required to complete development of the finding. Decisions made by the auditor should be fully documented and explained. The auditor has several options:

--If tests do not disclose major problems with data reliability, complete the summary memorandum outlined in Section VI and use the data as planned.
--If tests cast doubt on the data's reliability, the auditor could
--use other reliable data if found during the review,
--report the limitations on use of the data in the scope section of any report along with a clear explanation of the reasons for the limitations,
and/or
--recommend a separate review of the computer system as described in Section V.

In any case, the auditor should complete the summary memorandum outlined in Section VI.
### PRINCIPAL USERS

<table>
<thead>
<tr>
<th>Computer Product</th>
<th>User</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td></td>
</tr>
<tr>
<td>Number</td>
<td></td>
</tr>
<tr>
<td>Type</td>
<td></td>
</tr>
<tr>
<td>Purpose</td>
<td></td>
</tr>
<tr>
<td>Name</td>
<td></td>
</tr>
<tr>
<td>Function</td>
<td></td>
</tr>
<tr>
<td>Comments</td>
<td></td>
</tr>
</tbody>
</table>
USER SATISFACTION QUESTIONNAIRE

This questionnaire is designed to obtain user evaluation of computer products. It includes questions on product format, sufficiency and accuracy of reported information, necessity for the product, and possibilities for product improvement. Since computer output is generated for users, responses to this questionnaire can be considered strong indicators of whether computer products are accurate and reliable.

Product identification

1. Title of product.
2. Data processing identification number.
3. Type of product.
4. Part of product to be evaluated.

User identification

6. Name.
7. Date.
8. Title.
10. Phone number/address.
11. Extent of knowledge about product.
User evaluation of output product

12. For what purpose do you use the product?  

- Initiate transactions.  
- Authorize changes to the system.  
- Operate computer terminal.  
- Maintain data controls.  
- Design/program application.  
- Other. (Explain.)  

13. In relation to the work of your office or department, the product is  

Not important  

1 / 2 / 3 / 4 / 5 / 6 / 7 / 8 / 9 / 10  

Very important  

14. The product's contents are  

Very difficult to understand  

1 / 2 / 3 / 4 / 5 / 6 / 7 / 8 / 9 / 10  

Very easy to understand  

15. Can the product be used as is without correction, further identification or analysis?  

YES NO  

16. In your judgment, is the product  

- Accurate and reliable?  
- Available when needed?  
- Current and up-to-date?  
- Useful?  
- Understandable?  

For each "no" answer, please explain below and provide examples.  

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
17. In your opinion, should the product

---Provide more data? YES NO
---Provide less data? YES NO
---Be combined with other output products? YES NO
---Be considered obsolete? YES NO
---Be improved to make your job easier? YES NO

For each "yes" answer, please explain below.

\_______________________________________________________________________\n\_______________________________________________________________________\n\_______________________________________________________________________\n
18. If you maintain manual records to supplement computer-processed information, briefly explain why.

\_______________________________________________________________________\n\_______________________________________________________________________\n\_______________________________________________________________________\n
19. Does the product duplicate any other information you receive? YES NO

If "yes," briefly explain.

\_______________________________________________________________________\n\_______________________________________________________________________\n\_______________________________________________________________________\n
20. Can you readily obtain, from other sources, the information contained in the product? YES NO

If "yes," list the other source(s).

\_______________________________________________________________________\n\_______________________________________________________________________\n\_______________________________________________________________________\n
21. Do you supply the raw data (input) for this product? YES NO

22. Do you check this product for quality when you receive it? YES NO
If "no," please identify the person or group performing this function.  

23. Is the product ever rerun by the data processing department?  
   YES  NO  
   If "yes,"  
   --How frequently?  
   --Why were reruns necessary?  
   --How do you make sure that rerun material is correct?  

24. If you have/had problems with this product, with whom would/did you discuss them?  
   Is this person authorized to make changes to the product?  
   YES  NO  

25. Do you maintain correspondence with the data processing department or other user departments concerning the product?  
   YES  NO  
   If "yes," attach copies of recent correspondence.  

26. Could you effectively perform your duties:  
   YES  NO  
   --Without this product?  
   --If this product were produced less often?  

27. Did you or anyone within your department help design the product?  
   YES  NO  

28. Does it save you any clerical effort?  
   YES  NO  
   Explain.  

29. Can this product be improved to make your job easier?  
   YES  NO  
   Explain.
30. How often do you refer to this product?  

---Daily.  
---Weekly.  
---Monthly.  
---Annually.  
---Never.  
---Other. (Explain.) ____________________________  
______________________________  

31. How long is the product kept after receipt?  

---1 day  
---1 week  
---1 year  
---Other (Explain.) ____________________________  
______________________________  

Where is the output product filed? ____________________________

______________________________
SECTION V
EVALUATING INTERNAL CONTROLS IN
COMPUTER-BASED SYSTEMS

The preceding sections provide detailed procedures to help the auditor

-- identify computer data that will be used,
-- determine importance of the data in relation to its intended use,
-- understand data flow through the system, and
-- conduct tests to determine if the data is reliable.

If after completing the above tests the auditor is not satisfied with data reliability, limitations on use of the data must be included in the scope section of any report or further evaluation of the computer system must be performed. This review should be performed in accordance with generally accepted government auditing standards. GAO's audit guide on "Evaluating Internal Controls in Computer-Based Systems," may be used. A brief overview of this audit guide follows.

PURPOSE OF THE AUDIT GUIDE "EVALUATING INTERNAL CONTROLS IN COMPUTER-BASED SYSTEMS"

This audit guide was developed to provide a structured approach for auditing internal controls in a computer-based system. This "systems approach" helps evaluate the total system--from origination of source documents to final distribution of output products. Primary emphasis is placed on assessing a computer application's reliability in processing data in a timely, accurate, and complete manner. This is accomplished by evaluating both manual and automated internal controls and by performing tests to substantiate their existence and effectiveness.
AUDIT APPROACH

The guide is presented in an order that auditors would normally follow in reviewing a system:

--Collect background information on the agency, the ADP department, and the computer application being evaluated.
--Review agency internal controls: management controls, general controls over the data processing function, and application controls over the computer application.
--Prepare a detailed data flow diagram to help evaluate documentation, internal controls, and processing efficiency.
--Observe both the manual and automated processing procedures to make sure they conform with established procedures.
--Determine the usefulness of computer output reports by interviewing users.
--Conduct additional tests which may include
  --test data analysis,
  --computer program analysis,
  --data retrieval and analysis, or
  --job accounting data analysis.
--Report on control deficiencies and their effect on agency operations and make recommendations for corrective action.
--Suggest additional work based on observations made during this review.
Because of the complexity of this audit work, the "generalist" auditor would normally not be expected to perform detailed evaluations of computer-based systems. Staff must have proficiency adequate for the tasks required.
SECTION VI

SUMMARY MEMORANDUM ON

RESULTS OF RELIABILITY ASSESSMENT

The purpose of a reliability assessment is to determine the risk in relying on computer data. After completing audit steps in previous sections of this guide, the audit staff should be able to make an informed judgment on the data's reliability. They should prepare a memorandum summarizing results of work done and conclusions reached.

SUMMARY MEMORANDUM OUTLINE

A summary memorandum should include the following:
--Introduction. Identify the specific computer-processed data being used and comment on its sensitivity; i.e., what impact incomplete or inaccurate data would have on the final audit product. If the auditor concludes that a reliability assessment is not required, the reasons should be clearly stated.
--Background. Include a brief statement about the agency program being audited, the computer system used to maintain the data, and the purpose for which the data is being used by agency personnel.
--Work performed. Briefly describe work performed to establish reliability of the data.
--Results. Summarize results of the reliability tests performed.
--Conclusion. Include a statement about the reliability of the data being used in the final audit product. If data is not reliable or doubt still exists, limitations
on its use must be included in the scope section of any report along with a clear explanation of the reasons for the limitations. If the auditor decides not to use the computer data, reasons for this decision should be fully disclosed.

The summary memorandum should be completed, signed, and dated by the site supervisor and audit/project manager.

REPORTING TO THE AGENCY

If tests for data reliability disclose deficiencies in agency operations, the audit staff should inform the agency promptly through the standard exit conference and reporting process. Also, any useful suggestions and comments obtained from the User Satisfaction Questionnaire in exhibit 3 should be presented at this time.

AUDIT PROCEDURES

1. Prepare the summary memorandum as outlined above.

2. Report to the agency any deficiencies found during the reliability assessment.
APPENDIX I

DOCUMENT FLOW DIAGRAM OF PAYROLL PROCESS

ORIGINATING DEPARTMENT  PAYROLL DEPARTMENT  DATA PROCESSING

TIMEKEEPER PREPARES BIWEEKLY TIME & ATTENDANCE REPORT (T&A)

EMPLOYEE SUPERVISOR REVIEWS & INITIALS T&A

REVIEWS T&A FOR COMPLETENESS & CHECKS TOTAL HOURS

PREPARES CONTROL SHEET INCLUDING:
- TOTAL # OF T&As
- TOTAL REG. HRS.
- TOTAL OVERTIME HRS.
- TOTAL LWOP HRS.

SUBMITS COPIES OF CONTROL SHEET & ALL T&As

MAINTAINS COPY OF CONTROL SHEET & T&As

RECEIVES PAYROLL LISTING OF ALL EMPLOYEES

REVIEWS PAYROLL LISTING FOR ACCURACY AND COMPLETENESS:
- TOTAL # OF T&As
- TOTAL REG. HRS.
- TOTAL OVERTIME HRS.
- TOTAL LWOP HRS.

IDENTIFIES ANY ERRORS & INITIATES CORRECTIVE ACTION

MAINTAINS COPY OF PAYROLL LISTING FOR 6 MONTHS

PROCESS T&As

PROCESS ERROR CORRECTIONS

EMPLOYEE RECEIVES PAYCHECK

PROCESS PAYCHECKS
Narrative Document Flow of Payroll Process

The following procedures are used to process a biweekly employee payroll:

--At the end of the pay period, a timekeeper completes a time and attendance (T&A) report.

--The employee's supervisor reviews and initials the T&A and submits it to Payroll Department.

--Payroll clerk reviews T&A for completeness and checks total hours reported.

--When all the T&A reports are received, the payroll clerk prepares a control sheet which shows totals for number of T&A reports, number of regular hours, overtime hours, and LWOP hours.

--Payroll clerk keeps the originals and sends a copy of the control sheet and all T&A reports to Data Processing.

--Data Processing enters the payroll data on the terminal.

--At the completion of payroll processing, a listing of all employees paid is sent to the payroll clerk.

--The payroll clerk reviews the listing for completeness and accuracy, which includes a comparison of the number of T&A reports, regular hours, overtime hours, and LWOP hours with the control sheet totals.

--Any discrepancies are researched and resolved. Errors affecting pay are corrected and resubmitted to Data Processing for immediate action. Errors in leave are corrected in the subsequent pay period.

--The payroll clerk keeps the payroll listing for 6 months.

--The payroll process also prints the paycheck and mails it directly to the employee.
### DESCRIPTION OF PAYROLL DATA FILE

<table>
<thead>
<tr>
<th>Data Element</th>
<th>Position in Data File</th>
<th>Data Element Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SSN</td>
<td>1-9</td>
<td>Social Security Number</td>
</tr>
<tr>
<td>Name</td>
<td>10-29</td>
<td>Name - Last, First, Middle Initial</td>
</tr>
<tr>
<td>Grade</td>
<td>30-31</td>
<td>Payee's Grade</td>
</tr>
<tr>
<td>Salary</td>
<td>32-37</td>
<td>Yearly Salary</td>
</tr>
<tr>
<td>Taxes</td>
<td>38-43</td>
<td>Weekly Tax Deduction</td>
</tr>
<tr>
<td>Insurance</td>
<td>44-49</td>
<td>Weekly Insurance Deduction</td>
</tr>
<tr>
<td>Bond Code</td>
<td>50</td>
<td>Bond Deduction Code</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bond Code</th>
<th>Bond Amount</th>
<th>Weekly Deduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$ 100</td>
<td>$ 2</td>
</tr>
<tr>
<td>2</td>
<td>200</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>500</td>
<td>10</td>
</tr>
<tr>
<td>4</td>
<td>1,000</td>
<td>20</td>
</tr>
</tbody>
</table>

| Hours      | 51-52       | Hours worked during current pay period. |

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EXAMPLES OF DIFFERENCES BETWEEN COMPUTER OUTPUT AND DATA ELEMENTS

<table>
<thead>
<tr>
<th>Differences</th>
<th>Explanation of the difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total deductions on a payroll report might represent an addition of several data elements (taxes + health insurance + bonds + . . .).</td>
<td>The computer program used to produce the report adds the individual deductions and prints the total.</td>
</tr>
<tr>
<td>Bond deductions might be represented by a 1-character code on the data file.</td>
<td>The computer program converts the 1-character code to a dollar amount (e.g., 1 = $100 bond, 2 = $200 bond, etc.).</td>
</tr>
<tr>
<td>Weekly salary appears on the report and only annual salary is found in the data file.</td>
<td>The computer program converts the yearly salary into a weekly amount through division by weeks.</td>
</tr>
<tr>
<td>Average annual salary appears as an individual statistic while annual salaries are recorded in the data file.</td>
<td>The computer program totals all annual salaries in the file and divides the total by the number of records.</td>
</tr>
<tr>
<td>A report might show details and summary statistics for GS-12s while the data base contains payroll information for all grade levels.</td>
<td>The computer program selects only GS-12 records for printing and summarization.</td>
</tr>
</tbody>
</table>
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