

Memorandum 6M-3883

Page 1 of 27

Division 6 - Lincoln Laboratory
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Lexington 73, Massachusetts

SUBJECT: REPORT OF COMMITTEE STUDYING FAILURE REPORTING IN THE SAGE AND
EXPERIMENTAL SUBSECTORS

To: E. S. Rich

From: E. F. Ennis, BTL; W. J. Mitchell, IBM; C. W. Uskavitch, Group 22;
C. W. Watt, Group 64

Date: 9 September 1955

Approved: E. S. Rich
E. S. Rich

Abstract: The major recommendations of this committee, appointed by
E. S. Rich at a meeting on 14 June 1955, are as follows:

1. Records of equipment and system operation should be kept so that all 24 hours of each day are accounted for. Records of this sort will be called status records and are used in determining the reliability of the system or the equipment. Every change in status, whether caused by failure, scheduled use, or maintenance, will be noted. Recommended contents of the status reports are outlined in Appendices I and II.
2. Records of equipment and system failures should be kept for each failure incident that occurs. The failure and the status records should be tied together by incident numbers, so that a complete picture of the effect of each failure on system and equipment status can be obtained. Analysis of failure records will help in the location and elimination of causes of failures. Recommended contents of failure reports are outlined in Appendices III and IV.
3. All forms used should clearly indicate what is wanted, so that the need for individual interpretation is reduced, leading to clearer records.
4. All records should be transferred to IBM cards, and all processing should be done by machine.
5. To define, set up, and start operation of the record-keeping system outlined, it will be necessary to establish a continuing study in Lincoln, with at least

Memorandum 6M-3883

Page 2

one staff member full time, assisted by at least two more people full time. It is recommended that this group be set up at once, since the detailed development and use of a record-keeping system is a major project. If it is not, a unified record-keeping system for SAGE will not be ready for tryout in the Experimental Subsector early next year.

The following brief outline of this report may be the best indication of the scope of this study.

OUTLINE OF REPORT

- 1.0 Introduction
- 2.0 Present Failure Reporting Methods
 - 2.1 Air Force Procedures
 - 2.2 Cape Cod Procedures
 - 2.3 Procedures in XD-1
 - 2.4 The "Maintenance Coordinator"
- 3.0 Reports Proposed
 - 3.1 Status Reports
 - 3.2 Failure Reports
 - 3.3 Report on Examination of Failed Components
- 4.0 Analysis of Status and Failure Reports
- 5.0 Plan of Action
- 6.0 Conclusion

APPENDIX I: System Status Report

APPENDIX II: Equipment Status Report

APPENDIX III: Equipment Failure Report

APPENDIX IV: Report on Examination of Failed Unit or Part

References

1.0 Introduction

This is the report of a working committee organized to undertake the specific task of recommending procedures for failure reporting in the 1954 Cape Cod System and in the Experimental Subsector (ESS). The members of this committee were appointed at a conference which was called by Mr. E. S. Rich on 14 June 1955 to discuss equipment failure reporting and was attended by representatives of various groups in Lincoln and other organizations which have an interest in failure data.

There was agreement in the conference, on 14 June, that flexible, coordinated record-keeping methods should be provided to satisfy the need for failure data on such widely diversified system components as radars, encoding equipment, teletype, telephone lines and their special terminal equipment, radio communication links and the central digital computers. It was also agreed that these data should be in a form which would provide information on system reliability and that the data-collection and analysis methods should be adaptable to the SAGE system and compatible with those used by the Air Force. The committee accepted these agreements as ground rules and proceeded to outline a working system.

2.0 Present Failure Reporting Methods

A review was made of the reports now being used by the Air Force and in the 1954 CCS and of those being proposed for ESS.

2.1 Air Force Procedures

The failure-reporting methods used by the Air Force were reviewed previously by Mr. Uskavitch of this committee and are described in Memorandum 6M-5037¹, a copy of which is being transmitted along with this report. The military departments have recently standardized a failure report form DD-787; its use and advantages are discussed in the BuShips Journal for February 1955. It is understood that the Air Force is using this form, despite the fact that they have some reservations about its adequacy for supplying all the data they desire. (For full details of the programs being implemented by Headquarters AMC, the reader is referred to References 2, 3, 4, and 5.)

2.2 Cape Cod Procedures

At the present time, no standardized reporting exists in the 1954 CCS. The Montauk radar is operated by the Air Force and all failure records are in accordance with Air Force regulations. However, no arrangements have been made for the Lincoln people interested in radars to obtain a copy of these data.

¹ All superscripts refer to the list of references at the end of this report.

No one individual or group has been responsible for the operation and maintenance of the rest of the 1954 CCS. This, of course, is reflected in the variety of failure data available.

The South Truro heavy radar and the eight gap-filler radars are operated and maintained by Lincoln personnel. They do not use the maintenance data-recording procedures standardized by the Air Force. They employ local logs and send various kinds of detailed reports on equipment troubles to a maintenance engineer at Lexington. These reports are not suitable for statistical analysis and require considerable judgment on the part of the person filling them out. It is admitted by the users that they are not altogether suitable for an operating system as they were primarily designed to obtain detailed information during early development. Therefore, there should be no objection to their replacement.

Failure data on the Whirlwind computer are kept in a log. Some analyses of these data have been made by manual methods which involve transcription to a summary sheet and editing and amplification by a maintenance engineer. This work was reported in Mr. E. S. Rich's Memorandum 6M-3410⁶, "Analysis of Recent Performance Records for the Whirlwind Computer System," dated 1 March 1955. The Bell Laboratories have also used these data to illustrate quality control methods of analysis.

2.3 Procedures in XD-1

Failure-reporting procedures for the XD-1 computer in the ESS system are being developed by IBM. Mr. Mitchell of this committee has been active in this work, and no attempt is being made to duplicate the Whirlwind procedures. Attention is being given to efficient recording and to transfer of the information to IBM cards for analysis. As a result of Mr. Mitchell's participation in the work of the committee, it is expected that IBM's procedures will supply all of the information the committee recommends.

2.4 The "Maintenance Coordinator"

A lack of central responsibility for maintenance of the 1954 CCS system not only affected failure reporting but had a deleterious effect on operations. Unwillingness to accept responsibility sometimes resulted in serious delays in determining the causes of inadequate system operation and in their correction. This condition has been alleviated by the recent introduction of a "Maintenance Coordinator" in the 1954 CCS. His duties consist of directing the localization of system faults and issuing status and failure reports. Although this area was not considered when the charter for this committee was written, the information obtained from the "Maintenance

Coordinator" has a direct bearing on the effectiveness of any failure reporting procedures which may be adopted as a result of committee recommendations.

Looking to the future, both ESS and the SAGE subsectors may be compartmented by contract maintenance to a greater degree than is the 1954 CCS. Therefore, the only satisfactory guarantee of efficient maintenance appears to be a central authority such as the "Maintenance Coordinator." This has already been proposed in Lincoln Memoranda 6M-3442⁷ and 6M-3512⁸. Recent discussions with the Air Force indicate that, in the SAGE System, this authority may be vested in the Communications and Electronics (C&E) Duty Officer at the Direction Center^{9,10}.

3.0 Reports Proposed*

The consensus of the committee is that detailed recommendations as to the formats of reports should not be made until the contents of each report have been agreed to by representatives of Lincoln and the other groups interested in maintenance data from the 1954 CCS, ESS, and SAGE. Therefore, only the kind of reports and the material to be contained in them will be covered.

It is recommended that reports obtained include two general types of information, one being the system (or equipment) status and the other being details of the failures. Although both sets of data may be combined on one form, experience has shown that more efficient analysis of equipment data will result from separate reports.

In considering reports, the committee recognized that it is essential to keep the "paper work" by the maintenance technicians to a minimum. Also the forms used should require factual reporting rather than ask for opinions. However, space should be allowed for the writing of any additional information offered by the technicians filling out the form. The format of the form should be such as to permit efficient transfer to IBM punch cards for machine analysis.

The reports can be transcripts of information in logs kept at the equipment or copies of forms which serve as both a page in the log and as a report. The latter procedure is the suggestion of IBM and is being used to provide maintenance information from the XD-1 computer.

It is obvious that the implementation of the recommended reports will require logs and instructions that will insure that the desired information is contained therein. This is an area where the committee feels that detailed recommendations cannot be made until after the contents of the report have been agreed upon.

* When used in this memorandum, the word report refers to the raw data obtained directly from the operating or maintenance personnel; the term summary is used whenever reference is made to the reporting of results obtained from analysis of the data.

For the 1955 CCS and ESS, the following reports are recommended:

- (1) System Status Report
- (2) Equipment Status Report
- (3) Equipment Failure Report
- (4) Report on Examination of Failed Component

The committee does not think it essential that the reporting forms contain only one kind of information. For example, convenience of reporting may require that some failure data be reported on the status report form; this appears to be true for the computer, where the first indication of trouble usually appears at the main control console. However, whenever feasible, the use of a separate form for each kind of information should be used in order to reduce the amount of labor needed for complete analysis of the data.

3.1 Status Reports

One of the most essential pieces of information on a system's performance is that on reliability. In this connection the data obtained should provide at least:

- (1) The scheduled operational times lost due to equipment failures;
- (2) The intervals between failures;
- (3) The number of failures in a given period of time.

Status reports are intended to provide this information.

Normally, in a system scheduled for 24-hour operation, only one type (a system) status report is required. However, in the 1954 CCS and ESS where the individual equipments may be scheduled for 24-hour operation, but are used in the system for shorter periods, a separate status report for each equipment is recommended in addition to the system report. A similar recommendation is made for the case when duplexed equipments are used, since system reliability then depends upon the condition of the standby equipments as well as those being actively used in the system. To insure complete data, these reports should cover the status of the equipment (or system), including the use being made of it, during the entire 24-hour period.

The contents of the status reports as recommended by this committee are given in Appendices I and II. While most of the items are self-explanatory, it may be pointed out that the wording is arbitrary and can be changed if necessary for a better understanding.

The responsibility for filling out the status reports should be definitely assigned. In the case of the equipment, it would preferably be the technician in charge of its operation. For the 1954 CCS, the Maintenance Coordinator, previously mentioned, (or one of his staff) is recommended.

The "Maintenance Coordinator" should also provide some failure data which may indicate possibilities for improvement in the maintenance activity of that position; for example, a correlation of trouble indications with the sources of failure could increase the rapidity of locating (consequently, of correcting) troubles. However, since this type of data is of small quantity, it has been included in the recommended System Status Report (Appendix I) in order to obviate the need for a separate form.

3.2 Failure Reports

The value of failure reports for obtaining statistical data for improving maintenance, supply and design has been proven by the armed services as well as private industry. Several of the references^{11,12,13} contain excellent examples of the use of such data. Since the Lincoln Laboratory has the direct responsibility for the development of the SAGE system, it should obtain as much information as possible on the failures in the prototype equipments in the 1954 CCS and ESS. The proper analysis of this information, coupled with the status reports, will disclose design weakness as soon as possible and help evaluate improvements.

The Equipment Failure Report should be the responsibility of the maintenance supervisor; the information considered desirable is given in Appendix III. Although the DD-787-1 form will furnish most of the information desired, it does not include all of the desired details for some equipments: Essential computer-trouble indications such as alarms are not listed; details of data line failures and their indications can be much different from those listed; etc. This great diversity of details is one of the reasons that the committee feels that development of reporting forms should be treated as a separate full-time project.

3.3 Report on Examination of Failed Components

Since the 1954 CCS and ESS are to consist of many equipments still under development, it is essential that the engineers have complete information on the cause of equipment failures. In many cases this can be obtained only by a detailed test and examination of removed units or of other components replaced. A separate report on these examinations is recommended, containing the information listed in Appendix IV. In

this connection it is desirable to provide a tag which can be attached to the removed components so that they can be suitably identified.

4.0 Analysis of Status and Failure Reports

The reports recommended should be submitted on forms suitable for transfer to punch cards for analysis. In this area considerable development is required. The corresponding punch cards must be designed for maximum utilization of the columns. Also a knowledge of the analyses required is helpful in the layout of the card.

When the type of analyses have been agreed upon, there is the job of sorting and tabulating. This requires considerable study for efficient utilization of available equipment. This work, of course, cannot be undertaken until the reporting forms and their contents have been agreed upon.

5.0 Plan of Action

In order to provide failure data on the 1954 CCS and ESS, the committee recommends the following plan of action:

- (1) A meeting of responsible representatives from all participating organizations be convened to obtain agreement on the types and contents of reports (not forms) to be used and to initiate a coordinated effort towards implementing a compatible system of reports.

In order that a worthwhile attempt can be made to implement compatible reports on a systemwide basis, all organizations concerned with the system must agree on the reports needed. Moreover, they must agree to provide full cooperation in developing a compatible set of reports.* In this connection, it is understood that the contracts covering equipment operation and maintenance by groups outside of Lincoln may not cover the providing of such reports. In this case, the problem may have to be worked out with the help of the Air Force.

To obtain the agreements needed, a complete discussion of the problem is required. In addition to the organizations participating in the CCS and ESS, the Air Force and any other organizations which will have responsibilities in SAGE should be represented so that any set of reports developed in the experimental systems may aid in the development of those to be used in SAGE.

This meeting should be convened as soon as possible. Several organizations are already developing independent reports, not only for

* For details concerning the degree of cooperation which might be expected in this task, the reader is referred to the next recommendation.

the ESS, but also for SAGE. Consequently, the longer this task is delayed, the more difficult will be the establishment of a compatible set of records throughout the system.

- (2) A group be established in Lincoln to coordinate the development of a compatible set of reports and to implement a system of analysis.

Initially, this would be a full-time assignment for at least three people, one a staff member. That they have had some experience in failure reporting and punch-card analysis is desirable but not essential. The duties of this group will include the following:

- (a) To review the forms available from each activity and to insure the development of a set of forms to meet the requirements agreed upon.
- (b) To insure the development of adequate SOP's for filling out the forms in order that everyone (themselves especially) knows exactly what data is to be reported.
- (c) By agreement with all interested persons, to establish coding techniques for transferring the data to punched cards and to determine what summaries are to be obtained from analysis of this data.
- (d) To arrange for the IBM facilities required for punching and analyzing the cards and to initiate the preparation and analysis of cards punched.

No one of these tasks can be well done independently of the others; even when the first summaries become available, they may cause a revision in the ideas concerning the recording and processing of the data. Consequently, a consideration of the number of different equipments in the system and the number of participating organizations indicates that this group will certainly have a full-time job for several months.

- (3) Establish a group in Lincoln to handle all the routine work connected with the reports including data processing and analysis.

The size of this group and the facilities required can be estimated from the results obtained by the previously recommended group. Since IBM has established a group to do essentially the same work in the computer area, the Lincoln group responsibilities will have to be defined so that there is no duplication of effort. However, they should be free to review and comment on IBM procedures.

6.0 Conclusion

The committee feels that with this report, it has filled its obligations as outlined in the conferences held at Lincoln on 14 June 1955.

APPROVED FOR PUBLIC RELEASE. CASE 06-1104.

Memorandum 6M-3883

Page 11

It suggests that those attending the original conference be reconvened to consider the recommendations of this report and that steps be taken for rapid implementation of those agreed upon.

The committee can be of further service to Lincoln by monitoring the activities of a working group. Also the experience of the committee members in preparing forms and analyzing data by punch cards can be made available to such a group.

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APPENDIX I

SYSTEM STATUS REPORT

This report provides a continuous record of system status and includes additional information on indication of trouble, the time required to locate the trouble and the specific equipment in trouble. The additional information is required for efficient administration of the maintenance effort and could be the subject of a separate report. However, since both reports should come from the same source, they are combined in order to reduce the paper work. The report should be on a check-off type form suitable for transfer of information to punch cards.

The information that should be contained in the System Status Report is listed below, with brief explanatory comments.

1. System Designation
(Cape Cod, ESS, or SAGE Subsector No.)
2. Report Number
(Assigned by for reference purposes.)
3. Date
(Month, day, and year: 4/6/55.)
4. Reported By
(Name of person making the report. For later reference, when there is a question on details or completeness.)
5. Assigned Use:
 - Scheduled Mission No.
 - None
 - Calibration
 - Testing
 - Preventive Maintenance
 - Etc.

(This illustrates the type of information needed. The Scheduled Mission No. will probably be required only in the experimental systems to indicate how and what parts of the system are being used. In a fully operational system, this category would be

replaced by the system's normal function. The None category is included for the present when 24-hour operation is not specified.)

6. Condition

Operational

Operational With Reduced Capability - (list non-operating equipments).

Non-Operational, Scheduled

Non-Operational, Non-Scheduled

(Operational means that the system can correctly perform its normal function or scheduled mission. Operational with reduced capability means that system can operate although one or more equipments are not functioning. The non-operating equipments should be noted. Non-Operational, Scheduled covers such periods as those assigned to preventive maintenance or installation where the system has been dismantled as scheduled and will only be applicable in the experimental systems. Non-Operational, Not-Scheduled means that the normal system operation or scheduled mission has been interrupted by equipment failure.)

7. Time Start

(The time at which the change in the assigned use (5) or condition (6) has occurred. Should be the same as the Stop time on the previous status report in hours and minutes of local time, vis. 17:24.)

8. Stop Time

(The time at which the assigned use or condition ends should be the same as the Start time on the succeeding status report in hours and minutes of local time, vis. 19:56.)

9. Elapsed Time

(The time difference between Items 7 and 8 in hours and minutes, vis. 2:32. Provides a check on report accuracy and is used in reliability studies.)

10. Reason For Change

Change in Assigned Use

Equipment Failure

Environmental Conditions

Etc.

(This partial list indicates the type of information required.)

When the status change is the result of an equipment failure, the following items should also be reported.

11. First Indication of Trouble

Inoperative

Intermittent

Noisy

Etc.

(This partial list indicates the type of information required.)

12. Observer of First Indication of Trouble

Equipment Personnel

Monitor

Mapper

Maintenance Coordinator

Computer Operator

Etc.

(This list indicates the type of information required.)

13. Time When Trouble Was Located and Assigned For Correction

(In hours and minutes of local time 17:35.)

14. Time Elapsed

(The time difference between Items 7 and 13 in minutes is the time required by Maintenance Coordinator to locate the trouble. Will be zero, if trouble is first observed by equipment personnel.)

15. Equipment (or Major Unit) in Trouble

Type

Location

(Provides data on repetitive troubles and association between type of system trouble and source of trouble.)

16. Time When Trouble Reported As Corrected

(Hours and minutes of local time.)

APPENDIX IIEQUIPMENT STATUS REPORT

This report provides a continuous record of equipment status. It is required to provide information on equipment reliability, since some equipments such as central computer in the 1954 CCS and ESS may be operated on a 24 hour basis although the system is not. In this case the system status reports (Appendix I) will not provide the equipment status data required.

Although the situation may not exist in the SAGE system, duplex equipments will be in use, and the system status reports will only contain information on the active equipments in the system. Since reliability of this system will depend on the condition of the standby equipment, it is also necessary to provide information on the status of these equipments. Therefore, the continued use of equipment status reports appears desirable.

The requirement that these reports should provide a continuous record of the equipment status (rather than being requested only for times of equipment failures) is based upon previous experiences in obtaining reliable reporting. The increase in data reliability far offsets the disadvantage of increasing the paper-work required of equipment personnel. In addition, the use of a check-off type of report with no required narrative writing will facilitate reporting.

The information to be contained in the Equipment Status Report is listed below, with brief explanatory comments included.

1. Reporting Activity

(For identification of the responsible group: A/F squadron number, IBM group, etc. Especially needed when groups can be moved about.)

2. Equipment Location

(For direct identification. Especially needed when equipment can be moved and when the same group is responsible for equipments at more than one location.)

3. Equipment Identification: Model or Type and Serial Number

(The serial number especially needed when duplexed equipments are being used.)

4. Date

(Month, day, and year: 4/6/55)

5. Report Number

(Assigned by equipment personnel. For later reference. On questions of inadequate reporting.)

6. Reported By

(Name of personnel making the report. For later reference.)

7. Assigned Use

Normal operation

Preventive maintenance

Installation

Calibration

None

(This list illustrates the type of information needed. The None category is included for times when 24-hour operation is not specified.)

8. Condition

Active and

Operational

Operational with reduced capability

Non-operational: Not Assigned

Standby and

Operational

Operational with reduced capability

Non-operational - Assigned

Not Assigned

(The Standby condition is required when duplexed equipments are being used. Operational means that the equipment is performing or can correctly perform its normal function; Operational with reduced capability means that although not functioning fully the equipment can be used in the system.

Non-operational, Assigned means that the time has been assigned for preventive maintenance, installation, or some other use that makes the equipment inoperative in respect to its normal function; Non-operational, Not Assigned means that a failure has interrupted operations.)

9. Time Start

(The time at which the change in assigned use (7) or condition (8) has occurred. Should be the same as the Stop time on the previous status report on the equipment in hours and minutes of local time, vis. 17:24.)

10. Time Stop

(The time at which the assigned use or condition ends. Should be the same as the Start time on the succeeding status report in hours and minutes of local time, vis. 19:56.)

11. Elapsed Time

(The time difference between items 9 and 10 in hours and minutes, vis. 2:32. Provides a check on report accuracy and is used in reliability studies.)

12. Reason for Change

Electronic failure	Failure in associated equipment
Mechanical failure	Non-availability of part
Power failure	Change in assigned use
Unexplained failure	Environmental condition

(The list indicates the type of information required. Details of any failure can be obtained from the requested failure report, discussed in Appendix III.)

APPENDIX IIIEQUIPMENT FAILURE REPORT

One or more reports of this type should be made every time a piece of equipment fails in operation, or in a preventive maintenance test or inspection such as marginal checking. If the maintenance specification requires replacement of parts such as tubes after a given period of service, a report should be made on each replacement.

A separate failure report should be made for every part (resistor, capacitor, transformer, etc.) that fails or is replaced. While each individual report is of little value except for explaining why an equipment has been inoperative, the statistics accumulated from the reports of all failures are essential in improving maintenance, supply, and design. Long-term analyses will indicate trends and will show where engineering studies might prove useful in improving performance as well as reliability.

The information to be contained in the Equipment Failure Report is listed below, with brief explanatory comments included. All requested information may not be available for every failure; however, all applicable items should be reported.

- *1. Failure Report Number
(Assigned by equipment personnel. For later reference.)
2. System Report Number
(To be obtained by equipment personnel from Maintenance Coordinator. For cross-reference.)
- *3. Reported By
(Name of personnel making the report. For later reference.)
- *4. Reporting Activity
(For direct identification of the responsible group; A/F squadron number, IBM group, etc. Especially needed when groups can be moved about.)
- *5. Equipment Location
(For direct identification. Especially needed when equipment can be moved and when the same group is responsible for equipments at more than one location.)
- *6. Date of Incident
(Month, day, and year: 4/6/55.)

*7. Time of Incident

(Local time in hours and minutes, vis. 17:24. Provides a cross-reference with status reports.)

*8. Equipment Identification

*9. Major Unit Identification

*10. Subassembly Identification

(In order to facilitate the identification and presentation of trouble areas by machine analysis of these reports, the equipment should be subdivided as indicated in the last three items whenever feasible.

Examples:

Equipment:	Radar	Computer
Major Unit:	PPI	Rack (Frame)
Subassembly:	Power Supply	Plug-in Unit

At least the Model and Serial Numbers should be included in each case. Additional information concerning the contractor or manufacturer may be desirable for some equipments.)

*11. Part Data:

Name (6AT6, Resistor, etc.)

Symbol Designation (V-101, R-101, etc.)

Hours in Service

Serial Number

Manufacturer

(Both the name and symbol are needed as a check on report accuracy; also desirable when tabulations by tube types are wanted. Whenever the time that a failed part has been in service is known, this information is highly desirable. The serial number and manufacturer are also of importance when known.)

*12. Repair (or Replacement) Time

(The time required to find the trouble and to make the necessary repairs or, when a replacement unit is used, to make the replacement in hours and minutes.)

13. Replaced Unit Repair Time (if available)

(The time required to repair a failed unit, which in the meantime has been replaced in the equipment by another unit.)

14. Time Awaiting Part Not In Stock

(This time is obviously of importance to Supply.)

15. Repaired At

(When all repairs are not made at the equipment site, a list of possible repair locations should be included so that a record is available of the disposition of the unit.)

*16. Did This Trouble Interrupt The Assigned Use?

(Provides an indication of the importance of the trouble.)

*17. Was The Trouble Discovered During Preventive Maintenance?

(Marginal checking should be considered as preventive maintenance. This item permits easy sorting of the cards and is important because the statistical analysis of such failures is different from that of others.)

*18. Was The Failure Associated With Others?

(If two or more parts appear to fail at the same time, such an occurrence should be noted since a repetitive occurrence of this type will aid in discovering the basic cause.)

*19. First Indication of Trouble:

Inoperative

Intermittent Operation

Off Frequency

Parity Alarm

Overflow Alarm

Checksum Alarm

Etc.

(This list is incomplete, although indicating the type of information desired. Different types of equipment may require different lists under this item.)

*20. Type of Failure:

Burned Out
Bent
Broken
Gassy
Shorted
Out of Adjustment
Etc.

(This partial list is included merely to illustrate the type of information wanted.)

*21. Failed In or Due To:

Normal Operation
Faulty Packaging
Mishandling
Storage
Inspection or Testing
O.K. But Technical Order Replacement

(Required in order to insure complete supply information on the number of failed parts and to indicate the cause of failure.)

*These items are included on the Electronic Failure Report, DD Form 787-1, now being used by the Air Material Command. Although no space has been reserved on that form for Item 14, this information is also being requested in an available blank space on the form; Item 15 is also requested on the DD787-1 form, although no special space was saved for it.

APPENDIX IV

REPORT ON EXAMINATION OF FAILED UNIT OR PART

This report is to be requested whenever more detailed information is desired concerning a specific type of failure. For example, if the failure reports indicate an excessive failure rate of one type of unit, reports on detailed examinations of several similar failures will be desired to discover the reason(s) for them. Initially, while failure statistics are being compiled for a new type of equipment, a detailed examination of every individual failed part or unit may be desirable.

The information to be requested is listed below, with brief explanatory comments being included.

1. Examining Activity

2. Location

(These items completely identify the group responsible for the examination.)

3. Examined By

(Name of personnel performing the examination. For later reference.)

4. Report Number

(To be assigned by examining personnel. For later reference.)

5. Equipment Failure Report Number

6. Submitted By (Activity, Location)

(Items 5 and 6 provide identification of when and from whom the failed unit or part was obtained. For cross-reference.)

7. Unit Identification

(Type, Serial No., where used in equipment, Contractor, Manufacturer, etc.)

8. Failed Parts Data

(Each failed part should be listed with complete identification and all available information concerning prior service.)

9. Condition, Location, and Description of Failed Parts

(This probably must be supplemented by some narrative.)

Memorandum 6M-3883

Page 24

10. Primary Cause of Failure

(May require brief supplementary narration.)

11. Disposition

(Repaired, returned, scraped, etc.)

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