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STEP-BY-STEP SWITCHING SYSTEM CONTROLLED MAINTENANCE PLAN

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1.03 Parts 1 through 15, as shown in the table of contents, contain the principles, definitions, descriptions, explanations, and examples necessary to apply Controlled Maintenance. Part 2 defines central office equipment trouble, explains causes of trouble, and identifies common trouble-influencing factors. Part 3 describes the integrated plan for managing upkeep maintenance in the SXS Switching System. Parts 4 through 15 contain the required details of the different maintenance records, files, and techniques which are all part of Controlled Maintenance.

2. TROUBLES — THEIR CAUSES AND INFLUENCING FACTORS

2.01 Part 2 defines "trouble." It describes various causes and influencing factors. Some ideas on the proper use of environmental and personnel control are included. A full comprehension of trouble-influencing factors and the administration of corrective measures are vital to the understanding and application of Controlled Maintenance.

2.02 A "trouble" is said to occur when switching equipment fails to function as designed. The existence of the "trouble" is noted when a service or test call is applied to the affected equipment and results in an alarm, a report, a trouble card, or other observed indication. Customer service may be affected. This would depend on circuit design provision for a second trial or for selection of another route.

2.03 Not all equipment troubles are immediately evident. Circuit design does not always provide for an alarm or other trouble indication because of cost limitations. When troubles occur under this condition and the fault is in the customer line equipment, it is usually adequate to rely on customer reports for obtaining adequate information for trouble locating. However, when troubles occur in common equipment and trouble-identification circuitry is not provided, Plant forces may be unaware of their existence. Methods, explained later, are required for detecting these troubles.

2.04 *Intermittent and Transient Troubles:* "Intermittent troubles" are those which continue to appear and disappear until they are cleared. For example, wire clippings cause inter-

mittent faults and may also cause trouble indications to appear in different locations. The operation of switches and relays causes sufficient vibration to disturb wire clippings, resulting in the trouble-causing contact being broken intermittently. "Transient troubles" are those which appear once and disappear. For example, momentary opens or crosses caused by improper procedures on distributing frames may result in transient trouble such as noise, "clicks," or cut-offs.

2.05 *Common Equipment Troubles:* Many troubles occur in common equipment. "Common equipment troubles" produce reports and other indications which may originate from different sources. In addition, the indications often vary in amount and kind of information received. When this is the case, the different trouble indications may be misleading or obscure. However, in some cases of common equipment trouble, reports or indications received may disclose a common element. These cases are usually referred to as "patterns."

2.06 *Marginal Troubles:* "Marginal troubles" are failures of equipment under marginal tests applied by test frames or test sets. These tests are more severe than demands usually encountered in service connections. Marginal tests (either electrical or mechanical) are applied to apparatus to determine if the required reserve is present. If marginal test failures occur, it is an indication that normal deterioration has used up the reserve and that corrective action must be taken before it becomes service-affecting.

2.07 Fig. 1 illustrates different kinds of conditions which may affect calls. Calls affected by central office equipment troubles are shown in more detail. The main points illustrated are:

- (a) Not all troubles affect all calls.
- (b) Of the affected calls or affected machine attempts, many are subsequently completed.
- (c) The second trial feature provided in some SXS equipment substantially increases the probability of call completion when the first trial has been affected by common equipment trouble.

Causes of Troubles

2.08 Plant forces responsible for maintaining switching equipment must be familiar with the following causes of troubles, most of them the result of electrical or mechanical failures.

Dirt — Dirt may come from within or from outside the central office. Lint from clothing or other textiles, fibers from paper or cardboard boxes and packing material are common kinds of dirt. Dirt may also be due to dust carried in the air or brought into the building by people or on equipment. Solid particles or other residue, caused by contact arcing, are also called "dirt."

Wear — The continual operation of relays, switches, motor drives, brushes, etc, results in deterioration. Wear can be accelerated by dirt and faulty workmanship. Dirt can increase the friction between moving parts. Faulty workmanship which results in improper adjustment can accelerate wear.

Work Errors — Central office troubles can be caused by faulty workmanship or by improper procedures. Work errors may be caused by central office people or by others working in the office. In addition, work errors are found in central office record information (service orders, transfer orders, circuit layout cards, etc) as a result of work errors by employees in other departments.

Defects — Failures of apparatus or of components such as open relay windings, broken rotary pawls, internal crosses or grounds in spring assemblies, are called "defects."

Trouble-Influencing Factors

2.09 Plant forces must also recognize the key factors of central office maintenance which reduce dirt and work errors to a minimum and serve to diminish trouble due to wear. These factors are basic and should be *thoroughly* understood. They are described in 2.10 through 2.16.

2.10 Installation Activity: One of the controllable factors which influence central office equipment trouble rates is installation activity. It is essential that central office people and the installation forces be thoroughly familiar with

proposed work before the job is started. They must be familiar with instructions relating to central office equipment installation, which are found in Section 201-112-001 and the attached Western Electric Handbook sections. These instructions explain in detail the procedures for protecting service and equipment during installation work.

2.11 Central Office Personnel Activity: Activities by maintenance people may cause trouble by disturbing existing dirt or by introducing more dirt. They may also cause failures if they do not follow prescribed methods for adjusting apparatus or do not follow proper procedures for doing other work.

2.12 Housekeeping: Section 069-503-801 contains instructions for cleaning equipment without causing service reaction. Surface dusting and pressure-cleaning procedures should be followed to remove dirt from equipment. Material should not be stored, unpacked, or crated in equipment areas. Tools, test equipment, drawings, and supplies should not be allowed to become dirt collectors. Except when work is in progress, all equipment covers should be in place.

2.13 Contractor and Visitor Activity: During building alterations, large amounts of dust and dirt can be brought into the equipment areas. Special protection, such as temporary, dustproof partitions and special control of windows, doors, and ventilating equipment may all be required. Central office people should be on the alert for service or safety hazards and should inform the contractor's representative or the Chief Engineer, as appropriate, of the need for preventive requirements. Coordination with other departments and control of visitors during "Open House" and other activities also help to reduce dirt.

2.14 Other Force Activities: When it is necessary for other forces to work in the central office, the nature and duration of their visit and the details of work to be performed should be reported in accordance with local instructions. Central office forces are responsible for seeing that the work is performed in such a way that customer service is not jeopardized.

2.15 Environmental Control: Some central offices are provided with equipment for filtering air and regulating humidity. Its effective use, coupled with controlled use of windows, outside doors, and openings between building areas will reduce the introduction and circulation of dirt.

2.16 Application of Bell System Practices:

Bell System Practices prescribe proper procedures for testing, removing from service, adjusting, and repairing equipment. Work performed in accordance with these instructions should result in effective repairs without service reaction. Nonstandard adjustments or repairs must be avoided.

The Trouble Problem

2.17 Control of central office equipment troubles is made up of three main categories as follows:

Handling Trouble Reports — Prompt response and proper handling of reports, including fast restoral of service, is a key part of the central office trouble control job.

Detection of Obscure Troubles — It must be recognized that other equipment troubles exist and are affecting service but are not evidenced by associated indications. Scheduled, trouble-seeking procedures must be an integral part of the total maintenance plan for controlling these troubles.

Control of Trouble-Causing Factors — Control of dirt, limitation of wear, equipment protection, work errors, and outages are the main factors. This is the essence of the maintenance job. The maintenance people should thoroughly understand the operation of the equipment, the use of the test gear, and the true significance of trouble reports.

3. CONTROLLED MAINTENANCE — CORRECTIVE AND PREVENTIVE

3.01 *Controlled maintenance* is the term applied to the maintenance plan described in this section. It consists of an appropriate balance of corrective and preventive maintenance, tailored to the needs of the SXS Switching System. The terms "corrective maintenance" and "preventive maintenance" are defined as follows:

Corrective maintenance consists of the activities of logging reports, locating, repairing, and recording details of troubles reported by trouble recorders, trouble ticketers or by indicators, customers, operators, alarms, other offices, testboards, and other sources.

Preventive maintenance is the term applied to the activities of finding, repairing, and recording troubles, service-affecting or not, which are not associated with indicators received, and for other troubles for which there are inadequate indicators. For convenience of description, these activities are separated into two divisions: (1) The examination of corrective maintenance records for evidence of increasing trouble and the testing of associated equipment for further evidence. (2) The scheduling of manual or test frame tests for locating other troubles for which indications are obscure, or for the purpose of affirming the correct operation of selected, critical equipment items for which in-service failures cannot be tolerated.

3.02 In the Controlled Maintenance Plan, corrective maintenance procedures are used for handling trouble reports from all sources. These procedures are aimed at: (1) providing an effective means for controlling the prompt handling of trouble reports, (2) dispatching these reports for trouble location and repair, and (3) providing for orderly but simplified records which present information in an effective way for possible later use. It should be recognized that corrective maintenance is an adequate method for handling reports and indicators of trouble where information supplied contains sufficient detail for locating the trouble. The information is accurate, and it is received promptly.

3.03 The prompt receipt of adequate trouble details for trouble location depends largely on internal circuitry designed to *detect* and *report* failures or on the ability of the user (customer or operator) to provide *accurate* and *sufficient* description of the *noticed* effects of the trouble. In SXS, the latter is limited to customer line equipment and trunks used directly by operators.

SECTION 226-001-010

3.04 For SXS equipment, where the conditions stipulated in 3.03 are not met, other means for detecting troubles must be used so that troubles and deterioration, not yet affecting service, do not accumulate. Preventive maintenance, as outlined in this section, provides an *effective* and *economical* method for locating and repairing these troubles.

3.05 The key to the balanced use of corrective and preventive maintenance in the Controlled Maintenance Plan is the Equipment Test List. This list contains all the test requirements for the SXS Switching System. Tests are classified according to criteria established along the lines described in 3.03 and 3.04. The test classifications are defined in Section 226-001-011, SXS Switching System Equipment Test List Instructions.

3.06 The test classifications used in the Equipment Test List provide for the following:
(1) Where the failure of equipment could result in severe service reaction *and* where trouble details are missing or obscure, periodic tests are required. (2) For other equipment, where failures do not result in serious failures or reactions, scheduled reviews are required. The reviews are made for the purpose of determining the need to perform complete tests of the equipment. The Plan allows for only one review to be passed. On the next review, some action must be taken. (3) The Equipment Test List also provides for full use of test frame or test set tests. These tests are designed to detect failures or near-failures of equipment which, in most cases, are not readily detected by trouble reports and indications.

3.07 Fig. 2 depicts an overall view of the Controlled Maintenance Plan. The objective of the Plan is to maintain the designed capabilities of switching equipment. Quality control measures applied to manufacture and installation processes are intended to ensure that Telephone Companies are provided with equipment installations which meet the standards established by the design. In the Controlled Maintenance portion of Fig. 2, three "legs" can be seen. One is for corrective maintenance and the other two are for preventive maintenance. The center of Fig. 2 depicts the preventive maintenance activities which are the result of examination of

corrective maintenance details. This process is limited to those circuits where indicators are received, and they provide sufficient detail for examination and recognition of evidence of other troubles not yet reported or associated with reports received.

3.08 The right-hand part of Fig. 2 depicts the preventive maintenance activities which originate from the Equipment Test List. Both manual and test frame tests are represented here. This leg covers equipment where trouble indicators are missing, misleading, or obscure and accordingly require other means for recognizing trouble.

4. FORM E-5461, SXS TROUBLE TICKET

General

4.01 Part 4 describes Form E-5461, SXS Trouble Ticket, and its use in SXS offices. Included are instructions for making entries on trouble tickets, as well as examples of completed trouble tickets.

4.02 The Controlled Maintenance Plan applies to switching equipment. Troubles associated with switchboards and toll terminal equipment are described in other sections.

4.03 Trouble tickets are corrective maintenance work orders and records for central office maintenance people. Tickets are source documents for details of trouble reports and resultant found or not-found troubles. It is important that tickets be written for all trouble reports and that *entries be complete, accurate, and legible.*

Description

4.04 Form E-5461, printed on white paper, measures 3-1/2 by 6-1/2 inches.

4.05 The front of the trouble ticket provides space for entering information concerning reports, trouble indications, detailed descriptions of action taken, and troubles found (see Fig. 3). The back of the trouble ticket provides space for recording tracing information (see Fig. 4).

Use

4.06 The trouble ticket is used in all cases to record details of trouble reports or of related work operations. Trouble tickets are indicated as "T" or "Memo," according to 4.07 through 4.14.

4.07 "T" tickets are issued for reports from customers, employees, other departments, other offices, alarms requiring corrective action, trouble indicators, trouble ticketers, and trouble recorders as shown in Fig. 5, Table A.

4.08 "Memo" tickets are issued as memoranda of tracing information on permanent signals and interoffice or intraoffice connections. They are also used as memoranda of referred work, such as replacement and adjustment of apparatus, and for transmitting information to another employee. Troubles seen as a result of casual observation, not related to any scheduled tests or trouble-seeking activity, are recorded on "Memo" tickets. Also, installation or other work activity in a large central office building may require advice to the maintenance center through the use of a "Memo" ticket.

4.09 "Memo" tickets may be issued to cover pending work operations as a result of closed-out trouble reports ("T" tickets) where repairs are to be made later. When the report is closed out and service is restored by removing the defective equipment from service, the associated "T" ticket is retained in a special file for pending work. Later, when a craftsman is assigned to clear up these items, a "Memo" ticket is issued for recording details of the repair or replacement work operation. When the equipment is restored to service, the "T" and "Memo" tickets are completed and filed.

4.10 Trouble tickets are not issued for recording troubles disclosed by preventive maintenance activities such as tests, inspections, and samples. Procedures for handling these troubles are discussed in Parts 11 and 12.

4.11 All "T" tickets, as well as "Memo" tickets issued for traces, are serially numbered for identification and for relating them to reports or troubles.

4.12 When "T" tickets are closed out, details of found or not-found troubles are recorded for future studies. The right-hand part of the ticket is arranged for coding trouble data. Fig. 6, Table A, illustrates entries to be made in the "Equipment" and "Apparatus" spaces. Fig. 6, Tables B and C, illustrates entries to be made in the "Cause" and "NTF" spaces. A trouble-coding decision chart for different trouble-coding situations is shown in Fig. 7. Fig. 8 through 19 illustrate ticket use. "Memo" tickets are not to be coded.

4.13 Each "T" ticket *must* have an entry in the "Equipment" space. Enter the equipment and number, "NTF" or "REF OUT," whichever is applicable as explained in Fig. 6, Table A. All troubles which are found in the apparatus or wiring of an equipment frame should be coded to that equipment. Troubles which "came clear while testing," but which have been isolated to a particular equipment frame, are also coded to that equipment.

4.14 When several reports or indications received at the same time are found to be the result of one equipment trouble, the "T" tickets should be associated for correctly recording trouble information. Part 8, Form E-5463, Trouble Summary, describes how equipment trouble counts are used for maintenance administration. It is vital that on the Trouble Summary only one count be made for each equipment fault.

Plant Service Center Referrals

4.15 Form E-4086, Inspection and Routine of Central Office Equipment, is used by Plant Service Centers to refer trouble patterns to central offices. When one of these tickets is received, a Form E-5461, SXS Trouble Ticket, should be associated with Form E-4086. Only action taken, coding, and closeout details need be entered on Form E-5461. Fig. 20 is an illustration of Form E-4086.

4.16 Plant Service Centers use a code on Form E-4086 for customer reports. Similar types of customer reports are grouped. The coding system is called *Group Classification*. Form E-4736, Classification Codes and Definitions for the Manual Handling of Trouble Reports, illustrated in Fig. 21, depicts and explains the codes.

5. FORM E-5457, CENTRAL OFFICE LOG

General

5.01 Part 5 describes Form E-5457, Central Office Log, and its use in SXS offices. Illustrations of the form and typical examples are included.

5.02 The log is used for recording trouble reports, traces, and central office activities which could result in trouble reports. Information such as volume, origin, coding, and status of trouble is readily available for alerting central office forces to unfavorable changes or reactions in switching performance.

Description

5.03 Form E-5457, printed on white paper, measures 8-3/8 by 10-7/8 inches and is punched for filing in standard ring binders.

Use

5.04 Fig. 22 illustrates the use of Form E-5457, Central Office Log, by means of typical examples and explanatory notes.

5.05 The log may be closed out daily or periodically, depending on the volume of trouble reports and other entries. In large offices, the number of entries may be sufficient to require a separate log for each day. In smaller offices, it may be more convenient to use a sheet for several days. In either case, any trouble reports which are not closed out on one sheet of a log should be carried over to the log for the next day.

5.06 The log may also be used for noting central office activity, such as installation, contractor, or preventive maintenance activities. These kinds of entries are useful for investigating trouble increases which may be associated with central office activity.

5.07 Some offices require only one log for recording all reports and other activities. In large offices, it may be better to use separate logs for trouble reports, alarms, installation work, or other activities. It is not required to enter stuck sender or originating register trace tickets on the Central Office Log (see Part 14).

6. FORM E-5462, SXS CONTROL RECORD

General

6.01 Part 6 describes Form E-5462, SXS Control Record, and its use in SXS offices. Included are illustrations of the form, with typical examples.

6.02 Columns are provided for recording data pertaining to service, performance by each equipment group, and reports resulting in no trouble found. Several blank columns are provided for recording data for locally selected trouble indicators or common control equipment. The bottom three lines of the control record are arranged for entering partial and total objectives for selected indicators. See Fig. 23 and 24 for illustrations of Form E-5462.

Description

6.03 Form E-5462, printed on both sides on white paper, measures 8-3/8 by 10-7/8 inches. It is made for tumble-turn filing and is punched for standard ring binders.

Use

6.04 Form E-5462, SXS Control Record, provides a current picture of found and not-found trouble data accumulated for a month, usually on a daily basis.

6.05 Cumulative entries are made for each of the indicators under "Service Index." This is done to facilitate partial or total month comparison with an established bench mark. Other indicators may be entered cumulatively or by actual numbers. Cumulative entries are more easily compared with partial or total month objectives when trouble rates are large. Adverse changes or trends, deviating from the performance objectives, can be promptly recognized (see Fig. 23 and 24).

6.06 Most of the data recorded on this form is taken from Form E-5461, SXS Trouble Ticket. Only "T" tickets are summarized and recorded. The remainder of the data is supplied by plant and traffic registers and information from the Plant Service Center and Service Observing Force. Registers should be read at the same time each day, so that comparisons made

apply to equal time periods. Form E-4744, Register Readings, may be used for recording the daily readings and differences from the preceding readings (Fig. 25).

Setting Objectives

6.07 Significant deviations in the levels of service can be readily detected through the use of preset objectives. For this reason, it is necessary to establish objectives that are meaningful and attainable.

6.08 Objectives for the indicators listed under "Central Office Service Index" can be readily set. These service index indicators include all of the components of the Dial Central Office Service Index.

6.09 The following example illustrates a method for setting a Code 5 and 8 objective, using the rate shown in the index table in Section 201-102-002 for step-by-step.

(a) The index table shows that 2.75 reports per 100,000 originating calls is equivalent to a 97 component index. This is selected as the objective.

(b) Last month, the total originating peg count was 5,000,000. It is assumed that next month the peg count will be similar, and can be used as the base figure.

(c) The objective failure rate (2.75 reports per 100,000 originating calls), multiplied by the originating peg count in units of 100,000 (50×2.75), equals 137 reports, which is the maximum number of Code 5 and 8 reports that will produce a 97 component index for the month.

(d) To compute the partial month objectives (10 days, 20 days), the figure, 137 is divided by 3. One-third (45) is the 10-day objective, two-thirds (90) is the 20-day objective, and the total (137) is the objective for the month (see Fig. 23).

6.10 As the cumulative Code 5 and 8 reports are posted, the figures for the tenth and twentieth days are compared with the objective. It is unnecessary to wait for the tenth or twentieth day before making comparisons. The fifth day or any other day may be chosen and a simple mental division made to ascertain the objective.

For example, in 6.09(d), the ten-day figure of 45 equates to 22 for five days. This procedure permits prompt recognition of adverse service and control of results by the application of remedial action.

6.11 Objectives are set for all service components, using the Dial Central Office Service Index Tables. Partial and total month objectives for found troubles in the equipment groups and the three "NTF" classifications may be established by using trends and comparisons with past performance.

7. TICKET FILE

General

7.01 Part 7 describes the ticket file which is used in SXS offices. The file provides for systematic storage of all trouble tickets. They are readily available for reference or study. The file should be located where the maintenance records are kept.

Description

7.02 Fig. 26 shows a ticket file. Ordering information is included. Each ticket file unit is equipped with two fixed and two snap-on designation strip holders and 26 bin dividers. The bin sizes can be established in increments of 3/4 inches. This feature provides for various filing arrangements. In addition, file units may be connected together to provide the required size for an office.

Use

7.03 In the ticket file, ticket bins should be arranged to correspond to the equipment groups listed on Form E-5463, Trouble Summary (see Part 8). All "T" tickets should be filed together, according to the equipment group in which the troubles were found. All "NTF" tickets which cannot be associated with a particular unit of equipment should be filed in one of the three bins designed as "NTF" (originating, terminating, and other).

7.04 Trouble tickets should be retained in a three-month moving file. At the end of each report period, tickets for the oldest month should be removed (see Part 15 for Retention of Records).

7.05 Fig. 26 illustrates a suggested ticket file arrangement. Trouble tickets filed in each equipment group bin (line finder, 1st selector, connector, etc) should be filed sequentially by equipment number. For example, line finder frames 201, 202, 203; first selector frames 201, 203, 206 might represent trouble tickets filed in these equipment bins for troubles that had occurred in this equipment. During the course of a month, as tickets are filed by equipment number, repeat troubles may be easily seen through this filing method. That is, as each ticket is filed by equipment group and number, the tickets for the current month are examined quickly to see if the latest ticket is a repeated trouble.

7.06 Separate bins should be designated for filing "Memo," "Hold for Repair," and "Pending" trouble tickets issued during the current month. In most cases, "Memo" tickets need not be retained beyond the end of the month. For special studies, spare bins may be used.

8. FORM E-5463, TROUBLE SUMMARY

General

8.01 Part 8 describes Form E-5463, Trouble Summary, and its use in SXS offices. Included are examples of its use and instructions for recording information on the Trouble Summary and for interpreting data.

8.02 Form E-5463 is provided for recording each month the number of troubles associated with designated equipment groups. The form is arranged for comparison of troubles by months (trends), comparison of trouble with the past year's average, and comparison with an objective level of trouble.

Description

8.03 Form E-5463, printed on white paper, measures 8-3/8 by 10-7/8 inches and is punched for filing in standard ring binders.

8.04 Fig. 27 is an illustration of Form E-5463. It contains examples of entries to be made. A column is provided for listing major groups of equipment. Other columns are provided for recording the average number of troubles for the previous year, the current objective, and the number of troubles coded to each equipment group each month.

8.05 The back of the form provides space for entering remarks or explanatory notes which refer to entries made on the front of the form.

Use

8.06 The Trouble Summary provides space for recording trouble data by months so that the trouble trends are readily apparent. The data recorded on this summary is transcribed from the total found and not-found trouble figures developed on Form E-5462, SXS Control Record. "Memo" tickets are not recorded on the Control Record. Therefore, only summaries of "T" tickets by equipment groups appear on the Trouble Summary. Additional spaces are provided in the "Equipment" column of the Trouble Summary, in case a further breakdown of equipment trouble is required for special studies.

8.07 Two columns, "Avg. Prev. Year" and "Cur. Obj.," are provided on the Trouble Summary for comparing current trouble trends with past trouble results and for comparing also with an objective figure. As the number of troubles are entered each month for each equipment group, comparisons are made. If the number of troubles for a particular equipment group should rise unexpectedly or if a gradual rising trend is noticed, investigation to determine the cause is required.

8.08 The "Avg. Prev. Year" column is provided for entering the average month's trouble figure for the previous year. It is expressed as a whole number opposite each entry listed in the "Equipment" column. The number entered in this column should not in all cases be the arithmetical average of last year's trouble history. If for one or more months of the previous year, the trouble rates were excessively high or low for known reasons, then the average should represent only the other months of the year, so as not to distort the figure shown on the Trouble Summary. The point here is that the average of the previous year is intended to be a bench mark for making comparisons with present trouble rates. In order for such comparisons to be realistic, it is required that the figure shown in the "Avg. Prev. Year" column also be a realistic figure.

8.09 The "Cur. Obj." column is provided for entering the current year monthly objective figure. It is expressed as a whole number

opposite each entry listed under the "Equipment" column on the Trouble Summary. When the objective for the next year is being calculated, consideration must be given to current trends of trouble rates and conditions known or expected to exist next year which might affect trouble rates. For example, the addition of more frames, the transfer in or out of customer lines, the addition of new services or features, and the result of a reconditioning program would all have an effect on future trouble rates. The objective should be set with these in mind. In addition, the objective figure should be adjusted if actual results obtained are *far out of line* with the previously set current objective and the cause is known.

8.10 Form E-5463, Trouble Summary, is used for presenting trouble data in large enough pieces (monthly for each equipment group) so that developing trends can be recognized. When adverse trends are seen, investigation should be made for determining cause. The manner in which this is done is described in Part 9. Action taken as a result of investigations made should be noted on the back of the Trouble Summary, as shown in Fig. 27.

9. FORM E-5464, SXS TROUBLE TALLY SHEET

General

9.01 Part 9 describes Form E-5464, SXS Trouble Tally Sheet. Included are explanations of entries made on Form E-5464 and illustrations of its use in SXS offices.

9.02 Form E-5464 may be used when the Trouble Summary or the Control Record indicates that detailed examination of trouble data, coded on trouble tickets, is required.

Description

9.03 Form E-5464, printed on white paper, is 8-3/8 by 10-7/8 inches and is punched for filing in standard ring binders.

9.04 Entries on Form E-5464 correspond to the "Apparatus," "Cause," and "NTF" coding spaces on Form E-5461, SXS Trouble Ticket. The tally sheet is arranged so that coded trouble data

on tickets may be easily transferred to a tally sheet when required. Space is provided for recording totals of troubles for equipment units, for apparatus, and for various causes. Fig. 28 illustrates the use of Form E-5464, SXS Trouble Tally Sheet.

9.05 The back of the form is ruled for ease in making entries or remarks which pertain to knowledge gained from making the tally or from causes determined, as well as for action taken or not taken as a result of tallies made.

Use

9.06 Whenever the trouble data recorded on Form E-5462, Control Record, or on Form E-5463, Trouble Summary, exceeds objectives or is observed to be a rising trend, an investigation should be made to determine the cause. The first step is to select the trouble tickets filed under the affected equipment group for the period during which the trouble increased and tally them on the trouble tally sheet. Next, a group of tickets covering the preceding period of the same length as the first group are tallied on the same tally sheet but in a different color or column. Usually, a quick comparison of the tallies will be sufficient to identify the main contributor to the increase in trouble.

9.07 After the tickets have been tallied and the cause determined, they should be returned to the ticket file and arranged as before. Instructions for filing trouble tickets are covered in Part 7.

9.08 When the use of the tally sheet does not clearly identify the cause of an increase in trouble, it might be necessary to make use of sample inspections or tests to determine the exact nature and extent of the trouble condition. It is possible that an increase in total troubles noted on the control record or on the Trouble Summary could be caused by small increases in one or more trouble causes in different apparatus. It is likely that this will occur infrequently.

9.09 It could be argued that, within an equipment group, a trouble increase in one kind of apparatus due to one cause could be offset by an equal trouble decrease in the equipment group

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for another kind of apparatus and cause in the same time frame. If such an unlikely event should occur, the total number of troubles, for the month, would be unchanged and normally undetected on the Trouble Summary.

9.10 After maintenance activities aimed at reducing trouble rates have been started, indicators should be watched for a drop in trouble. If the drop occurs, the extent of it should be considered when evaluating trouble levels on the Trouble Summary. If the expected drop in trouble does not occur, it is necessary to examine additional trouble data to determine the nature of the new situation.

9.11 Fig. 29 is a block diagram of the corrective maintenance process describing Parts 4 through 9. All corrective maintenance flows from trouble reports or indications and ends with the service restoral and report close-out. Information is collected and recorded on the Control Record and trouble summary for preventive maintenance reference.

10. FORM E-5450, EQUIPMENT TEST LIST, AND FORM E-5451, SCHEDULE

General

10.01 Part 10 describes Form E-5450, Equipment Test List, and Form E-5451, Schedule. These forms are provided for listing and scheduling all equipment tests and inspections found in Bell System Practices. Included are examples of the use of the forms.

Description

10.02 Forms E-5450 and E-5451, printed on white paper, measures 8-3/8 by 10-7/8 inches. Form E-5450 is punched in the right-hand margin for filing in standard ring binders, whereas Form E-5451 is punched in the left-hand margin. These forms are arranged this way so that Form E-5450 can be filed as a left-hand facing sheet and associated Form E-5451 can be filed as a right-hand facing sheet. Fig. 30 illustrates the filing method of Forms E-5450 and E-5451.

10.03 Form E-5450 is provided with columns for listing section, test requirement or paragraph, work description, test classification, frequency, and job number assigned in the office. Form E-5451 provides a column for listing the job numbers assigned to the tests. Other columns are provided for indicating the particular period of time when requirement is scheduled. Most scheduling is done on a monthly basis, and assignments can be indicated by a diagonal line in the appropriate spaces. The completion of an assignment is usually shown by a second diagonal line, forming an "X." Test frequencies not assigned by the month (weekly, biweekly, etc) can be indicated by a horizontal line in the appropriate spaces. Vertical lines can then indicate the number of times the test has been completed in the month. Tests with daily frequencies can be assigned by simply entering the word "Daily" on the schedule, next to the job number.

Use

10.04 Form E-5450 is the format for a series of Bell System Practices, known as *test lists*, specifying classifications and frequencies, where applicable, for BSP tests and other requirements related to standard central office equipment. For each major switching system, there is one test list which contains the tests and requirements for that system and for directly associated apparatus. The test list for SXS equipment common to all offices is Section 226-001-011. There are two additional test lists for specific and miscellaneous equipment. These lists are designated Sections 225-001-011 and 227-001-011, respectively.

10.05 In order to provide a complete record of all tests and inspections found in the section, the Equipment Test Lists contain tests which may not apply to some offices. Where this is the case, the pages which do not apply should be retained for later needs. Parts of other pages which do not apply are indicated by writing "NA" in the associated scheduling sheet spaces on Form E-5451.

10.06 Other tests not included in Divisions 225, 226, and 227, but which apply to other equipment, are to be entered on blank Forms

E-5450. Examples are building security and safety items. Form E-5451 is associated as described.

10.07 All of the tests and requirements in the Equipment Test List are given one of the following four classifications: MW, MR, TF, or TT. These classifications are defined in the Equipment Test List section. MW (Mandatory Work) tests *must be performed* at least as often as the frequency specified in the Equipment Test List. MR (Mandatory Review) tests *must be reviewed*, for the need to do them, at least as often as the frequency specified in the Equipment Test List. A record of the review must be made on the Test and Inspection Summary, even if no action is taken. A mandatory review at the next interval requires further action. Fig. 31, Table A, shows the MR Review Procedure.

10.08 TF (Test Frame) tests are scheduled according to a test frame program developed locally. The test frequency for each TF test, as specified in the office program, is posted in the "FREQ" column on Form E-5450 of the Equipment Test List. Every TF test must be included in the office program and must be performed accordingly. Completed TF tests are indicated by appropriate marks on Form E-5451.

10.09 Tests classified as TT (Trouble Test) are not scheduled. These tests are listed on separate pages in the Equipment Test List, for filing separately. TT tests are included in the published Equipment Test Lists so that every test and requirement has an assigned classification, and to provide a ready reference for select-

ing tests for trouble clearing and equipment testing purposes.

10.10 The frequencies at which tests are scheduled are indicated by the following symbols:

| SYMBOL | FREQUENCY |
|--------|--|
| D | Daily |
| W | Weekly |
| M | Monthly |
| — | Less frequent intervals are indicated by a number prefix, for example, 6W for once in six weeks. |

11. FORMS E-5453, E-5454, AND E-5455, TEST AND INSPECTION SUMMARIES

General

11.01 Part 11 describes Forms E-5453, E-5454, and E-5455, Test and Inspection Summaries. Included are illustrations of the use of these forms.

11.02 These forms are sources of information for preparing Form E-5452, Test and Inspection Work Order and Record, which is described in Part 12. The information on Forms E-5453, E-5454, and E-5455 is obtained from the Equipment Test List and also from office equipment records. In addition, spaces are provided for summarizing found troubles and craft work time.

Description

11.03 The three Test and Inspection Summary forms are described below:

| FORM | TITLE | SIZE | SIDES PRINTED | PAPER STOCK | MARGIN PUNCH |
|--------|-----------------------------|------------------|---------------|-------------|--------------|
| E-5453 | Test and Inspection Summary | 8-3/8" x 10-7/8" | Both | Bond | 7 holes |
| E-5454 | Test and Inspection Summary | 5" x 8" | Both | Card | No |
| E-5455 | Test and Inspection Summary | 11" x 17" | One | Bond | 7 holes |

11.04 Form E-5453 provides spaces on the front for recording assignment data, section number, equipment, work description, number of equipment units involved, estimate of work time, and results of work done (see Fig. 32). The back of the form provides more spaces for results. Form E-5454 is a smaller version of Form E-5453 (see Fig. 33); Form E-5455 has more space for summarizing multiple assignment work details for certain jobs in large offices (see Fig. 34). These are jobs which must be broken down into smaller assignments because the amount of overall work is too great for scheduling at one time.

Use

11.05 A Form E-5453, E-5454, or E-5455 must be prepared for each MW, MR, or TF test or requirement specified on the Equipment Test List. For nonmultiple jobs a Form E-5453 or E-5454 may be used, depending on the filing system used in the office. Form E-5455 is used where large multiple assignments are required and a considerable amount of summary information is collected.

11.06 Generally, it is preferable that Equipment Test List job assignments be made so that the work may be completed within a work tour. However, there are cases where these assignments are used as fill-in work to round out a fixed-work job assignment. In these cases, the work may be spread over several days. For tests and inspections which are scheduled at longer intervals, it may be better to divide the work into several job assignments. This has the advantage of providing a constant check on equipment performance and also produces a more even distribution of work load. The equipment involved in a yearly requirement might be divided into parts, for example, with consideration given to vacation periods or other factors. This is a typical multiple job assignment which would use several lines on a Form E-5455. When large jobs are divided into smaller job assignments, a limiting factor which must be considered is the setup time. If the setup time is appreciable, then the minimum job assignment must be long enough so that the setup time is only a small part of the total.

11.07 Form E-5453, E-5454, or E-5455 provides the necessary information for preparing Form E-5452, Test and Inspection Work Order

and Record. When the work is completed, trouble details, time spent, and initials of the workman are to be entered on Form E-5453, E-5454, or E-5455.

11.08 There may be tests for which few troubles are expected and where the work can normally be completed in one tour. In these cases, Form E-5453 or E-5454 may be used as both the work order and the summary, and the test results may be posted directly on these forms (see Fig. 33).

11.09 Form E-5455 is used for tests or inspections where multiple job assignments are required. This form provides spaces for 35 individual assignments. In these cases individual work orders, Forms E-5452, are issued as each assignment is due. When the assignment is completed, details are taken from Form E-5452 and are posted in the appropriate spaces on Form E-5455 (see Fig. 34). It may be desirable to illustrate progress on extended programs. This can be accomplished by coloring the "Work Compl." spaces as completion dates are entered. A light-colored pencil, such as yellow, will provide the effect without obliterating the entries (see Fig. 34).

12. FORM E-5452, TEST AND INSPECTION WORK ORDER AND RECORD

General

12.01 Part 12 describes Form E-5452, Test and Inspection Work Order and Record. Included are illustrations of the use of the form.

12.02 Form E-5452 is used as a preventive maintenance work order and as a record of work performed.

Description

12.03 Form E-5452, printed on both sides on white paper, measures 8-3/8 by 10-7/8 inches and is punched for filing in standard ring binder.

12.04 The front of Form E-5452 provides spaces at the top for recording assignment data, section number, equipment, work description, units involved and progress made. The bottom part of the form is for recording details of troubles found and action taken. The back of the form provides more spaces for recording trouble details.

Use

12.05 Form E-5452 is issued for job assignments listed on the Equipment Test List, except as noted in 11.08. Assignment and reference data are obtained from the Test and Inspection Summaries for each preventive maintenance job shown on the Equipment Test List. Form E-5452 is a work order for craftsmen. It specifies work to be performed. Details of test failures and troubles found are to be entered in the spaces provided. Complete or partial details of a job are entered in the "Progress Report" portion of the form (see Fig. 35).

12.06 Form E-5452 is also used for recording results of test frame operation. It is the work order for each test program. Details of test failures and troubles found are recorded in the "Work Record" part of the form. Progress of tests and time spent by craftsmen assigned to test frames are entered in the "Progress Report" part of the form.

12.07 It is important that maximum use be made of test frames because they are provided for detecting troubles which cannot be detected easily by other means. Forms E-5452 for test frames should be used until space for recording details of progress is used up (see Fig. 36).

12.08 Form E-5452 is also used for other work not specified by the Equipment Test List. Examples are special equipment tests, inspections, or samples.

12.09 Some tests and inspections do not ordinarily result in many found troubles and also do not require numerous separate work operations. In these cases it is not necessary to use Form E-5452. Test or inspection results may be recorded on Form E-5453 or on Form E-5454.

12.10 Fig. 37 is a diagram of the preventive maintenance process described in Parts 10, 11, and 12. The left-hand portion of the diagram illustrates the use of the results of corrective maintenance. This part of the process depends on adequate trouble indicators which are related to similar equipment troubles not associated with reports. The right-hand portion of the diagram shows the use of the Equipment Test List to initiate preventive maintenance work. This is done for checking the performance

of other equipment which otherwise cannot easily be checked. This part of preventive maintenance makes use of manual and Test Frame tests.

13. SAMPLING MAINTENANCE CONDITIONS

General

13.01 Part 13 describes the use of sampling for evaluating performance or condition of switching equipment. It includes definitions of terms, tables of random numbers, and an example of sampling applied to SXS.

13.02 Sampling, as explained in this part, is called *scientific sampling*. This refers to the fact that certain rules govern the sample size as well as the selection of the particular items to be sampled. The reasons for these rules are:

- (1) To minimize the possibility of bias or distortion affecting sample results.
- (2) To allow certain definite conclusions to be drawn about the particular universe when the sample results are known.

13.03 When things are sampled without adherence to the rules governing sample size and selection, it is called *judgment sampling*. Under certain conditions, judgment samples, carefully taken by knowledgeable persons, can be useful. However, no accurate statement of the nature of the entire lot can be made from the results of judgment samples.

13.04 Although scientific sampling is widely used in industry, it is sometimes viewed as being complicated. The information which follows shows how scientific sampling can be applied to evaluation of central office equipment conditions. The method described consists of simple steps which, if followed carefully, will produce useful results of known reliability. No attempt is made to show why sampling works, because it would require a mathematical treatment of the subject.

Definitions

13.05 Defined below are sampling terms which are commonly used.

Universe — The total number of items under investigation is called the *universe*. For in-

stance, all the wipers in an office or all of the (A) relays in all of the connectors would be examples of universes.

Sample — A sample is that part of the universe which is selected for examination.

Sample Size — The number of items selected for the sample is dependent on three things: (1) the size of the universe, (2) a rough approximation of the percentage of existing defects, and (3) the degree of accuracy required. As the universe becomes larger, its size is less of a factor for determining sample size.

Ordering — All items in the universe must be numbered for identifying each one separately. In the central office, for example, the existing equipment numbering (frame, circuit number, or designation) lends itself readily to association with random numbers.

Random Selection — In scientific sampling, random selection means selection governed wholly by laws of chance. The selection of the individual sample items must be independent of human decision. In drawing a sample from a group of items, each of the items must have an equal chance of being selected.

Random Number Tables — Lists of numbers which are generated by a computer and are completely random, with each digit being independent of any other. They are used for selecting sample items, in order to ensure that all items in a universe have an equal chance of being selected in a sample taken.

Criteria — It is necessary that the defective items be precisely identifiable, so that the determination of good and bad may be consistent. Tests and inspections should be made according to standards in Bell System Practices, whenever applicable. In other cases, standards for determining good and bad items must be determined locally.

Use

13.06 There are three reasons for use of sampling in central offices. First, sampling can reduce the cost of obtaining information about the condition of equipment. Second, sampling can be used to gain information more quickly than a 100% inspection. Third, sampling

can be used to determine which parts of a large group of equipment need attention sooner than others.

13.07 Sampling can be applied to a large number of equipment components when information is sought about the extent of a specific condition. Usually, contact or apparatus wear is the equipment condition about which information is required. However, there are other applications where sampling may be used, such as determining the number of tubes with low emission.

13.08 There are instances when the use of sampling is not recommended because little or no savings may be gained. For instance, if the time required for taking the sample is large, when compared with the time required for a 100% inspection, little may be gained by taking a sample. This is the case when the number of items in the sample is a large portion of the total, as is the situation for small universes. It is also the case when setup time required to test the sample items is large, when compared with the time to test the sample.

13.09 If three rules are followed, sampling can and should be used to reduce maintenance costs. First, it should be used only in appropriate situations, avoiding those described in 13.08. Second, procedures for taking samples must be followed exactly. Third, results must be understood for what they represent and must be used accordingly.

Application

13.10 Sampling may be used effectively to ascertain the extent of contact wear when normal trouble-reporting information indicates that wear may be widespread or "MR" review action is required. A typical case would be the need to learn the extent of contact wear of the (A) relays in the first selectors. The suspicion that wear is a widespread problem would arise through trouble-locating and repair procedures and the use of corrective maintenance procedures described in other parts of this section.

13.11 The following example illustrates the use of sampling in a SXS office. An increase in first selector failures noted on Form E-5462, SXS Control Record, leads to an investigation of recent trouble tickets. Form E-5463,

Trouble Summary, shows a rising trouble trend in first selectors. Study of the trouble tickets for this equipment shows (A) relay contact wear is high. In this office there are ten first selector bays, each equipped with 160 selectors, and a tally of recent trouble tickets hints that contact wear is a widespread problem. However, the trouble tickets on hand describe only troubles already experienced. There may be relay contacts which are worn to the point of causing intermittent failures, but which have not been identified and represented by trouble tickets in file. There also may be other contacts not yet worn enough to cause trouble, but which are bad enough to need attention. A sample, properly taken, could produce a practical estimate of the extent of this condition. This will provide an indication of urgency, the total number of reconditioning hours required, and the amount of material needed.

13.12 In order to sample the first selectors, certain steps must be followed. First, the condition being sought must be identifiable. In this case, suspected contact wear, specific Bell System Practice tests and inspections must be designated.

13.13 Next, the sample size must be determined. The size of the universe is 1600 (160 selectors x 10 bays). Reference to Fig. 38 shows that the sample size is 100.

13.14 Next, the sample must be determined in terms of the particular items ("A" relays) in the universe which are to be inspected. It is important that this step be done as described. If proper procedures are not followed, results obtained are not reliable. It must be understood that the random sample selection method described will properly weight the effect of variables such as first choice, age, and location.

13.15 Tables of random numbers are provided in Fig. 39. Numbers are selected from the tables and used for selecting the sample items. The numbers shown contain five digits, but may be used to provide random numbers of one digit, two digits, etc. To use tables, start at the top left-hand side of one of the columns (the same starting point should not be used for successive samples). Select one digit, two digits,

or more, depending on the size of the universe. The number of digits must correspond to the number of digits in the universe.

13.16 The following illustrates the use of random number tables.

- (a) Universe size — 1600
- (b) Sample size (from Fig. 38) — 100
- (c) Random numbers to be selected — 100
- (d) Items in universe are numbered 0001 to 1600
- (e) Refer to Fig. 39, Table D. Start at the top left-hand side of column designated (1). Inspect first four columns of digits (digits seen are 0507, 9332, 1880, etc).
- (f) Scan down the first four digits of the first column and select any four-digit numbers between 0001 and 1600. Selections: 0507, 0178, 1133, 0977, 1441, 0917, 0930.
- (g) Repeat, starting at the top of column (2), selecting the first digits. Selections: 0505, 0227, 0370, etc.
- (h) Repeat until 100 numbers have been selected.
- (i) Arrange the 100 random numbers in convenient order. If repetitions are encountered, discard all but one of set and select more random numbers.

13.17 If the items in the universe do not possess unique numbers, they must be numbered so that they may be associated with the random numbers selected. This may be done mentally by counting from upper left across each succeeding row to bottom right. Spare equipment locations should not receive unique number assignment. For example, the first selector bay has 158 switches. Therefore, the first switch on the second bay should be numbered 159. Items whose position number corresponds with one of the random numbers selected become one of the sample.

13.18 The above description sounds more complicated than the actual procedure. However, if reliable sampling results are to be obtained, these preliminary steps must be followed. Experience gained from the use of sampling greatly helps to simplify and speed up the process.

13.19 Now that the specific items to be sampled have been selected, it is necessary to establish clearly the criteria for deciding good and bad items in the sample. Bell System Practice standards should be used, where applicable. Examples of worn contacts, labeled "good" or "bad" as appropriate, are useful for comparing with items in the sample. The next step is to prepare Form E-5452, Test and Inspection Work Order and Record, showing the specific test and inspection to be made and the identity of each sample item. As work is completed on each item the result, in appropriate detail, is entered on the form.

13.20 When it is necessary to sample a maintenance condition in several bays or frames, it is also practical to treat the individual frames as separate universes so that results can be compared. When this is done, the universes are smaller and require a larger number of samples to be checked than if all frames were considered as one universe. However, there is an overall saving in maintenance work when the results of the separate frames are compared *and* it is properly concluded that no further work is required in some frames.

Consider ten bays of selectors, for example, equipped with 120 switches. The sample size for 120 is 25. The numbers are obtained from the tables (as outlined in 13.15 and 13.16) and are used to select the particular switches to be sampled. Use the same 25 numbers for each bay. After all ten bays have been sampled, results are compared as illustrated. This is called *stacking*.

| BAY NO. | NUMBER OF DEFECTS |
|---------|-------------------|
| 103 | 17 |
| 106 | 17 |
| 104 | 14 |
| 101 | 12 |
| 109 | 11 |
| ----- | |
| 108 | 6 |
| 102 | 5 |
| 105 | 5 |
| 110 | 3 |
| 107 | 3 |

The total switches sampled in the ten frames is 250, of which 93 are defective. This represents a rate of 37% defects in the entire universe. However, stacking the results from worst to best indicates that frames 103, 106, 104, 101, and 109 contain more defective switches. In this example, a local maintenance decision is made to do a 100% check of these frames. The remaining frames receive no more attention, except that known defects in the samples taken are repaired. If the ten frames in this example had been considered as a universe (1200 switches) and a random sample taken of the *entire* lot, results would have indicated the need for maintenance work *but* the worst and best frames would not have been identified.

14. STUCK SENDER ADMINISTRATION

General

14.01 Various SXS offices have been equipped with senders or originating registers in order to provide AMA, CAMA, or Common Control features. Because of the variety of equipment in use, each with its own designations, they will all be referred to in Part 14 as *senders*. Senders are equipped with manually operated devices for canceling the timed release feature (H key, HN key, HD jack, etc). These will be referred to as "HOLD" keys.

14.02 The majority of troubles causing stuck senders are in trunking facilities. Regardless of the trouble location, the customer's call is not completed. This usually results in another attempt, which increases the load on the common equipment. Therefore, it is necessary to trace as many stuck senders as practicable in order to locate the trouble and to minimize the stuck sender rate.

14.03 A high stuck sender rate reduces the sender group capacity by significantly increasing individual sender holding time. This is especially true for a sender with its HOLD key operated, since it remains out of service until released by the maintenance force. Also, a trunk in trouble which causes a stuck sender will have a shorter than normal holding time when the HOLD key is normal. The result is that the trunk in trouble is selected more frequently which increases the trouble rate, sticks more senders, and produces customer reaction. The need for prompt

and adequate attention to stuck senders is of utmost importance. Trunks and equipment causing stuck senders must be located and removed from service.

Sender Tracing Program

14.04 When preparing or reviewing a stuck sender tracing program, the following considerations are important:

Operation of HOLD keys — The number of senders placed in the "HOLD" or "cancel timed release" condition is dependent on the rate of stuck senders, whether or not sender group busy alarms are being received, and the available manpower for tracing stuck senders. **HOLD keys should not be operated if senders are not being traced promptly.** If senders are held by operated HOLD keys and are not promptly traced, the service reaction is likely to be worsened because of sender group and trunk group overflows to customers.

Number of senders to be traced — The number of senders to be traced is set by the locally determined objective stuck sender rate for the office. The available manpower for tracing senders must certainly be considered. This is not to say that tracing stuck senders is not an important job. However, it must be recognized that other office work may be considered equally or, perhaps more important for a short period of time, limiting the amount of manpower available for tracing stuck senders. In any case, there must be a continuing program for tracing stuck senders, and for locating and clearing troubles, as well as studies of trouble records aimed at finding other troubles not yet identified.

14.05 Two methods for handling stuck sender data are in common use: logs and trouble tickets. The recommended method is described here and makes use of trouble tickets and the ticket file. For each stuck sender traced, information is recorded on a trouble ticket which is filed in the ticket file for later use. Stuck sender trouble tickets are stored in a separate part of the ticket file reserved for stuck sender studies. A suggested layout of this file is shown in Fig. 40. Other arrangements may serve a particular location to better advantage. For example, a

common control office may find it more beneficial to file by code selectors and combined trunk groups.

14.06 When stuck sender trouble tickets are closed out, they may be filed under the particular trunk group involved in the connection. Tickets are filed sequentially by trunk number for ease in spotting "repeaters." This method requires little clerical work. Repeated failures show up quickly as tickets are filed in the trouble bins. Common troubles are indicated by marked increases in the number of tickets in one or more bins. Trouble in a sender should be noticed by the man who is assigned to tracing senders. For detecting obscure sender or sender link troubles, however, it is recommended that tickets be tallied periodically. The need for doing this tally will vary according to the amount of tickets or, of course, the amount of troubles of an office. Fig. 41 illustrates Form E-5477, Stuck Sender Tally Sheet, which is used for tallying stuck sender trouble tickets.

14.07 Methods of stuck sender administration using logs are not recommended. Logs require more clerical work and do not provide sufficient space for recording the necessary information. Therefore, subsequent study is restricted by the limited information available.

15. RETENTION OF RECORDS, AND ORDERING INFORMATION

Retention of Records

15.01 The forms described in this section have been designed for containing useful information in an orderly fashion. The need for retaining the different forms for maintenance administration varies. However, it may be visualized that other uses, such as for audits, may require longer retention.

15.02 A simple method for retaining these records is to establish twelve large folders or mailing envelopes, each marked for a month of the year. As each report month ends, records may be removed from binders and filed in the appropriately marked envelope. The records already in the envelope, now a year old, are discarded.

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Ordering Information

15.03 Forms are packaged as shown below. Forms should be ordered in multiples of the quantities shown. Requisitions should be worded as follows:

(Quantity) Form (number)

| FORM NO. | FORMS PER PACKAGE |
|-----------------|--------------------------|
| E-4744 | 25 |
| E-5450 | 25 |
| E-5451 | 50 |
| E-5452 | 50 |

| FORM NO. | FORMS PER PACKAGE |
|-----------------|--------------------------|
| E-5453 | 25 |
| E-5454 | 25 |
| E-5455 | 25 |
| E-5457 | 50 |
| E-5461 | 50 |
| E-5462 | 25 |
| E-5463 | 25 |
| E-5464 | 25 |
| E-5477 | 25 |

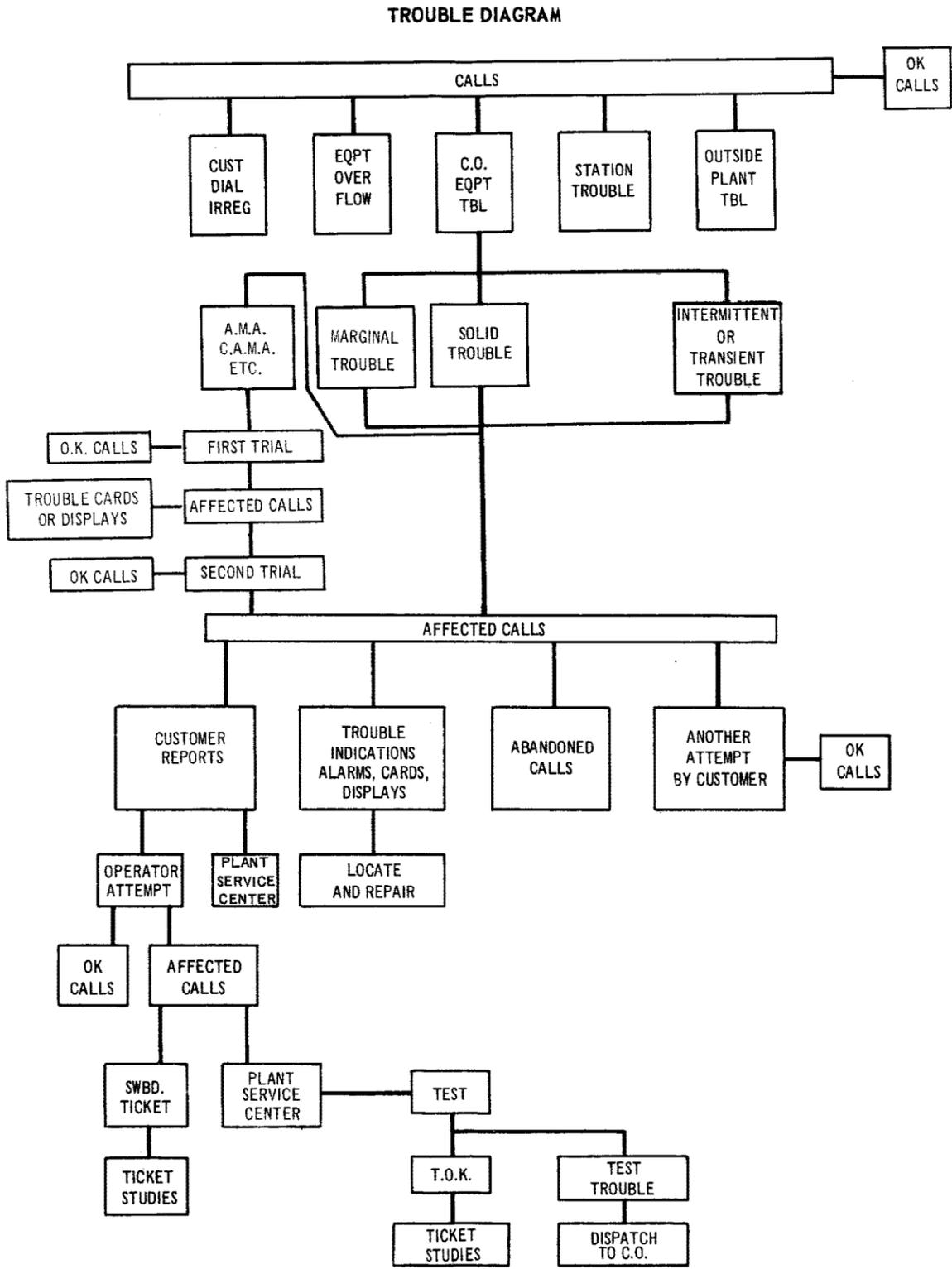


Fig. 1

CONTROLLED MAINTENANCE DIAGRAM

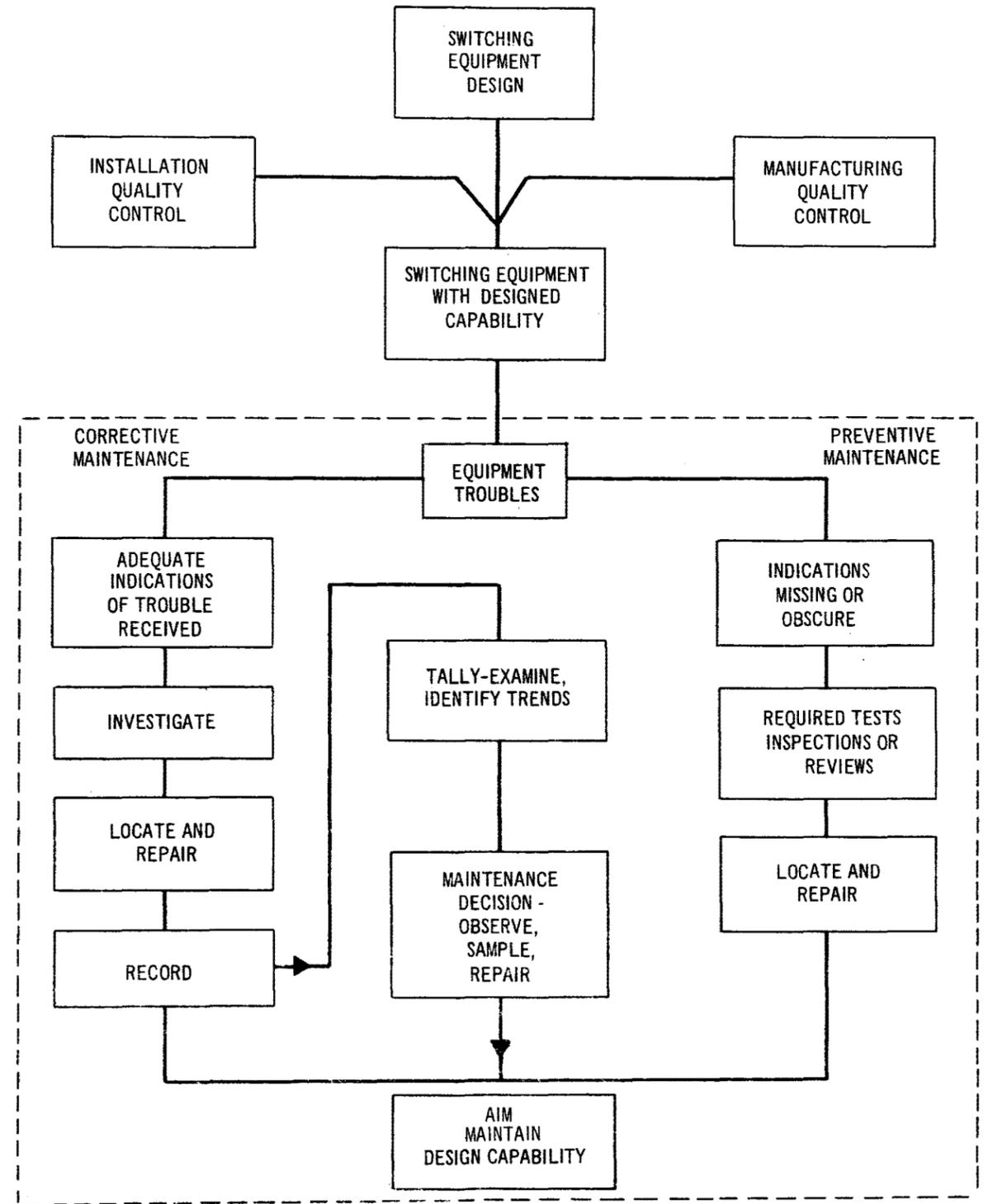


Fig. 2

SXS TROUBLE TICKET

| | | | | | | | | | | | | | |
|----------------|------|---------------------------|------|------|----------------------|----------|----------|-----------------|-----------|---------|-----|------|--|
| T | MEMO | SXS TROUBLE TICKET | | | | | O/S | TKT. NO. | EQUIPMENT | | | | |
| (A) | | OFFICE | DATE | TIME | REPT. BY | LOCATION | RCVD. BY | REPT. CLS. | (Q) | | | | |
| | | (D) | (E) | (F) | (G) | (H) | (I) | | | | | | |
| TEL. NO. | | LINE EQPT. | | | ASSOC. EQPT./CA. PR. | | | APPARATUS | | | | | |
| REPORT DETAILS | | | | | | | | RELAY | | | | | |
| | | | | | | | | SWITCH | | | | | |
| | | | | | | | | OTH. SPG. ASSY. | | | | | |
| | | | | | | | | BANK - WIPER | | | (R) | | |
| | | | | | | | | WIRING | | | | | |
| | | | | | | | | MISC. | | | | | |
| ACTION TAKEN | | | | | | | | CAUSE | | | | | |
| | | | | | | | | DIRT | | | | | |
| | | | | | | | | WEAR | | | | | |
| | | | | | | | | DEFECT | | | (S) | | |
| | | | | | | | | WORK ERROR | | | | | |
| | | | | | | | | OTHER | | | | | |
| | | | | | | | | NTF | | | | | |
| | | | | | | | | ORIGINATING | | | | | |
| | | | | | | | | TERMINATING | | | (T) | | |
| | | | | | | | | OTHER | | | | | |
| CLEARED BY | | TO | | TIME | | DATE | | WORKTIME | | FMN. CK | | CODE | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

FORM E-5461 (6-67) BACK

- | Note | Explanation |
|------|--|
| A | Check "T" or "Memo". |
| B | Check O/S (out of service) if equipment is removed from service. |
| C | Serial number of ticket. |
| D | Central office name or designation. |
| E | Date and time report received in central office.* |
| F | Initials of person reporting or equipment designation if from alarm, trouble recorder, trouble indicator, or trouble ticketer. |
| G | Origin of report. |
| H | Initials of person receiving report. |
| I | Report class (see Fig. 5, Table A). |
| J | Details of trouble report. |
| K | Details of action taken including referrals. |
| L | Initials of person clearing trouble, person report cleared to and time.* |
| M | Date report closed out. |
| N | Time spent on this trouble. |
| O | Foreman's initials upon review of ticket. |
| P | Central office trouble code. (Disposition Fig. 21) |
| Q | Equipment group abbreviation and location (see Fig. 6, Table A and Fig. 7). |
| R | Check apparatus where trouble is located (see Fig. 6, Table A and Fig. 7). |
| S | When apparatus is identified check cause of trouble (see Fig. 6, Table B, and Fig. 7). |
| T | If N.T.F. check according to report (see Fig. 6, Table C and Fig. 7). |
- * Recommend use of 24-hour clock.

Fig. 3

TRACING INFORMATION

| EQUIP. | BAY/GRP. | SWITCH | LEVEL | TRK. TERM. |
|----------|----------|--------|-------|------------|
| LF-PLS | | | | |
| SLS | | | | |
| 1st SEL | | | | |
| 2nd SEL | | | | |
| 3rd SEL | | | | |
| 4th SEL | | | | |
| 5th SEL | | | | |
| CONN. | | | | |
| ROTS. | | | | |
| RPTR. | | | | |
| TRK. | | | | |
| INC. SEL | | | | |

REGISTER TRUNK & LINK

| FR. | SWI. | HOR. | VER. |
|---------|----------|------|------|
| | PRI. | | |
| | SEC. | | |
| TP | REG. NO. | RD | |
| | | TT | |
| REF. TO | INITIALS | DATE | TIME |

REMARKS:

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- | Note | Explanation |
|------|--|
| A | Record of equipment. |
| B | Additional record of Common Control equipment. |
| C | Referral record. |
| D | Supplementary information (called number registered in originating register, status of selected relays in sender, additional tracing details, etc.). |

Fig. 4

Figs. 3 & 4

| TABLE A – REPORT CLASSIFICATIONS | | |
|--|--------------|--|
| The major sources of trouble reports are assigned the following alphabetical designations for ease in identifying report sources on trouble tickets. | | |
| Type of Ticket | Report Class | Report Source |
| T | A | Plant Service Center or Testboards |
| T | B | Traffic Department |
| T | C | Sender or Originating Register |
| T | D | Alarm |
| T | E | Trouble Recorder, Trouble Indicator, Tbl. Ticketer |
| T | J | Other office or other sources of report |
| Memo | No Class | All "Memo" Tickets |

| |
|---|
| S - EQUIPMENT AND APPARATUS |
| <u>Situations</u> |
| and number, (see Fig. 23 for abbreviations) for cases where trouble disappears. If equipment is not tested enter NTF. Enter Ref. Out (Referred Out) referred to another office, PSC or testboard. |
| h case of found trouble. |
| oubles caused by relay failures. |
| bles caused by failures |
| ." for troubles caused by mblies such as 11th rotary l, etc. |
| oubles located in banks, oubles caused by wiper |
| se connections, opens, crosses, transpositions, or ce, either in wiring, cabling, or between wiring ses where solder or wire clippings cause short sses. Also includes troubles caused by missing, d, transposed or left-in cross-connection. |
| laneous) for troubles that cannot be assigned to atus categories, i.e., lamps, transformers, itors, resistors, etc. |

. 6A

| TABLE B - CODING "T" TICKETS - CAUSE | | |
|--------------------------------------|--|---|
| | <u>Situations</u> | <u>Examples</u> |
| <u>Cause</u> | Score one cause for each case of found trouble | |
| Dirt | Score "dirt" for troubles caused by failure of contacts to complete a circuit when the reason for the failure is the presence of non-conducting material between the contacts and the contacts and springs meet the minimum requirements specified by Bell System Practices or circuit requirement tables. | Locking path of relay tests open. Cause is lint between contacts in locking path. Follow meets requirements. Contacts are cleaned. |
| Wear | Score "wear" for troubles caused by apparent normal deterioration or aging. Includes contact erosion, loss of tension, low emission, metal fatigue or mechanical wear. Also includes cases where replacement is necessary because mechanical requirements can no longer be met. Wear includes troubles due to changes in electrical characteristics of tubes, diodes, transistors, varistors, etc. where the trouble can be cleared by circuit adjustment. | E repeater has reduced gain. Trouble is found to be tube with low emission. |
| Defect | Score "defect" for troubles corrected by replacement of apparatus or component for reasons other than "wear" or "work error." Includes electrical or mechanical failures of apparatus or components, such as open windings, non-conducting tubes, "shorted" spring assemblies or broken pawls. | E repeater has no gain. Trouble is found to be tube with open heater. |
| Work Error | Score "work error" for troubles likely or known to have been caused by maintenance personnel, installation forces, contractor's forces or others. For example, bent wipers, bent shafts, incorrectly adjusted apparatus and most wiring troubles should be scored as "work error" | M.D.F. jumper tip wire loose at V.M.D.F. terminal. Ring wire is properly connected and soldered. Conclusion is that tip wire was inadvertently left unsoldered. |
| Other | Score "other" for troubles where the cause can not be included in one of the above. The "Action Taken" portion of trouble ticket <u>must</u> show a complete explanation whenever "other" is checked. | In clearing a case of trouble, sleeve wire is found to be open in cable between two terminations. Open is under sheath and cause of open is unknow. |

Fig. 6B

| TABLE C - CODING "T" TICKETS - NTF | | |
|------------------------------------|-------------|---|
| <u>Trouble Coding Spaces</u> | | <u>Situations</u> |
| <u>NTF (No Trouble Found)</u> | | Score one when cause of trouble cannot be determined. |
| | Originating | Score when trouble report describes originating service (Can't Call, NDT). |
| | Terminating | Score when trouble report describes terminating service (No Bell, Don't Get Calls, Bell Rings After Answer). |
| | Other | Score when trouble report relates to completed connections (Noise, Can't Hear Cutoffs). Also includes reports from alarms, trouble recorders, trouble indicators or trouble ticketers where no trouble was found or trouble came clear while testing. |

Fig. 6C

Figs. 6A, 6B, 6C

| TABLE A – CODING “T” TICKETS – EQUIPMENT AND APPARATUS | |
|--|--|
| <u>Trouble Coding Spaces</u> | <u>Situations</u> |
| <u>Equipment</u> | Enter equipment, frame, and number, (see Fig. 23 for abbreviations) for cases of found trouble and for cases where trouble disappears. If equipment is not determined or no trouble is tested enter NTF. Enter Ref. Out (Referred Out) when trouble report is referred to another office, PSC or testboard. |
| <u>Apparatus</u> | Score one cause for each case of found trouble. |
| Relay | Score “relay” for all troubles caused by relay failures. |
| Switch | Score “switch” for troubles caused by failures in switch mechanisms. |
| Oth. Spg. Assy | Score “other spg. assy.” for troubles caused by failures in spring assemblies such as 11th rotary step, vertical off-normal, etc. |
| Bank-Wiper | Score “bank-wiper” for troubles located in banks, other than wiring, and troubles caused by wiper failures. |
| Wiring | Score “wiring” for loose connections, opens, crosses, transpositions, or low insulation resistance, either in wiring, cabling, or between wiring terminals. Includes cases where solder or wire clippings cause short circuits, grounds or crosses. Also includes troubles caused by missing, open, crossed, grounded, transposed or left-in cross-connection. |
| Misc. | Score “misc.” (miscellaneous) for troubles that cannot be assigned to one of the above apparatus categories, i.e., lamps, transformers, Electron Tubes, capacitors, resistors, etc. |

Fig. 6A

| TABLE B – CODING “T” TICKETS – CAUSE | | |
|--------------------------------------|--|---|
| | <u>Situations</u> | <u>Examples</u> |
| <u>Cause</u> | Score one cause for each case of found trouble | |
| Dirt | Score “dirt” for troubles caused by failure of contacts to complete a circuit when the reason for the failure is the presence of non-conducting material between the contacts and the contacts and springs meet the minimum requirements specified by Bell System Practices or circuit requirement tables. | Locking path of relay tests open. Cause is lint between contacts in locking path. Follow meets requirements. Contacts are cleaned. |
| Wear | Score “wear” for troubles caused by apparent normal deterioration or aging. Includes contact erosion, loss of tension, low emission, metal fatigue or mechanical wear. Also includes cases where replacement is necessary because mechanical requirements can no longer be met. Wear includes troubles due to changes in electrical characteristics of tubes, diodes, transistors, varistors, etc. where the trouble can be cleared by circuit adjustment. | E repeater has reduced gain. Trouble is found to be tube with low emission. |
| Defect | Score “defect” for troubles corrected by replacement of apparatus or component for reasons other than “wear” or “work error.” Includes electrical or mechanical failures of apparatus or components, such as open windings, non-conducting tubes, “shorted” spring assemblies or broken pawls. | E repeater has no gain. Trouble is found to be tube with open heater. |
| Work Error | Score “work error” for troubles likely or known to have been caused by maintenance personnel, installation forces, contractor’s forces or others. For example, bent wipers, bent shafts, incorrectly adjusted apparatus and most wiring troubles should be scored as “work error” | M.D.F. jumper tip wire loose at V.M.D.F. terminal. Ring wire is properly connected and soldered. Conclusion is that tip wire was inadvertently left unsoldered. |
| Other | Score “other” for troubles where the cause can not be included in one of the above. The “Action Taken” portion of trouble ticket <u>must</u> show a complete explanation whenever “other” is checked. | In clearing a case of trouble, sleeve wire is found to be open in cable between two terminations. Open is under sheath and cause of open is unknow. |

Fig. 6B

| |
|-----------|
| Trouble C |
| NTF (No |

| | | | |
|----------------|------------|-----------|-----------------|
| T | MEMO | TKT. NO. | EQUIPMENT |
| OFFICE | | EPT. CLS. | |
| TEL. NO. | | PR. | RELAY |
| REPORT DETAILS | | APPARATUS | SWITCH |
| ACTION TAKEN | | | OTH. SPG. ASSY. |
| | | | BANK - WIPER |
| | | | WIRING |
| | | | MISC. |
| BY | CLEARED TO | CODE | CAUSE |
| | | | DIRT |
| | | | WEAR |
| | | | DEFECT |
| | | | WORK ERROR |
| | | NTF | ORIGINATING |
| | | | TERMINATING |
| | | | OTHER |

Part of Form E-5461
SxS Trouble Ticket

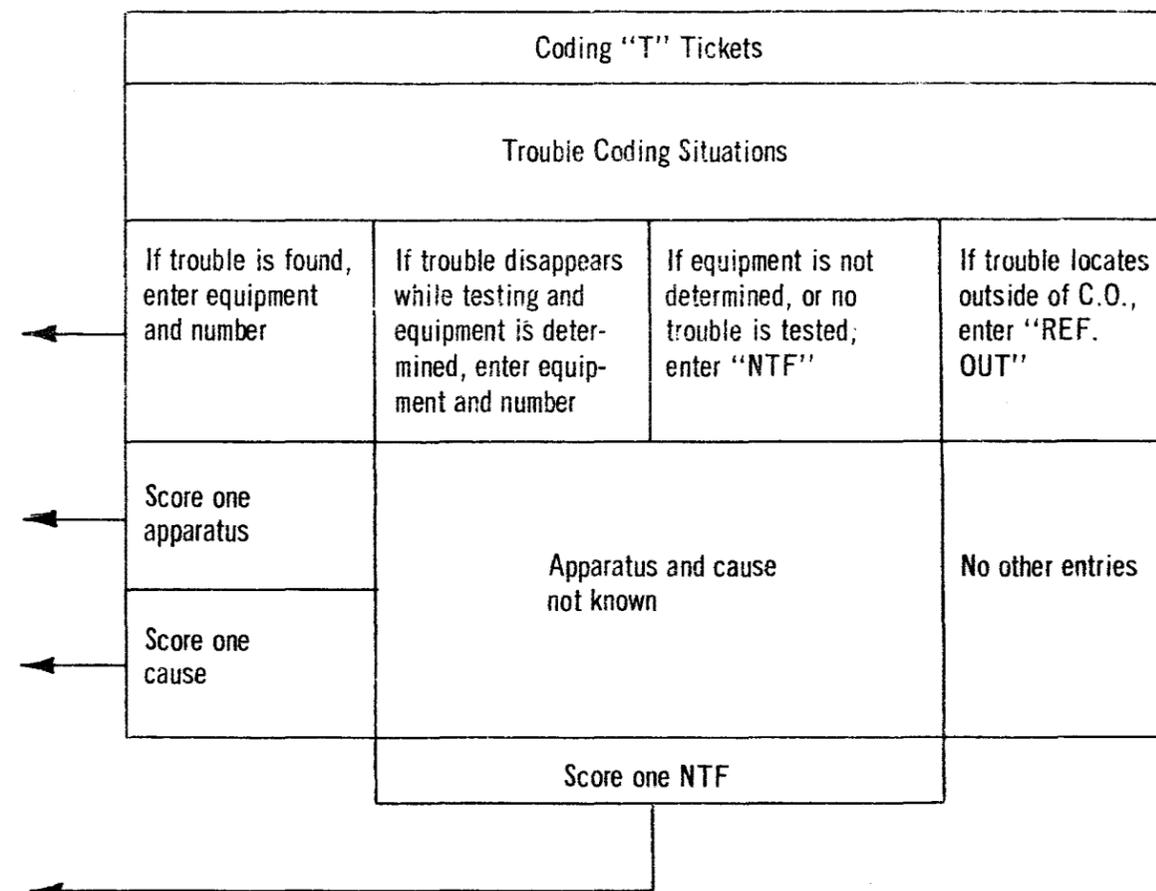


Fig. 7

| SXS TROUBLE TICKET | | | | | | | O/S | TKT. NO. | EQUIPMENT | |
|--|------------|-------|----------------------|----------|----------|------------|-----|----------|-----------|--|
| ✓ | MEMO | | | | | | ✓ | 215 | NTF | |
| OFFICE | DATE | TIME | REPT. BY | LOCATION | RCVD. BY | REPT. CLS. | | | | |
| 972,4,6 | 10-31- | 1630 | SA #4 | DSA | WY | B | | | | |
| TEL. NO. | LINE EQPT. | | ASSOC. EQPT./CA. PR. | | | | | | | |
| 972-3449 | 17-82 | | 14/394 | | | | | | | |
| REPORT DETAILS | | | | | | | | | | |
| VOISY CONNECTIONS ON CALLS TO 79 NUMBERS | | | | | | | | | | |
| ACTION TAKEN | | | | | | | | | | |
| ALL TRUNKS TO 279 CHECKED FOR VOISE. NTF | | | | | | | | | | |
| NTF | | | | | | | | | | |
| CLEARED TO | TIME | DATE | WORKTIME | FMN CK | CODE | | | | | |
| JE | 1130 | 11-1- | 120M | ESP | | | | | | |

| SXS TROUBLE TICKET | | | | | | | O/S | TKT. NO. | EQUIPMENT | |
|---|------------|-------|----------------------|----------|----------|------------|-----|----------|-----------|--|
| ✓ | MEMO | | | | | | ✓ | 2 | MDF | |
| OFFICE | DATE | TIME | REPT. BY | LOCATION | RCVD. BY | REPT. CLS. | | | | |
| 972,4,6 | 11-1- | 0910 | KG | PSC | KL | A | | | | |
| TEL. NO. | LINE EQPT. | | ASSOC. EQPT./CA. PR. | | | | | | | |
| 972-3449 | 17-82 | | 14/394 | | | | | | | |
| REPORT DETAILS | | | | | | | | | | |
| NDT - RING SIDE TESTS OPEN | | | | | | | | | | |
| ACTION TAKEN | | | | | | | | | | |
| RING JUMPER NOT SOLDERED AT HMDF SOLDERED - RETEST OK | | | | | | | | | | |
| NTF | | | | | | | | | | |
| CLEARED TO | TIME | DATE | WORKTIME | FMN CK | CODE | | | | | |
| JP | 0920 | 11-1- | 10 MIN | EF | 5 | | | | | |

| SXS TROUBLE TICKET | | | | | | | O/S | TKT. NO. | EQUIPMENT | |
|--|------------|-------|----------------------|----------|----------|------------|-----|----------|-----------|--|
| ✓ | MEMO | | | | | | ✓ | 4 | MISC. | |
| OFFICE | DATE | TIME | REPT. BY | LOCATION | RCVD. BY | REPT. CLS. | | | | |
| 972,4,6 | 11-1- | 1030 | SA #2 | POS 23 | KL | B | | | | |
| TEL. NO. | LINE EQPT. | | ASSOC. EQPT./CA. PR. | | | | | | | |
| REPORT DETAILS | | | | | | | | | | |
| POOR TRANSMISSION ON 356 TOLL SW. TRK # 4 | | | | | | | | | | |
| ACTION TAKEN | | | | | | | | | | |
| REPLACED SHORTED TUBE-E RPTR 201-7 RESETS OK | | | | | | | | | | |
| NTF | | | | | | | | | | |
| CLEARED TO | TIME | DATE | WORKTIME | FMN CK | CODE | | | | | |
| JP | 1100 | 11-1- | 15 MIN | EF | | | | | | |

"T" TICKET - NTF OTHER

Reports noise on calls to several numbers in 279 office. All trunks to 279 office checked for trouble found. Since equipment causing trouble is not known - enter NTF. NTF-OTHER because report concerns trouble after connection established.

Fig. 8

"T" TICKET - WIRING WORK ERROR

A customer reports "no dial tone". The test center tests one side open in the central office and refers the trouble to the switchroom for correction. Investigation of the frame connections discloses that the ring side had not been soldered on the HMDF. The connection is repaired and the ticket closed out to the test center. In this case, the equipment "MDF" is written in and the apparatus and cause scored.

Fig. 10

"T" TICKET - MISCELLANEOUS DEFECT

Investigation of Traffic Report discloses a shorted tube in voice repeater. Ticket is coded to show equipment, apparatus, and cause.

Fig. 12

| SXS TROUBLE TICKET | | | | | | | O/S | TKT. NO. | EQUIPMENT | |
|---|------------|-------|----------------------|----------|----------|------------|-----|----------|-----------|--|
| ✓ | MEMO | | | | | | ✓ | 1 | 1st SEL | |
| OFFICE | DATE | TIME | REPT. BY | LOCATION | RCVD. BY | REPT. CLS. | | | | |
| 6 | 11/11 | 0830 | BC | PSC | KL | A | | | | |
| TEL. NO. | LINE EQPT. | | ASSOC. EQPT./CA. PR. | | | | | | | |
| 6-2421 | 14-72 | | 9/206 | | | | | | | |
| REPORT DETAILS | | | | | | | | | | |
| GET WRONG NUMBERS WHEN CALLING OUT | | | | | | | | | | |
| ACTION TAKEN | | | | | | | | | | |
| ELECTOR 102-14 FAILS PULSE TESTS RELAY CONTACTS PITTED AND WORN REPLACED AND PULSED | | | | | | | | | | |
| NTF | | | | | | | | | | |
| CLEARED TO | TIME | DATE | WORKTIME | FMN CK | CODE | | | | | |
| BC | 0910 | 11-1- | 40M | EF | 5 | | | | | |

| SXS TROUBLE TICKET | | | | | | | O/S | TKT. NO. | EQUIPMENT | |
|---|------------|-------|----------------------|----------|----------|------------|-----|----------|-----------|--|
| ✓ | MEMO | | | | | | ✓ | 3 | C 246-#9 | |
| OFFICE | DATE | TIME | REPT. BY | LOCATION | RCVD. BY | REPT. CLS. | | | | |
| 972,4,6 | 11-1- | 0940 | RC | 855-9994 | KL | J | | | | |
| TEL. NO. | LINE EQPT. | | ASSOC. EQPT./CA. PR. | | | | | | | |
| REPORT DETAILS | | | | | | | | | | |
| CALLED 972-4637 No RING - HOLDING | | | | | | | | | | |
| ACTION TAKEN | | | | | | | | | | |
| #9 CONN 246 - No RING - TBL CAME CLEAR WHILE TESTING - CHECKED ALL CONTACTS IN RINGING PATH - FOLLOW OK - NTF | | | | | | | | | | |
| NTF | | | | | | | | | | |
| CLEARED TO | TIME | DATE | WORKTIME | FMN CK | CODE | | | | | |
| EC | 0955 | 11-1- | 15 MIN | EF | | | | | | |

| SXS TROUBLE TICKET | | | | | | | O/S | TKT. NO. | EQUIPMENT | |
|---|------------|-------|----------------------|----------|----------|------------|-----|----------|-----------|--|
| ✓ | MEMO | | | | | | ✓ | 5 | NTF | |
| OFFICE | DATE | TIME | REPT. BY | LOCATION | RCVD. BY | REPT. CLS. | | | | |
| 972,4,6 | 11-1- | 1120 | BC | PSC | KL | A | | | | |
| TEL. NO. | LINE EQPT. | | ASSOC. EQPT./CA. PR. | | | | | | | |
| 972-1451 | 37-112 | | 23/197 | | | | | | | |
| REPORT DETAILS | | | | | | | | | | |
| NDT AT TIMES - REPEAT REPORT | | | | | | | | | | |
| ACTION TAKEN | | | | | | | | | | |
| CHECKED ALL FRAME CONNECTIONS, LINE CIRCUIT, AND LINE FINDERS - NTF | | | | | | | | | | |
| NTF | | | | | | | | | | |
| CLEARED TO | TIME | DATE | WORKTIME | FMN CK | CODE | | | | | |
| JP | 1145 | 11-1- | 20 MIN | EF | 8 | | | | | |

"T" TICKET - RELAY WEAR

Equipment and apparatus are identified. Lack of contact "follow" in (A) relay apparently caused by deterioration - cause is "wear." Trouble in C.O. causing customer report is a code 5.

Fig. 9

"T" TICKET - NTF TERMINATING

"No Ring" report received from employee at 855 office. Connector #9 failed to ring out on line. Equipment is known, but trouble came clear before apparatus and cause were determined.

Fig. 11

"T" TICKET - NTF ORIGINATING

Plant Service Center refers a repeat report of "No Dial Tone at Times" to central office for investigation. No trouble is found in central office. NTF is entered in "equipment" space and NTF originating is scored.

Fig. 13

| | | |
|----------------|--|----------------------|
| O/S | TKT. NO. | EQUIPMENT |
| ✓ | 6 | REF OUT |
| OFFICE | DATE | TIME |
| 972,4,6 | 11-1- | 1430 |
| REPT. BY | LOCATION | RCVD. BY |
| KG | PSC | KL |
| TEL. NO. | LINE EQPT. | ASSOC. EQPT. CA. PR. |
| 974-8267 | 27-63 | 17/322 |
| REPORT DETAILS | CBC - BDR | |
| ACTION TAKEN | CONNECTOR TEST - #1 CONN. FAILED DIRTY CONTACT 3/4 TOP (K) RELAY-FOLLOW OK | |
| CLEARED TO | TIME | DATE |
| BY JP TO KG | 1145 | 11-1- |
| WORKTIME | FMN CK | CODE |
| 15 MIN | EF | 5 |

OUT
Center tests no trouble and dispatches
8. The trunk is made busy entered on
out to Plant Service Center. "Ref.
red Out" bin of ticket file.

| TRACING INFORMATION | | | | |
|-----------------------|----------|--------|-------|------------|
| EQUIP. | BAY/GRP. | SWITCH | LEVEL | TRK. TERM. |
| LF-PLS | 104 | 1 | 1 | 6 |
| SLS | | | | |
| 1st SEL | 102 | 12 | 0 | 3 |
| 2nd SEL | | | | |
| 3rd SEL | | | | |
| 4th SEL | | | | |
| 5th SEL | | | | |
| CONN. | | | | |
| ROTS. | | | | |
| RPTR. | | | | |
| TRK. | | | | |
| INC. SEL | | | | |
| REGISTER TRUNK & LINK | | | | |
| FR. | SWI. | HOR. | VER. | |
| | PRI. | | | |
| | SEC. | | | |
| TP | REG. NO. | RD | | |
| | | TT | | |
| REF. TO | INITIALS | DATE | TIME | |
| | | | | |

REMARKS:

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MO" TICKET-TRAFFIC TRACE
of calling line. The back of ticket is used for recording equipment details.

Fig. 15

| | | | | | | | | |
|----------------|--|----------------------|----------|----------|----------|------------|----------|-----------|
| T | MEMO | SXS TROUBLE TICKET | | | | O/S | TKT. NO. | EQUIPMENT |
| ✓ | | | | | | ✓ | 8 | C 482#1 |
| OFFICE | DATE | TIME | REPT. BY | LOCATION | RCVD. BY | REPT. CLS. | | |
| 972,4,6 | 11-1- | 1430 | KG | PSC | KL | A | | |
| TEL. NO. | LINE EQPT. | ASSOC. EQPT. CA. PR. | | | | | | |
| 974-8267 | 27-63 | 17/322 | | | | | | |
| REPORT DETAILS | CBC - BDR | | | | | | | |
| ACTION TAKEN | CONNECTOR TEST - #1 CONN. FAILED DIRTY CONTACT 3/4 TOP (K) RELAY-FOLLOW OK | | | | | | | |
| CLEARED TO | TIME | DATE | WORKTIME | FMN CK | CODE | | | |
| BY JP TO KG | 1145 | 11-1- | 15 MIN | EF | 5 | | | |

"T" TICKET - RELAY DIRT
A Customer report of "can't be called" and "bell doesn't ring" results in finding a faulty contact in a connector relay. Contact follow is O.K. therefore, "dirt" is scored as the cause. Apparatus and equipment are also recorded as above.

Fig. 16

| | | | | | | | | |
|----------------|-----------------------------------|----------------------|----------|----------|----------|------------|----------|-----------|
| T | MEMO | SXS TROUBLE TICKET | | | | O/S | TKT. NO. | EQUIPMENT |
| ✓ | | | | | | | | |
| OFFICE | DATE | TIME | REPT. BY | LOCATION | RCVD. BY | REPT. CLS. | | |
| 972,4,6 | 11-1- | 1120 | JP | | | | | |
| TEL. NO. | LINE EQPT. | ASSOC. EQPT. CA. PR. | | | | | | |
| | 37-114 | | | | | | | |
| REPORT DETAILS | BROKEN TIP WIRE -HMDF | | | | | | | |
| ACTION TAKEN | CLEANED LUG AND RE-CONNECTED WIRE | | | | | | | |
| CLEARED TO | TIME | DATE | WORKTIME | FMN CK | CODE | | | |
| BY JP TO | 1125 | 11-1- | 5 MIN | EF | | | | |

"MEMO" TICKET - OBSERVED TROUBLE
While working on a trouble (see Fig. 13) craftsman noticed a broken wire on an adjacent line circuit. Craftsman cleared this trouble as well as one reported on Figure 13. This memo ticket is made out by craftsman to indicate work done, and account for time spent. Memo tickets are not coded.

Fig. 17

| | | | | | | | | |
|----------------|---|----------------------|----------|----------|----------|------------|----------|-----------|
| T | MEMO | SXS TROUBLE TICKET | | | | O/S | TKT. NO. | EQUIPMENT |
| ✓ | | | | | | ✓ | 9 | LF 37-7 |
| OFFICE | DATE | TIME | REPT. BY | LOCATION | RCVD. BY | REPT. CLS. | | |
| 972,4,6 | 11-1- | 1830 | ALM | LG 37 | FN | D | | |
| TEL. NO. | LINE EQPT. | ASSOC. EQPT. CA. PR. | | | | | | |
| | | | | | | | | |
| REPORT DETAILS | CALL BLOCK ALARM L.F. #7 - NO ROTARY | | | | | | | |
| ACTION TAKEN | BROKEN ROTARY PAWL - L.F. MADE BUSY | | | | | | | |
| CLEARED TO | TIME | DATE | WORKTIME | FMN CK | CODE | | | |
| BY FN TO | 1835 | 11-1- | 5 MIN | EF | | | | |

"T" TICKET - HELD FOR REPAIR
Investigation of a call block alarm discloses a broken rotary pawl. Pending replacement, the line finder is made busy and ticket held for repair in pending file. When repair is made later, work details are entered on memo ticket (see Fig. 19). "T" ticket may be coded to show trouble found if sufficient information is available when trouble report is investigated.

Fig. 18

| | | | | | | | | |
|----------------|---|----------------------|----------|----------|----------|------------|----------|-----------|
| T | MEMO | SXS TROUBLE TICKET | | | | O/S | TKT. NO. | EQUIPMENT |
| ✓ | | | | | | | | |
| OFFICE | DATE | TIME | REPT. BY | LOCATION | RCVD. BY | REPT. CLS. | | |
| | | | | | | | | |
| TEL. NO. | LINE EQPT. | ASSOC. EQPT. CA. PR. | | | | | | |
| | | | | | | | | |
| REPORT DETAILS | L.F. 37-7 REPLACE BROKEN ROTARY PAWL (SEE TKT 9) | | | | | | | |
| ACTION TAKEN | REPLACED PAWL, TESTED, RELEASED FOR SERVICE | | | | | | | |
| CLEARED TO | TIME | DATE | WORKTIME | FMN CK | CODE | | | |
| BY EC TO EF | 0900 | 11-2- | 30 MIN | EF | | | | |

"MEMO" TICKET - REPAIR
A memo ticket is used here for recording details of a deferred repair. When the repair is done the memo is associated with "T" ticket and coding details are entered on the "T" ticket, unless previously supplied (see Fig. 18)

Fig. 19

| | | | | | | | | | | |
|---|------|--------------------|-------|----------------------|----------|----------|----------|------------|-----------|--|
| T | MEMO | SXS TROUBLE TICKET | | | | | O/S | TKT. NO. | EQUIPMENT | |
| ✓ | | OFFICE | DATE | TIME | REPT. BY | LOCATION | RCVD. BY | REPT. CLS. | REF OUT | |
| | | 972,4,6 | 11-1- | 1315 | KG | PSC | KL | A | | |
| TEL. NO. | | LINE EQPT. | | ASSOC. EQPT. CA. PR. | | | | | | |
| 976-0563 | | 17-42 | | 14/112 | | | | | | |
| REPORT DETAILS | | | | | | | | | | |
| CANT CALL 356 NUMBERS | | | | | | | | | | |
| ACTION TAKEN | | | | | | | | | | |
| TRK #8 FAILS ON CALL THRU TEST-REF'D TO GS AT 356-MADE BUSY AT R25-23 (BROKEN VERT. PAWL INC. SEL. 302-119) | | | | | | | | | | |
| CLEARED | | TIME | DATE | WORKTIME | FMN CK | CODE | NTF | | | |
| BY JP TO KG | | 1335 | 11-1- | 20MIN | EF | 0 | | | | |
| APPARATUS | | | | | | | | | | |
| RELAY | | | | | | | | | | |
| SWITCH | | | | | | | | | | |
| OTH. SPG. ASSY. | | | | | | | | | | |
| BANK - WIPER | | | | | | | | | | |
| WIRING | | | | | | | | | | |
| MISC. | | | | | | | | | | |
| DIRT | | | | | | | | | | |
| WEAR | | | | | | | | | | |
| DEFECT | | | | | | | | | | |
| WORK ERROR | | | | | | | | | | |
| OTHER | | | | | | | | | | |
| ORIGINATING | | | | | | | | | | |
| TERMINATING | | | | | | | | | | |
| OTHER | | | | | | | | | | |

"T" TICKET - REFERRED OUT
 A customer reports trouble calling the 356 office. The Plant Service Center tests no trouble and dispatches report to the central office. Investigation discloses trouble on trunk #8. The trunk is made busy entered on trunk outage log, and referred to terminating office. Ticket is closed out to Plant Service Center. "Ref. out" is recorded in the equipment space and ticket is filed in "Referred Out" bin of ticket file.

Fig. 14

| | | | | | | | | | | |
|----------------------|------|--------------------|-------|----------------------|----------|----------|----------|------------|-----------|--|
| T | MEMO | SXS TROUBLE TICKET | | | | | O/S | TKT. NO. | EQUIPMENT | |
| ✓ | | OFFICE | DATE | TIME | REPT. BY | LOCATION | RCVD. BY | REPT. CLS. | | |
| | | 972,4,6 | 11-1- | 1410 | SA #3 | POS. 14 | KL | - | | |
| TEL. NO. | | LINE EQPT. | | ASSOC. EQPT./CA. PR. | | | | | | |
| 972-2722 | | 10-6 | | | | | | | | |
| REPORT DETAILS | | | | | | | | | | |
| TRACE "O" NC #12 TRK | | | | | | | | | | |
| ACTION TAKEN | | | | | | | | | | |
| REF'D SA #3 | | | | | | | | | | |
| CLEARED | | TIME | DATE | WORKTIME | FMN CK | CODE | NTF | | | |
| BY EC TO SA #3 | | 1420 | 11-1- | 10MIN | EF | | | | | |
| APPARATUS | | | | | | | | | | |
| RELAY | | | | | | | | | | |
| SWITCH | | | | | | | | | | |
| OTH. SPG. ASSY. | | | | | | | | | | |
| BANK - WIPER | | | | | | | | | | |
| WIRING | | | | | | | | | | |
| MISC. | | | | | | | | | | |
| DIRT | | | | | | | | | | |
| WEAR | | | | | | | | | | |
| DEFECT | | | | | | | | | | |
| WORK ERROR | | | | | | | | | | |
| OTHER | | | | | | | | | | |
| ORIGINATING | | | | | | | | | | |
| TERMINATING | | | | | | | | | | |
| OTHER | | | | | | | | | | |

"MEMO" TICKET-TRAFFIC TRACE
 Traffic requests a trace for identification of calling line. The back of ticket is used for recording equipment details.

Fig. 15

| TRACING INFORMATION | | | | |
|-----------------------|----------|--------|-------|------------|
| EQUIP. | BAY/GRP. | SWITCH | LEVEL | TRK. TERM. |
| LF-PLS | 104 | 1 | 1 | 6 |
| SLS | | | | |
| 1st SEL | 102 | 12 | 0 | 3 |
| 2nd SEL | | | | |
| 3rd SEL | | | | |
| 4th SEL | | | | |
| 5th SEL | | | | |
| CONN. | | | | |
| ROTS. | | | | |
| RPTR. | | | | |
| TRK. | | | | |
| INC. SEL | | | | |
| REGISTER TRUNK & LINK | | | | |
| FR. | SWI. | HOR. | VER. | |
| | PRI. | | | |
| | SEC. | | | |
| TP | REG. NO. | | RD | |
| | | | TT | |
| REF. TO | INITIALS | DATE | TIME | |

REMARKS:

E-5461 (6-67)

| | | | | | | | | | | |
|--|------|--------------------|-------|----------------------|----------|----------|----------|------------|-----------|--|
| T | MEMO | SXS TROUBLE TICKET | | | | | O/S | TKT. NO. | EQUIPMENT | |
| ✓ | | OFFICE | DATE | TIME | REPT. BY | LOCATION | RCVD. BY | REPT. CLS. | C 482 #1 | |
| | | 972,4,6 | 11-1- | 1430 | KG | PSC | KL | A | | |
| TEL. NO. | | LINE EQPT. | | ASSOC. EQPT. CA. PR. | | | | | | |
| 974-8267 | | 27-63 | | 17/322 | | | | | | |
| REPORT DETAILS | | | | | | | | | | |
| CBC - BDR | | | | | | | | | | |
| ACTION TAKEN | | | | | | | | | | |
| CONNECTOR TEST - #1 CONN. FAILED DIRTY CONTACT 3/4 TOP (K) RELAY-FOLLOW OK | | | | | | | | | | |
| CLEARED | | TIME | DATE | WORKTIME | FMN CK | CODE | NTF | | | |
| BY JP TO KG | | 1145 | 11-1- | 15MIN | EF | 5 | | | | |
| APPARATUS | | | | | | | | | | |
| RELAY | | | | | | | | | | |
| SWITCH | | | | | | | | | | |
| OTH. SPG. ASSY. | | | | | | | | | | |
| BANK - WIPER | | | | | | | | | | |
| WIRING | | | | | | | | | | |
| MISC. | | | | | | | | | | |
| DIRT | | | | | | | | | | |
| WEAR | | | | | | | | | | |
| DEFECT | | | | | | | | | | |
| WORK ERROR | | | | | | | | | | |
| OTHER | | | | | | | | | | |
| ORIGINATING | | | | | | | | | | |
| TERMINATING | | | | | | | | | | |
| OTHER | | | | | | | | | | |

"T" TICKET - RELAY DIRT
 A Customer report of "can't be called" and "bell doesn't ring" results in finding a faulty contact in a connector relay. Contact follow is O.K. therefore, "dirt" is scored as the cause. Apparatus and equipment are also recorded as above.

Fig. 16

| | | | | | | | | | | |
|-----------------------------------|------|--------------------|-------|----------------------|----------|----------|----------|------------|-----------|--|
| T | MEMO | SXS TROUBLE TICKET | | | | | O/S | TKT. NO. | EQUIPMENT | |
| ✓ | | OFFICE | DATE | TIME | REPT. BY | LOCATION | RCVD. BY | REPT. CLS. | | |
| | | 972,4,6 | 11-1- | 1120 | JP | | | | | |
| TEL. NO. | | LINE EQPT. | | ASSOC. EQPT./CA. PR. | | | | | | |
| | | 37-114 | | | | | | | | |
| REPORT DETAILS | | | | | | | | | | |
| BROKEN TIP WIRE - HMDF | | | | | | | | | | |
| ACTION TAKEN | | | | | | | | | | |
| CLEANED LUG AND RE-CONNECTED WIRE | | | | | | | | | | |
| CLEARED | | TIME | DATE | WORKTIME | FMN CK | CODE | NTF | | | |
| BY JP TO | | 1125 | 11-1- | 5MIN | EF | | | | | |
| APPARATUS | | | | | | | | | | |
| RELAY | | | | | | | | | | |
| SWITCH | | | | | | | | | | |
| OTH. SPG. ASSY. | | | | | | | | | | |
| BANK - WIPER | | | | | | | | | | |
| WIRING | | | | | | | | | | |
| MISC. | | | | | | | | | | |
| DIRT | | | | | | | | | | |
| WEAR | | | | | | | | | | |
| DEFECT | | | | | | | | | | |
| WORK ERROR | | | | | | | | | | |
| OTHER | | | | | | | | | | |
| ORIGINATING | | | | | | | | | | |
| TERMINATING | | | | | | | | | | |
| OTHER | | | | | | | | | | |

"MEMO" TICKET - OBSERVED TROUBLE
 While working on a trouble (see Fig. 13) craftsman noticed a broken wire on an adjacent line circuit. Craftsman cleared this trouble as well as one reported on Figure 13. This memo ticket is made out by craftsman to indicate work done, and account for time spent. Memo tickets are not coded.

Fig. 17

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(4-66)

**INSPECTION AND ROUTINE OF
CENTRAL OFFICE EQUIPMENT**

TICKET NO. _____

| | | | |
|------------------|------|------------|----------------|
| DATE | TIME | RPT'D BY | C.O. TRBL CODE |
| C.O. DESIGNATION | | CABLE & PR | |

| DATE | TIME | LINE OR EQUIPMENT | TYPE REPORT CODE | DATE | TIME | LINE OR EQUIPMENT | TYPE REPORT CODE |
|------|------|-------------------|------------------|------|------|-------------------|------------------|
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

REMARKS:

(FRONT)

| | | | |
|------------------------------|--------------------------------|-----------------------------|--------------------------------|
| ORIG. EQUIP. (INSP. & ROUT.) | | TERM EQUIP. (INSP. & ROUT.) | |
| CLEARED BY | TIME SPENT LOCATING & CLEARING | CLEARED BY | TIME SPENT LOCATING & CLEARING |
| TIME | | TIME | |
| DATE | | DATE | |
| MDF (INSP.) | | IDF OR LDF (INSP.) | |
| CLEARED BY | TIME SPENT LOCATING & CLEARING | CLEARED BY | TIME SPENT LOCATING & CLEARING |
| TIME | | TIME | |
| DATE | | DATE | |
| RTN TO | DATE | TIME | TOTAL TIME LOC. & CLEARING |

(BACK)

Form E-4086

FORM E-4736 (9-65 REV 1)

CLASSIFICATION CODES AND DEFINITIONS FOR THE MANUAL HANDLING OF TROUBLE REPORTS

| | CODE | TYPES OF REPORTS |
|---------------------------------|---|---|
| Originating Call | 1 CC - NDT CAN'T CALL NO DIAL TONE | Does not hear Central Office Dial Tone, Can't Raise the Operator, or receives Slow Dial Tone. |
| Originating Call | 2 CC - OTH CAN'T CALL OTHER | Hears Central Office Dial Tone but Cannot Originate or Complete a Call. Includes reports of Cannot Call on circuits that do not furnish dial tone. |
| Originating or Terminating Call | 3 TRAN-NOISE TRANSMISSION NOISE | Reports Poor Transmission, Noise, or Interference. |
| Terminating Call | 4 CBC CAN'T BE CALLED | Reports Can't Be Called, e.g., Bell Doesn't Ring, Bell Rings and Can't Answer, Bell Rings No Answer, Bell Rings After Answer, Bell Rings and Can't Trip Ring, Called For Wrong Number, or Gets Busy Incoming. |
| | 5 MEM SVCS FAIL. MEMORY SERVICES FAILURE | Reports trouble with Customer Calling Services features, such as Speed Calling, Call Transfer, Three-way Calling, Call Waiting, Dial Pickup, Dial Hold, or Camp-On/Busy of an Automatic Switching System |
| | 6. DATA FAIL. DATA FAILURE | Reports Can't Send Data or Can't Receive Data. Includes reports on Automatic Call Unit failures. |
| | 7 PHY COND PHYSICAL CONDITION | Reports Worn, Damaged, Loose, or Missing Equipment, etc. |
| | 8 MISC MISCELLANEOUS | Any type trouble report not included in the other codes. |

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DISPOSITION CODES

- 1 STATION SET**
All troubles in the station set used for any class of service. It includes Teletypewriter station sets, Call Directors, station sets associated with Speakerphones, PICTUREPHONES, PBXs, or Order Turrets, and Mobile Telephones. The subset of the two-piece telephone set is considered a part of the station set. Troubles on that portion of a coin telephone involving coin apparatus are included in Other Station Equipment.
- 2 OTHER STATION EQUIPMENT**
All troubles in station equipment other than the station set such as Data Sets, BELLBOY Receiver Units, Auxiliary Signaling Equipment, Key Telephone Units, Key Cabinets or Turrets, Supplementary Station Equipment, Switchboards, Switching Equipment, Booths, and Coin Apparatus.
- 3 STATION WIRING**
All troubles in Drop and Block Wire, Station Protectors, Inside Wire, Inside Wiring Cable used in lieu of Inside Wire, and Ground Wires.
- 4 OUTSIDE PLANT**
All troubles in Cable, Cable Terminals, Amplifiers, Line Wire, Load Coils and their protection; Concentrators, Carrier Equipment, Base and Coast Stations in General Mobile Service and BELLBOY Personal Signaling Service located in places other than central offices.
- 5 CENTRAL OFFICE**
All troubles in central office equipment. Includes troubles in central office equipment permanently associated with customer lines, and troubles in equipment common to customer lines.
- 6 CUSTOMER ACTION**
All troubles caused by customer action or error affecting Company-owned and customer-owned equipment or attachments. Also includes trouble on customer-owned equipment or attachments.
- 60 RECEIVER OFF HOOK**
All troubles caused by customers leaving the receiver off the hook.
- 7 TEST OK**
Trouble reports are closed as Test OK when the trouble-causing condition cannot be determined and the report is not referred to the central office or outside forces for further investigation. Includes central office and concentrator overload conditions.
- 8 FOUND OK-IN**
All trouble reports Found OK by central office forces, and not dispatched to outside forces. Reports where there is substantial evidence that the report was caused by lockup conditions, equipment off normal, etc. are classified to the central office.
- 9 FOUND OK-OUT**
All trouble reports Found OK by outside forces. Reports that were Found OK by central office forces before dispatching are included.
- 0 REFERRED-OUT**
All trouble reports referred to other forces or agencies for further handling. This does not apply to trouble reports on TWX and WATS Classes of Service when the trouble locates in near-end plant (Station Apparatus, Access Lines, and Serving Central Office).

CAUSE CODES

- 1 MAN MADE-TELEPHONE EMPLOYEE**
Trouble was caused by a Telephone Company employee or overlooked by an employee on a previous report.
- 2 MAN MADE-OTHER**
Trouble was caused by other than Telephone Company employees—intentionally or unintentionally. Includes troubles caused by Western Electric employees.
- 3 PLANT OR EQUIPMENT**
Trouble was caused by overload, failure or breakdown of plant or equipment— independent of any direct human action.
- 4 WEATHER**
Trouble was caused by weather conditions. Includes troubles caused by a tree being blown into the route of cables or wires.
- 5 OTHER**
Covers cases not included in codes 1 thru 4.
- 6 UNKNOWN**
Covers cases where it is impossible to determine the cause of a trouble or trouble report.

Fig. 21

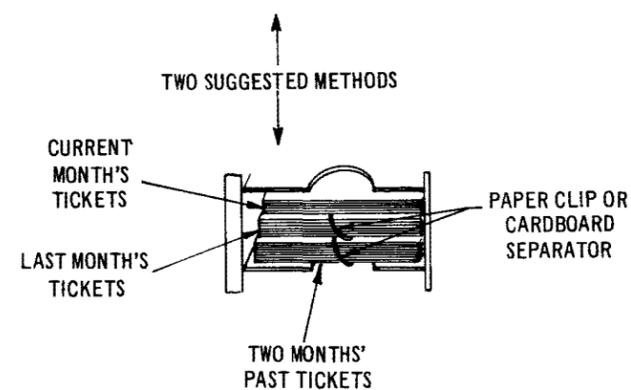
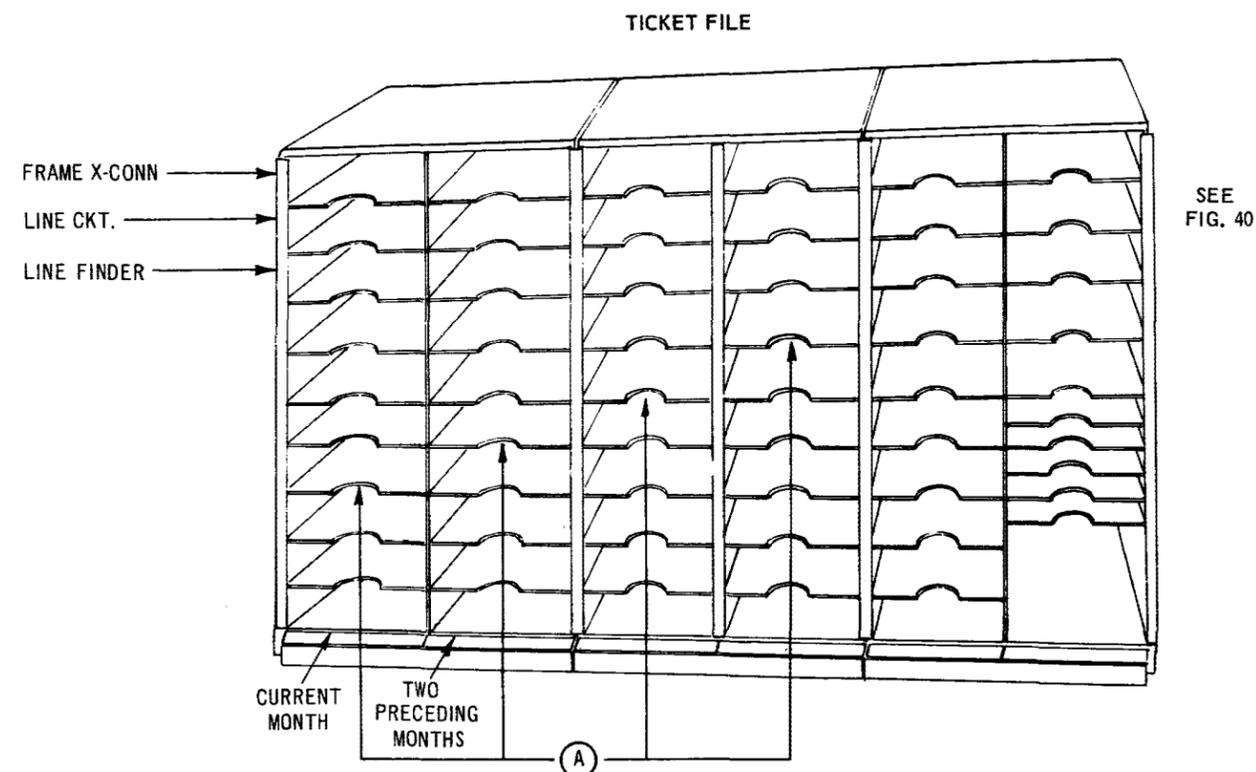
(A) (B) E-5457 (6-67)

OFFICE 972 974 976 CENTRAL OFFICE LOG

PERIOD NOVEMBER 1, 1966

| DATE | TKT. NO. | TIME RCVD. | FROM OR REPORT CLASS | NATURE OF REPORT OR ACTIVITY | DISP. TO | CLOSED OUT | EQPT. GROUP |
|--|----------|------------|----------------------|---|----------|------------|-------------|
| (C) 10-31 | 215 | 1630 | B | NOISY CONNECTION TO 279 | WY | 1130 | NTF |
| (D) 11-1 | 1 | 0830 | A | 976-2421 GETS WRONG NUMBERS CALLING OUT | EC | 1115 | 1st SEL |
| 11-1 | 2 | 0910 | A | 972-3449 NDT - OPEN INSIDE | JP | 0930 | MDF |
| 11-1 | 3 | 0940 | J | 855 CALLING 972-4637 NO RING HOLDING | BC | | CONN |
| 11-1 | 4 | 1030 | B | POOR TRANSMISSION ON 356 TOLL SW TRK #4 | JP | | MISC |
| 11-1 | | | | WE CO. WORKING IN L. 6 41-MOP #67 | EF | | |
| 11-1 | 5 | 1120 | A | 972-1451 NDT AT TIMES - REPEAT REPORT | JP | 1150 | NTF |
| 11-1 | 6 | 1315 | A | 976-0563 - CAN'T CALL 356 NUMBERS | JP | 1335 | R. O. |
| 11-1 | 7 | 1410 | | TRACE "O" NC #12 TRK | EC | | MEMO |
| (E) | (F) | (G) | (H) | (I) | (J) | (K) | (L) |
| Typical Entries, Form E-5457, Central Office Log | | | | | | | |
| <u>NOTE</u> | | | | <u>EXPLANATION</u> | | | |
| A | | | | Central office name or unit designation. | | | |
| B | | | | Period covered by form. | | | |
| C | | | | The date in this example indicates report is carried over. | | | |
| D | | | | Current date indicates the end of carried over reports. | | | |
| E | | | | Date of report or activity. | | | |
| F | | | | Central office trouble ticket serial number. | | | |
| G | | | | Time report received. | | | |
| H | | | | Trouble report source or report classification. | | | |
| I | | | | Details of reports or activities. | | | |
| J | | | | Initials of individual to whom report is dispatched. | | | |
| K | | | | Enter close out time and/or date. | | | |
| L | | | | Trouble ticket filing information. Record in this column the information entered in the Equipment space of "T" tickets. For MEMO tickets, enter "MEMO." | | | |

Fig. 22



TICKET FILE ORDERING INFORMATION:

- (QUANTITY) - TICKET ANALYSIS FILE - DRAWING 38-Y-3868
- (QUANTITY) - SNAP ON 8G DESIGNATION STRIP, TICKET ANALYSIS FILE - DRAWING 38-Y-3868
- (QUANTITY) - DIVIDER, TICKET ANALYSIS FILE, DRAWING 38-Y-3868

NOTE

A-MAJOR ITEMS OF EQUIPMENT

- FRAME X-CONN.
- LINE CIRCUIT
- LINE FINDER
- LINE SWITCH
- 1st SELECTOR
- 2nd SELECTOR
- 3rd SELECTOR
- 4th SELECTOR
- 5th SELECTOR
- TOLL SELECTOR
- CONNECTOR
- TRUNK
- REPEATER
- MISCELLANEOUS
- AMA/ANI
- NTF {
 - ORIGINATING
 - TERMINATING
 - OTHER

(SEE FIG. 27)

Fig. 26

TROUBLE SUMMARY

Office 972, 4, 6

Period Covered 1966

| EQUIPMENT | AVG PREV. YEAR | CUR OBJ | J | F | M | A | M | J | J | A | S | O | N | D | TOTAL |
|--------------------------|----------------------|------------|----|----|-----------------|-----------------|-----------------|----|----|----|----|----|----|---|-------|
| FRAME X-CONN | 49 | 45 | 44 | 51 | 62 ^① | 51 | 46 | 41 | 39 | 40 | 42 | 45 | 47 | | |
| LINE CKT | | | | | | | | | | | | | | | |
| LINE FINDER | 42 | 39 | 41 | 44 | 46 | 49 ^② | 40 | 39 | 35 | 34 | 39 | 42 | 40 | | |
| LINE SWITCH | | | | | | | | | | | | | | | |
| 1 ST SELECTOR | | | | | | | | | | | | | | | |
| 2 ND SELECTOR | | | | | | | | | | | | | | | |
| 3 RD SELECTOR | | | | | | | | | | | | | | | |
| 4 TH SELECTOR | | | | | | | | | | | | | | | |
| 5 TH SELECTOR | | | | | | | | | | | | | | | |
| TOLL SELECTOR | | | | | | | | | | | | | | | |
| CONNECTOR | 44 | 38 | 34 | 36 | 41 | 47 | 52 ^③ | 45 | 33 | 31 | 35 | 39 | 39 | | |
| TRUNK | | | | | | | | | | | | | | | |
| REPEATER | | | | | | | | | | | | | | | |
| MISCELLANEOUS | | | | | | | | | | | | | | | |
| AMA / ANI | | | | | | | | | | | | | | | |
| COMMON CONTROL | | | | | | | | | | | | | | | |
| NTF-ORIGINATING | | | | | | | | | | | | | | | |
| NTF-TERMINATING | 27 | 22 | 21 | 23 | 28 | 36 | 43 ^③ | 34 | 23 | 20 | 24 | 25 | 23 | | |
| NTF- OTHER | | | | | | | | | | | | | | | |

○ SEE REMARKS ON BACK OF SHEET

(FRONT)

- ① MAR - FRAME TROUBLES HIGH DUE TO INEXPERIENCE IN ERROR, ETC. - VACUUM CLEANED TERM.
- ② APR - LINE FINDER (C) RELAY PROBLEM - INSPECTION CONTACT REPLACEMENT PROJECT - VACUUM CLEANED TERM.
- ③ MAY - TALLY OF CONNECTOR TROUBLES AND EXAMINATION DIRT PROBLEM IN CONNECTOR FRAMES OF BANK AND WIPER CLEANING AND OPERATION

SXS TROUBLE TALLY SHEET

OFFICE 972, 4, 6 PERIOD COVERED MAY, 1966

| EQUIPMENT | | 202 | 214 | 243 | 245 | 246 | 247 | 249 | 252 | 253 | 261 | 264 | 283 | 290 | (D) | TOTAL |
|------------------|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|
| RELAY | DIRT | / | | // | / | /// | // | / | / | | | | | / | | 14 |
| | WEAR | | / | | | | | | | | | | | | | 1 |
| | DEFECT | | | | | | | | | | | | | | (E) | |
| | WORK ERROR | | | | | | | | | | | | / | | | 1 |
| | OTHER | | | | | | | | | | | | | | | |
| SWITCH | DIRT | | | | | / | | / | | | | | | | | 2 |
| | WEAR | | | | | | | | | | | | | | | |
| | DEFECT | | | | | | / | | / | | / | | | | | 3 |
| | WORK ERROR | | | | | | | | | | | | | | | |
| | OTHER | | | | | | | | | | | | | | | |
| OTHER SPG. ASSY. | DIRT | | / | / | / | // | / | / | | | | | | | | 7 |
| | WEAR | | | | | | | | | | / | | | | | 1 |
| | DEFECT | | | | | | | | | | | | | | | |
| | WORK ERROR | | | | | | | | | | | | | | | |
| | OTHER | | | | | | | | | | | | | | | |
| BANK WIPER | DIRT | | | // | /// | /// | /// | // | | | | | | | | 15* |
| | WEAR | | | | / | // | | | | | | | | | | 3 |
| | DEFECT | | | | | | | | | / | | / | | | | 2 |
| | WORK ERROR | | | | | | | | | | | | | | | |
| | OTHER | | | | | | | | | | | | | | | |
| WIRING | WORK ERROR | | | | | | | | / | | | | | | | 1 |
| | OTHER | | | | | | | | | | | | | | | |
| MISC. | DIRT | | | | | | | | | | | | | | | |
| | WEAR | | | | | | | | | | | | | | | |
| | DEFECT | | | | | | | | | | | | | | | |
| | WORK ERROR | | | | | | | | | | | | | | | |
| | OTHER | | | | | | | | | | | | | | | |
| NTF | ORIGINATING | | | | | | | | | | | | | | E | |
| | TERMINATING | | | | | / | / | | | | | | | | | 2 |
| | OTHER | | | | | | | | | | | | | | | |
| TOTAL | | 1 | 2 | 5 | 6 | 14 | 10 | 5 | 2 | 2 | 1 | 2 | 1 | 1 | | 52 |

(E)

A Office Designation
 B Period covered by tickets tallied
 C Equipment group under scrutiny
 D Frame, Bay, Equipment Number
 E Determine "Apparatus" and "Cause" or "NTF" from trouble ticket and tally in appropriate space under equipment heading. Comparison with a previous period of equal time may be made by using a different color or column on the same sheet (Not Illustrated).
 F Total troubles by equipment heading
 G Total troubles by apparatus and cause or NTF classification
 * See Item 3 of Fig. 27 Remarks.

Fig. 28

CORRECTIVE MAINTENANCE DIAGRAM

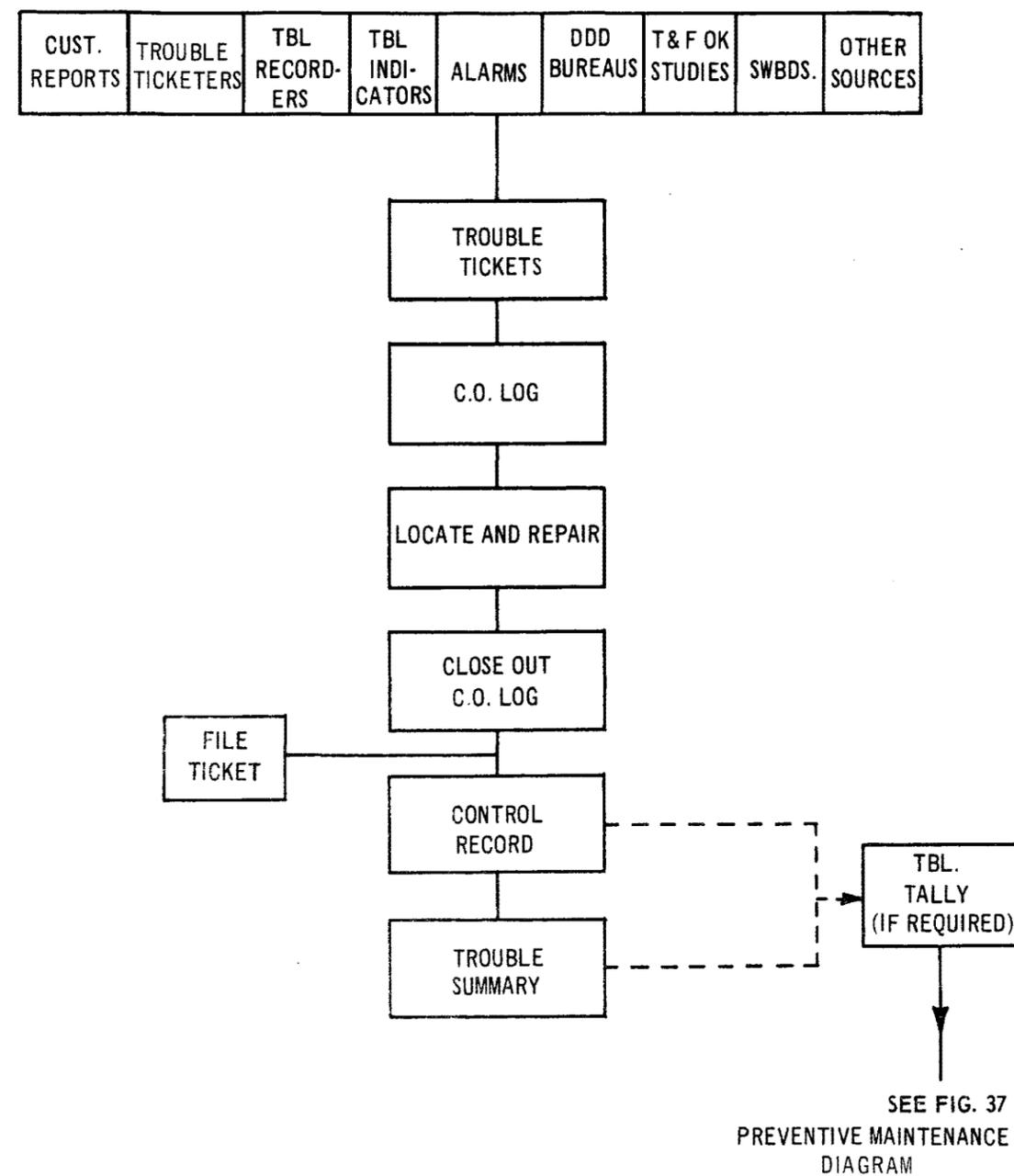


Fig. 29

E-5450 (6-67)

E-5451 (6-67)

| EQUIPMENT TEST LIST | | | | | |
|---------------------|--------------|---|-------|-------|---------|
| B.S.P. | TEST OR REQ. | EQUIPMENT AND WORK DESCRIPTION | CLASS | FREQ. | JOB NO. |
| 226-305-503 | | LOCAL AND TOLL SELECTORS - TEST SET | | | |
| | | SD-90210-01 OR SD-90416-01 | | | |
| | A | Local Selectors | MR | 24M | 1 |
| | B | Toll Selectors Test Set SD-90210-01 | MR | 24M | 2 |
| | C | Toll Selectors Test Set SD-90416-01 | MR | 24M | NA |
| | D | Restricted Svc & CIs of Svc Features | MR | 24M | 3 |
| 226-400-500 | | CONNS - TEST SET SD-31481-01 | | | |
| | B | Over-All Pulsing and E Relay Hold | MR | 24M | 4 |
| 226-400-501 | | CONNS - TEST SET SD-90418-01 | | | |
| | A | B Relay Release - Excluding Toll L.H. | MR | 24M | 5 |
| | B | C Relay Release - Excluding L.H. | MR | 24M | 6 |
| 226-800-500 | | SWITCH TROUBLE AND FUSE ALARMS | | | |
| | A | Switch Frame Fuse Alarm | MW | 12M | 7 |
| | B | LF, TF, Convr Fdr, Sel, Coin Cont Sel, 8-Pty & 10-Pty RC Sel, TD, & Conn Rels Alarm | MW | 12M | 8 |
| | C | 2 & 4 Pty Rev Sel Rls Alm | MW | 12M | 9 |
| 226-801-500 | | TROUBLE AND FUSE ALARMS - MISC CKTS | | | |
| | A | Misc Relay Rack Fuse Alarm | MW | 12M | 10 |
| | B | Switchroom Pwr and Supv Panel Fuse Alms | MW | 12M | 11 |
| | C | 60 and 120 IPM Interrupter Ckt Alarms | MW | 12M | 12 |
| | P | Extended Alarms | MW | 12M | 13 |
| | T | M.R. Trunk Int and Int Alarm Ckts | MW | 12M | 14 |
| | U | Alarm Sender SD-32193-01 | MW | 12M | 15 |
| | W | Interrupter Relay and Alarm Ckt | MW | 12M | 16 |
| | X | M.R. ANI-Type C Ckts Alarms | MW | 12M | 17 |
| 226-833-500 | | CALL-THRU TESTS - TEST SET SD-32522-01 | | | |
| | A | Call-Thru Tests from Line Finders | TF | * D | 18 |
| | B | Call-Thru Tests from Selectors | TF | * W | 19 |
| | C | Call-Thru Tests from Toll Selectors | TF | *2W | 20 |

| SCHEDULE | | | | | | | | | | | | |
|----------|------------------|------|-----|-----|-------|-----|-----|-----|-----------|-----|-----|-----|
| JOB NO. | OFFICE 972, 4, 6 | | | | SHIFT | | | | YEAR 1966 | | | |
| | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
| 1 | 1967 | | | | | | | | | | | |
| 2 | | 1967 | | | | | | | | | | |
| 3 | 1967 | | | | | | | | | | | |
| 4 | | | | | | | | | | X | | |
| 5 | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | |
| 7 | | | | | X | | | | | | | |
| 8 | | | | | X | | | | | | | |
| 9 | | | | | X | | | | | | | |
| 10 | | | | | X | | | | | | | |
| 11 | | | | | X | | | | | | | |
| 12 | | | | | X | | | | | | | |
| 13 | | | | | X | | | | | | | |
| 14 | | | | | X | | | | | | | |
| 15 | | | | | X | | | | | | | |
| 16 | | | | | X | | | | | | | |
| 17 | | | | | X | | | | | | | |
| 18 | DAILY | | | | | | | | | | | |
| 19 | III | II | III | III | III | III | II | II | III | III | III | |
| 20 | II | II | II | II | II | II | I | I | II | II | II | |

SHEET NO. _____

Fig. 30

TABLE A
MR REVIEW PROCEDURE

| FORM E-5453 E-5454 OR E-5455 INDICATES | AVAILABLE INFORMATION INDICATES NEED TO DO | SIZE OF JOB | |
|--|---|--------------|-------------|
| | | SMALL | LARGE |
| WORK PERFORMED LAST TIME OR SINCE | YES | PERFORM WORK | SAMPLE* |
| | NO | PASS ϕ | PASS ϕ |
| WORK NOT PERFORMED LAST TIME OR SINCE | YES | PERFORM WORK | SAMPLE* |
| | NO | PERFORM WORK | SAMPLE* |

* THE SIZE OF THE JOB AS WELL AS THE NATURE OF THE WORK MAY OR MAY NOT LEND ITSELF TO SAMPLING PROCEDURES. INSTRUCTIONS FOR MAKING THIS DETERMINATION AND FOR TAKING SAMPLES ARE COVERED IN PART 13.

ϕ A RECORD OF EACH REVIEW MUST BE MADE ON THE TEST AND INSPECT SUMMARY EVEN IF NO ACTION IS TAKEN.

OFFICE ^(A) 972, 4, 6 ASSIGNMENT OR JOB NO. ^(B) 76 1-10

TEST AND INSPECTION SUMMARY
MULTIPLE JOB ASSIGNMENTS

| EST. TIME | JOB NO. | MO. DUE | FROM EQPT. UNIT | TO EQPT. UNIT | NO. UNITS | DATE | | BY | NO. OF TBL. | TIME SPENT | | DATE | | BY | NO. OF TBL. | TIME SPENT | | DATE | | BY | NO. OF TBL. | TIME SPENT | | DATE | | BY | NO. OF TBL. | TIME SPENT | | DATE | | | | |
|---|---------|---------|-----------------|---------------|-----------|-------------|-------------|----|-------------|-------------|-------------|-------------|-------------|----|-------------|-------------|-------------|-------------|-------------|----|-------------|-------------|-------------|-------------|-------------|----|-------------|-------------|-------------|-------------|-------------|--|--|--|
| | | | | | | E-5452 ISS. | WORK COMPL. | | | E-5452 ISS. | WORK COMPL. | E-5452 ISS. | WORK COMPL. | | | E-5452 ISS. | WORK COMPL. | E-5452 ISS. | WORK COMPL. | | | E-5452 ISS. | WORK COMPL. | E-5452 ISS. | WORK COMPL. | | | E-5452 ISS. | WORK COMPL. | E-5452 ISS. | WORK COMPL. | | | |
| | | | | | | TEST | RE-PAIR | | | TEST | RE-PAIR | TEST | RE-PAIR | | | TEST | RE-PAIR | TEST | RE-PAIR | | | TEST | RE-PAIR | TEST | RE-PAIR | | | TEST | RE-PAIR | TEST | RE-PAIR | | | |
| (G) PER UNIT 6 MIN (F) CLASS MW (D) EQUIPMENT SELECTORS (E) WORK DESCRIPTION LUBRICATION 030-705-706 MID TEST LETTER OR PAR. 3.01 (C) | 1 | JAN. | 101-1 | 103-160 | 480 | 1-4-3 | 1-12-3 | AK | 2 | 48HR | 20M | 1-3-6 | 1-14-6 | CZ | 4 | 47HR | 40M | | | | | | | | | | | | | | | | | |
| | 2 | FEB. | 104-1 | 106-160 | 471 | 2-3-3 | 2-12-3 | AK | 3 | 48HR | 30M | 2-1-6 | 2-11-6 | JM | 2 | 48HR | 15M | | | | | | | | | | | | | | | | | |
| | 3 | MAR. | 107-1 | 201-160 | 475 | 3-1-3 | 3-11-3 | EC | 1 | 52HR | 15M | 3-2-6 | 3-14-6 | CZ | 5 | 48HR | 60M | | | | | | | | | | | | | | | | | |
| | 4 | APR. | 202-1 | 204-160 | 480 | 4-2-3 | 4-12-3 | AK | 3 | 47HR | 30M | 4-4-6 | 4-12-6 | JM | 3 | 51HR | 30M | | | | | | | | | | | | | | | | | |
| | 5 | MAY | 205-1 | 301-160 | 473 | 5-3-3 | 5-12-3 | EC | 1 | 50HR | 10M | 5-2-6 | 5-18-6 | AK | 1 | 48HR | 15M | | | | | | | | | | | | | | | | | |
| | 6 | JUN | 302-1 | 304-160 | 479 | 6-4-3 | 6-14-3 | CZ | 4 | 48HR | 50M | 6-1-6 | 6-15-6 | HB | 2 | 52HR | 20M | | | | | | | | | | | | | | | | | |
| | 7 | SEP | 305-1 | 401-160 | 472 | 9-2-3 | 9-12-3 | CZ | 2 | 49HR | 20M | 9-1-6 | 9-13-6 | AK | 2 | 48HR | 15M | | | | | | | | | | | | | | | | | |
| | 8 | OCT | 402-1 | 404-160 | 480 | 10-1-3 | 10-10-3 | AK | 2 | 47HR | 15M | 10-3-6 | 10-12-6 | AK | 4 | 47HR | 45M | | | | | | | | | | | | | | | | | |
| | 9 | NOV. | 501-1 | 503-160 | 480 | 11-2-3 | 11-10-3 | AK | 1 | 50HR | 10M | 11-2-6 | | | | | | | | | | | | | | | | | | | | | | |
| | 10 | DEC. | 504-1 | 602-160 | 476 | 12-1-3 | 12-11-3 | EC | 2 | 48HR | 30M | 12-1-6 | | | | | | | | | | | | | | | | | | | | | | |
| 11 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 13 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 14 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 15 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 17 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 18 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 19 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 21 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 22 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 23 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 24 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 26 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 27 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 28 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 29 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 31 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 32 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 33 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 34 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

NOTE EXPLANATION

- A - DESIGNATION OF CENTRAL OFFICE.
- B - LOCALLY ASSIGNED - CROSS-REFERENCED TO EQUIPMENT TEST LIST.
- C - TEST REFERENCE INFORMATION.
- D - DESCRIPTION OF EQUIPMENT.
- E - DESCRIPTION OF TESTS OR INSPECTIONS.
- F - TEST OR INSPECTION CLASS AND FREQUENCY - FROM EQUIPMENT TEST LIST.
- G - ESTIMATED TEST TIME PER UNIT AND ASSIGNMENT.
- H - NUMBER SUFFIXED TO ASSIGNMENT OR JOB NO. TO IDENTIFY INDIVIDUAL ASSIGNMENTS.
- I - MONTH WORK ASSIGNMENT IS SCHEDULED FOR REVIEW, SAMPLE OR COMPLETION.
- J - SHOW FIRST AND LAST UNIT OF EQUIPMENT FOR EACH ASSIGNMENT.
- K - ENTER NUMBER OF UNITS PER ASSIGNMENT.
- L - ENTER DAT FORM E-5452 WAS ISSUED AND DATE THE ASSIGNMENT WAS COMPLETED REVIEWED OR SAMPLED.
- M - WORKMAN'S INITIALS.
- N - TOTAL TROUBLE APPEARANCES - TAKEN FORM E-5452.
- O - TOTAL TEST AND REPAIR TIME - TAKEN FORM E-5452.
- P - THIS ASSIGNMENT SCHEDULED AND COMPLETED WITH FOUR TROUBLES FOUND.
- Q - ASSIGNMENT IS SCHEDULED, BUT NOT COMPLETED. COLORING IS OPTIONAL. THE COLORED HALF-BLOCK CAN ALSO BE USED TO ILLUSTRATE MR TESTS SAMPLED AND PASSED WITH APPROPRIATE ENTRIES.

Fig. 34

(A)

TEST AND INSPECTION WORK ORDER AND RECORD

(B)

OFFICE 972,4,6

ASSIGNMENT OR JOB NO. 76-8

| ASSIGNMENT DATA | | | | | | PROGRESS REPORT | | | | | | | |
|--|------------------------|--------------------------------|------------|-----------------|------------|------------------|-----------------|-----------|---------------|------------|----------------------|------------|-----------|
| B.S.P. NO. <u>030-705-706</u> TEST LETTER OR PAR. <u>3.01</u> (C) | | | | | | DATE | FROM EQPT. UNIT | | TO EQPT. UNIT | | TIME SPENT (MINUTES) | | BY |
| EQUIPMENT <u>SELECTORS</u> (D) | | | | | | | | | | | TEST | REPAIR | |
| WORK DESCRIPTION <u>LUBRICATION</u> (E) | | | | | | | | | | | | | |
| FROM EQPT. UNIT (F) | | TO EQPT. UNIT | | TOTAL UNITS (G) | SHIFT (H) | | | | | | | | |
| <u>402</u> | <u>1</u> | <u>404</u> | <u>160</u> | <u>480</u> | <u>EVE</u> | <u>10-3-6</u> | <u>402</u> | <u>1</u> | <u>402</u> | <u>80</u> | <u>460M</u> | <u>20M</u> | <u>AK</u> |
| | | | | | | <u>10-4-6</u> | <u>402</u> | <u>81</u> | <u>402</u> | <u>160</u> | <u>480M</u> | | |
| | | | | | | <u>10-5-6</u> | <u>403</u> | <u>1</u> | <u>403</u> | <u>80</u> | <u>470M</u> | <u>10M</u> | |
| | | | | | | <u>10-6-6</u> | <u>403</u> | <u>81</u> | <u>403</u> | <u>160</u> | <u>480M</u> | | |
| | | | | | | <u>10-11-6</u> | <u>404</u> | <u>1</u> | <u>404</u> | <u>80</u> | <u>465M</u> | <u>15M</u> | |
| | | | | | | <u>10-12-6</u> | <u>404</u> | <u>81</u> | <u>404</u> | <u>160</u> | <u>465M</u> | | <u>V</u> |
| ASSIGNED TO (I) | | TO BE STARTED (J) | | TO BE COMPLETED | | ← (N) → | | | | | | | |
| <u>A.K.</u> | | <u>10-3-66</u> | | <u>10-12-66</u> | | | | | | | | | |
| WORK RECORD | | | | | | | | | | | | | |
| EQPT. UNIT (K) | TROUBLE APPEARANCE (L) | | | | | ACTION TAKEN (M) | | | | | REPAIR TIME | BY | |
| <u>402</u> | <u>52</u> | <u>LOOSE SHAFT SPRG. ASSY.</u> | | | | | <u>REPAIRED</u> | | | | | <u>10</u> | <u>AK</u> |
| <u>402</u> | <u>74</u> | <u>FRAYED WIPER CORD</u> | | | | | ↓ | | | | | <u>10</u> | ↓ |
| <u>403</u> | <u>72</u> | <u>FRAYED WIPER CORD</u> | | | | | | | | | | <u>10</u> | |
| <u>404</u> | <u>2</u> | <u>LOOSE SHAFT SPG. ASSY.</u> | | | | | | | | | | <u>15</u> | |
| NOTE EXPLANATION | | | | | | | | | | | | | |
| A - CENTRAL OFFICE IDENTIFICATION. | | | | | | | | | | | | | |
| B - LOCALLY ASSIGNED NUMBER AND OR LETTER TO IDENTIFY ASSIGNMENT OR JOB BY TYPE OF WORK, SHIFT, EQUIPMENT, ETC. | | | | | | | | | | | | | |
| C - REFERENCE INFORMATION. | | | | | | | | | | | | | |
| D - IDENTIFICATION OF EQUIPMENT. | | | | | | | | | | | | | |
| E - DESCRIPTION OF WORK TO BE PERFORMED. | | | | | | | | | | | | | |
| F - FOR DESIGNATING THE FIRST AND LAST CIRCUIT OR EQUIPMENT ASSIGNED BY WORK ORDER. | | | | | | | | | | | | | |
| G - TOTAL UNITS THIS ASSIGNMENT. | | | | | | | | | | | | | |
| H - "SHIFT" WORK TO BE PERFORMED (DAY, EVENING, NIGHT). | | | | | | | | | | | | | |
| I - SHOW TRICK DESIGNATION OR INITIALS OF EMPLOYEE WORK ASSIGNED TO. | | | | | | | | | | | | | |
| J - SHOW DATE AND/OR TIME WORK IS SCHEDULED TO BE STARTED AND COMPLETED. | | | | | | | | | | | | | |
| K - EQUIPMENT UNIT ON WHICH TROUBLE IS INDICATED. | | | | | | | | | | | | | |
| L - DETAILS OF TROUBLE APPEARANCE. | | | | | | | | | | | | | |
| M - DETAILS OF ACTION TAKEN TO CLEAR TROUBLE, TIME CONSUMED, WORKMAN'S INITIALS. | | | | | | | | | | | | | |
| N - SHOW WORKMAN'S INITIALS AND SUMMARY OF TIME SPENT TESTING AND REPAIRING BY DATE AND EQUIPMENT INVOLVED. | | | | | | | | | | | | | |
| O - FOR TOTALING TROUBLE APPEARANCES THIS PAGE. IF LIMITED TROUBLE MIGHT BE EXPECTED ON THIS TEST, USE OF THIS FORM ON THIS TEST WOULD BE OPTIONAL. | | | | | | | | | | | | | |

(O) TOTAL TROUBLE APPEARANCES 4

NO. SHEETS 1 SHEET NO. 1

TEST AND INSPECTION WORK ORDER AND RECORD

OFFICE 972, 4, 6

ASSIGNMENT OR JOB NO. 18

| ASSIGNMENT DATA | | | | PROGRESS REPORT | | | | | |
|--|------------------------|------------------|------------|--|-----------------|---------------|----------------------|-------------|--------------|
| B.S.P. NO. <u>226-833-500</u> TEST LETTER OR PAR. <u>A</u> | | | | DATE | FROM EQPT. UNIT | TO EQPT. UNIT | TIME SPENT (MINUTES) | | BY |
| EQUIPMENT <u>CALL THRU TEST SET</u> | | | | | | | TEST | REPAIR | |
| WORK DESCRIPTION <u>TESTS FROM LINE FINDERS</u> | | | | <u>11/1/</u> | <u>LG 1</u> | <u>LG 10</u> | <u>60M</u> | | <u>JC</u> |
| | | | | <u>11/2/</u> | <u>LG 11</u> | <u>LG 20</u> | <u>80M</u> | <u>30M</u> | <u>JC EC</u> |
| | | | | <u>11/3/</u> | <u>LG 21</u> | <u>LG 30</u> | <u>90M</u> | <u>35M</u> | <u>JC EC</u> |
| | | | | <u>11/4/</u> | <u>LG 31</u> | <u>LG 40</u> | <u>60M</u> | <u>40M</u> | <u>JC EC</u> |
| FROM EQPT. UNIT | TO EQPT. UNIT | TOTAL UNITS | SHIFT | | | | | | |
| <u>ALL LG</u> | | <u>10 LG/DAY</u> | <u>DAY</u> | | | | | | |
| ASSIGNED TO | TO BE STARTED | TO BE COMPLETED | | | | | | | |
| <u>J.C.</u> | <u>11/1</u> | <u>11-30-</u> | | | | | <u>290M</u> | <u>105M</u> | |
| WORK RECORD | | | | | | | | | |
| EQPT. UNIT | TROUBLE APPEARANCE | | | ACTION TAKEN | | | REPAIR TIME | BY | |
| | <u>11-1-</u> | | | <u>No FAILURES</u> | | | | | |
| | <u>11-2-</u> | | | | | | | | |
| <u>SEL 103-1A</u> | <u>PULSING FAILURE</u> | | | <u>ADJ'D AND PULSED (A) REL</u> | | | <u>25MIN</u> | <u>EC</u> | |
| <u>CONN 483-2</u> | <u>RINGING FAILURE</u> | | | <u>DIRT 3/4 TOP (K) REL</u> | | | <u>5MIN</u> | <u>JC</u> | |
| | <u>11-3-</u> | | | | | | | | |
| <u>SEL 105-71</u> | <u>CGT</u> | | | <u>ADJD 3/4 V.O.N. SPGS.</u> | | | <u>10MIN</u> | <u>JC</u> | |
| <u>LF 37-4</u> | <u>CAN'T FIND LINE</u> | | | <u>BROKEN WIPER</u> | | | <u>20MIN</u> | <u>EC</u> | |
| <u>CONN 437-6</u> | <u>RINGING FAILURE</u> | | | <u>NO FOLLOW 3/4 TOP (K) REL.</u> | | | <u>5MIN</u> | <u>JC</u> | |
| | <u>11-4</u> | | | | | | | | |
| <u>SEL 101-41</u> | <u>PULSING FAILURE</u> | | | <u>REPLACED (A) CONTS & PULSED</u> | | | <u>40MIN</u> | <u>EC</u> | |
| <p>ASSIGNMENT DATA SHOWS ALL LINE GROUPS SCHEDULED FOR "CALL THRU" TEST AT RATE OF 10 LINE GROUPS PER DAY FOR THE MONTH. "J.C." WAS ASSIGNED THE TASK OF OPERATING THE TEST SET AND CLEARING TROUBLES INVOLVING MINOR APPARATUS WORK. "E.C." PERFORMED THE REMAINDER OF THE APPARATUS WORK. REPAIR TIME FOR EACH TROUBLE IS SHOWN IN WORK RECORD. TESTING PROGRESS, TESTING TIME, AND REPAIR TIME PER DAY ARE SHOWN IN PROGRESS REPORT. TOTAL TIME SPENT IS SHOWN AT BOTTOM OF PROGRESS REPORT. TOTAL TROUBLE APPEARANCES ARE RECORDED AT BOTTOM OF SHEET. THE TOTALED FIGURES ARE ENTERED ON TEST AND INSPECTION SUMMARY, FORMS E-5453 OR E-5454.</p> | | | | | | | | | |

TOTAL TROUBLE APPEARANCES 6

NO. SHEETS 1 SHEET NO. 1

PREVENTIVE MAINTENANCE DIAGRAM

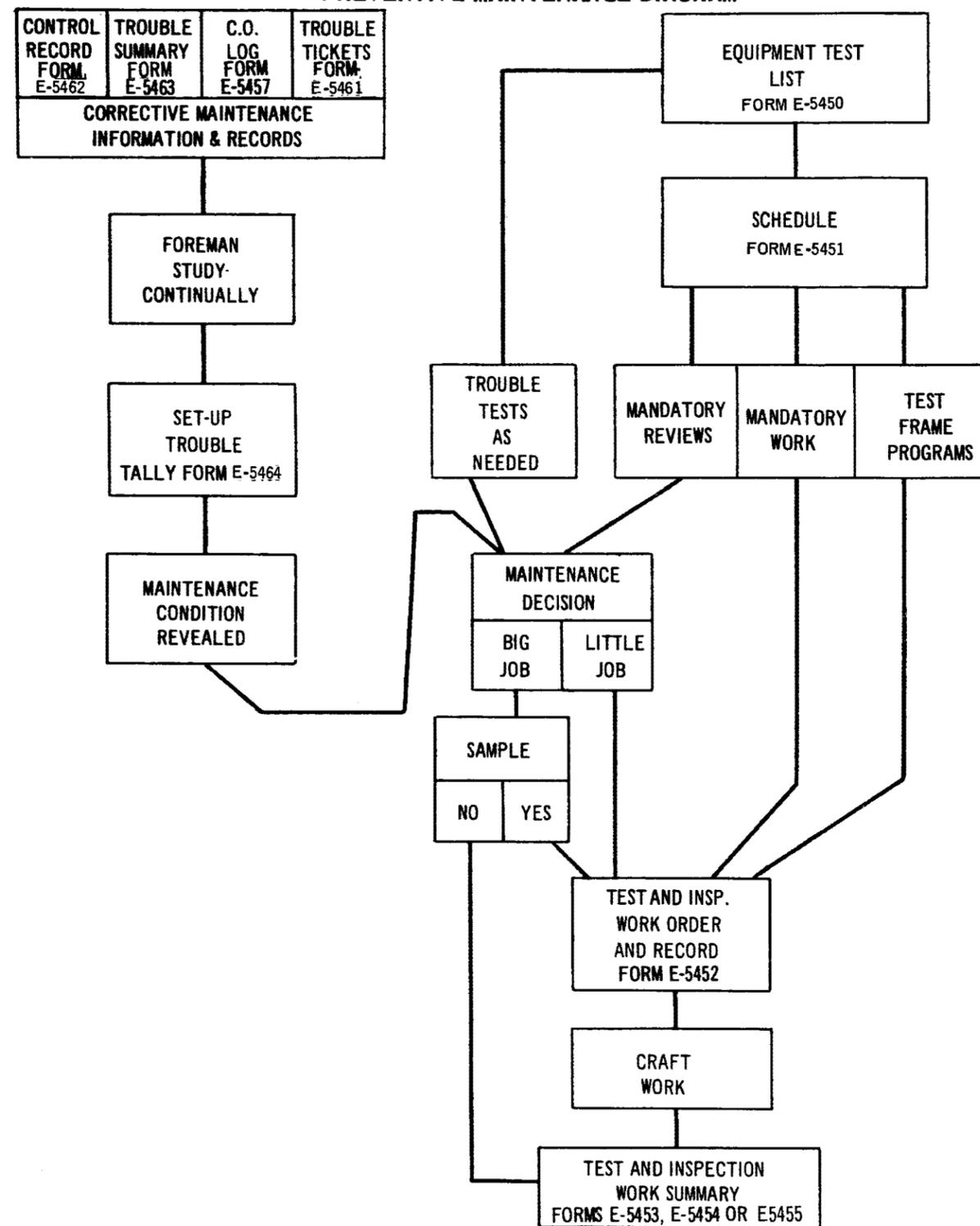


Fig. 37

Sample size is dependent upon several factors, such as, size of universe, expected number of defects, accuracy (assurance level and range) desired. The sample sizes illustrated are selected for their practical value and "fit" to the typical central office maintenance application. When the universe size is different from any of the sizes shown below, use a sample size for the nearest universe size in the table.

Sample Sizes

| <u>Size of Universe</u> | <u>Sample Size</u> |
|-------------------------|--------------------|
| Below 60 | All |
| 60 | 15 |
| 80 | 15 |
| 100 | 15 |
| 120 | 15 |
| 125 | 15 |
| 150 | 20 |
| 160 | 20 |
| 200 | 25 |
| 300 | 30 |
| 400 | 40 |
| 500 | 50 |
| 600 | 60 |
| 700 | 70 |
| 800 | 80 |
| 900 | 90 |
| 1000 and Up | 100 |

TABLE A

| (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) |
|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 4972 | 78739 | 04419 | 60523 | 31022 | 23728 | 37647 | 16476 | 11170 | 68376 | 56874 |
| 1276 | 44426 | 17369 | 29010 | 45337 | 90245 | 92053 | 41447 | 14897 | 18753 | 68291 |
| 2676 | 67781 | 95137 | 88430 | 78260 | 66962 | 31812 | 12759 | 06427 | 40337 | 50115 |
| 3487 | 78639 | 92006 | 63846 | 92263 | 33212 | 26516 | 93662 | 72399 | 88244 | 33922 |
| 1907 | 26827 | 98865 | 38882 | 25757 | 26662 | 91441 | 89357 | 87803 | 61521 | 80600 |
| 5997 | 55293 | 95033 | 31736 | 75068 | 91314 | 75293 | 04895 | 39355 | 54837 | 57203 |
| 6908 | 71364 | 06089 | 92394 | 73691 | 57883 | 09983 | 35643 | 79309 | 53449 | 95334 |
| 9836 | 99596 | 59050 | 25419 | 04130 | 54632 | 17223 | 94604 | 22973 | 97731 | 99476 |
| 9782 | 81449 | 13652 | 94420 | 74460 | 46707 | 94303 | 85523 | 95244 | 70995 | 10742 |
| 9209 | 82909 | 66610 | 84418 | 66214 | 26001 | 78685 | 69117 | 72446 | 79783 | 22305 |
| 2145 | 82388 | 45197 | 97609 | 83942 | 01120 | 71717 | 32858 | 58679 | 97165 | 02810 |
| 2306 | 91784 | 33177 | 17681 | 18963 | 07216 | 49288 | 43185 | 62797 | 00735 | 27085 |
| 9562 | 28846 | 81581 | 10249 | 23190 | 53440 | 32357 | 16472 | 99013 | 24328 | 93670 |
| 1569 | 56090 | 44558 | 42095 | 92311 | 57915 | 13368 | 13719 | 15833 | 38744 | 56065 |
| 2159 | 53911 | 01952 | 59273 | 32250 | 39647 | 29908 | 49075 | 23061 | 07795 | 95047 |
| 1488 | 67528 | 84234 | 76462 | 13628 | 21286 | 13736 | 67478 | 45218 | 27867 | 93049 |
| 3151 | 40663 | 43633 | 87954 | 69800 | 24773 | 62596 | 52476 | 60631 | 50503 | 94116 |
| 4558 | 62490 | 26936 | 49682 | 16307 | 98535 | 44822 | 99574 | 58487 | 85020 | 68881 |
| 3568 | 62484 | 29140 | 14152 | 37044 | 90398 | 92042 | 35099 | 31640 | 99753 | 44409 |
| 1361 | 73733 | 61486 | 33189 | 08907 | 41189 | 08147 | 18478 | 33250 | 17361 | 79961 |
| 2915 | 45847 | 87401 | 13339 | 53850 | 34931 | 00602 | 75307 | 99708 | 77863 | 04924 |
| 8175 | 43825 | 45211 | 86287 | 78190 | 02431 | 66251 | 74970 | 50246 | 23975 | 80697 |
| 0253 | 67516 | 59076 | 92006 | 65676 | 87343 | 89231 | 15760 | 73706 | 69426 | 01979 |
| 4461 | 52266 | 26967 | 68284 | 31612 | 40335 | 28865 | 98949 | 64492 | 96905 | 29184 |
| 8541 | 13010 | 16596 | 72001 | 38546 | 76305 | 22119 | 82668 | 84017 | 44111 | 40302 |
| 6403 | 73837 | 73445 | 86663 | 15929 | 08237 | 05647 | 15785 | 70444 | 58670 | 95967 |
| 1396 | 60823 | 22680 | 50459 | 05429 | 35227 | 92559 | 24136 | 13126 | 22099 | 52388 |
| 9977 | 16348 | 41119 | 51548 | 19511 | 90142 | 65604 | 16147 | 63445 | 60525 | 10480 |
| 5588 | 75165 | 20179 | 94198 | 25700 | 33473 | 59554 | 30974 | 69973 | 57629 | 38550 |
| 1700 | 07003 | 97507 | 69260 | 53349 | 86947 | 27517 | 80159 | 01899 | 46890 | 53850 |
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| 2702 | 70588 | 53144 | 27087 | 05591 | 57759 | 51394 | 98873 | 45625 | 61069 | 78783 |
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| 6397 | 89457 | 19577 | 65877 | 04802 | 61938 | 25032 | 09190 | 74932 | 36925 | 82686 |
| 0328 | 29084 | 32332 | 08635 | 25192 | 31337 | 20249 | 95073 | 93800 | 70022 | 99968 |
| 3024 | 90687 | 23726 | 11212 | 30414 | 42185 | 49224 | 46560 | 80447 | 24334 | 74866 |
| 6762 | 02564 | 27250 | 79316 | 83848 | 38684 | 20552 | 44402 | 85153 | 94526 | 41256 |
| 5005 | 46677 | 75851 | 73938 | 73044 | 05132 | 61204 | 90384 | 90296 | 03182 | 36672 |
| 4936 | 81680 | 53829 | 40412 | 01479 | 24241 | 58488 | 65341 | 93414 | 07135 | 43446 |
| 4643 | 72962 | 08172 | 37824 | 87587 | 40698 | 34964 | 50166 | 74756 | 77033 | 41501 |
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| 2423 | 54092 | 69375 | 63308 | 08016 | 28407 | 98287 | 22874 | 57545 | 72695 | 01604 |
| 6951 | 69084 | 33477 | 87968 | 15639 | 82409 | 34125 | 36864 | 52112 | 27102 | 87334 |
| 6975 | 06785 | 80930 | 26443 | 44892 | 77561 | 51123 | 34495 | 31376 | 06238 | 15973 |
| 6699 | 46212 | 74692 | 92603 | 91306 | 58558 | 57280 | 50639 | 20563 | 71370 | 81487 |
| 2488 | 72704 | 97821 | 70614 | 53616 | 39050 | 30355 | 18340 | 97298 | 41795 | 35185 |
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TABLE B

| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) |
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| 40778 | 12451 | 14921 | 51464 | 45331 | 75822 | 46859 | 66829 | 35803 | 27645 | 76095 | 41535 | 25508 | 53066 |
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TABLE A

| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) |
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| 43427 | 25412 | 25587 | 21276 | 44426 | 17369 | 29010 | 45337 | 90245 | 92053 | 41447 | 14897 | 18753 | 68291 |
| 58575 | 81958 | 51846 | 02676 | 67781 | 95137 | 88430 | 78260 | 66962 | 31812 | 12759 | 06427 | 40337 | 50115 |
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| 31864 | 74120 | 66231 | 82306 | 91784 | 33177 | 17681 | 18963 | 07216 | 49288 | 43185 | 62797 | 00735 | 27085 |
| 81171 | 75639 | 60863 | 49562 | 28846 | 81581 | 10249 | 23190 | 53440 | 32357 | 16472 | 99013 | 24328 | 93670 |
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| 29418 | 03091 | 06364 | 13151 | 40663 | 43633 | 87954 | 69800 | 24773 | 62596 | 52476 | 60631 | 50503 | 94116 |
| 38222 | 31231 | 79415 | 44558 | 62490 | 26936 | 49682 | 16307 | 98535 | 44822 | 99574 | 58487 | 85020 | 68881 |
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| 45275 | 16852 | 02284 | 41361 | 73733 | 61486 | 33189 | 08907 | 41189 | 08147 | 18478 | 33250 | 17361 | 79961 |
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| 77186 | 93967 | 25918 | 66403 | 73837 | 73445 | 86663 | 15929 | 08237 | 05647 | 15785 | 70444 | 58670 | 95967 |
| 23114 | 05481 | 42335 | 51396 | 60823 | 22680 | 50459 | 05429 | 35227 | 92559 | 24136 | 13126 | 22099 | 52388 |
| 59988 | 49944 | 41038 | 99977 | 16348 | 41119 | 51548 | 19511 | 90142 | 68604 | 16147 | 63445 | 60525 | 10480 |
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| 91106 | 26450 | 14451 | 50328 | 29084 | 32332 | 08635 | 25192 | 31337 | 20249 | 95073 | 93800 | 70022 | 99968 |
| 37133 | 88924 | 27845 | 13024 | 90687 | 23726 | 11212 | 30414 | 42185 | 49224 | 46560 | 80447 | 24334 | 74866 |
| 13982 | 25736 | 10087 | 16762 | 02564 | 27250 | 79316 | 83848 | 38684 | 20552 | 44402 | 85153 | 94526 | 41256 |
| 26663 | 36187 | 81688 | 25005 | 46677 | 75851 | 73938 | 73044 | 05132 | 61204 | 90384 | 90296 | 03182 | 36672 |
| 62572 | 08275 | 16313 | 24936 | 81680 | 53829 | 40412 | 01479 | 24241 | 58488 | 65341 | 93414 | 07135 | 43446 |
| 65925 | 95455 | 08383 | 24643 | 72962 | 08172 | 37824 | 87587 | 40698 | 34964 | 50166 | 74756 | 77033 | 41501 |
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| 68565 | 44811 | 39238 | 70394 | 78555 | 33539 | 56310 | 40809 | 63204 | 14479 | 19635 | 97299 | 66947 | 58010 |
| 54370 | 31672 | 03893 | 32423 | 54092 | 69375 | 63308 | 08016 | 28407 | 98287 | 22874 | 57545 | 72695 | 01604 |
| 79954 | 89601 | 23881 | 46951 | 69084 | 33477 | 87968 | 15639 | 82409 | 34125 | 36864 | 52112 | 27102 | 87334 |
| 55479 | 01059 | 44229 | 56975 | 06785 | 80930 | 26443 | 44892 | 77561 | 51123 | 34495 | 31376 | 06238 | 15973 |
| 38114 | 70330 | 42157 | 86699 | 46212 | 74692 | 92603 | 91306 | 58558 | 57280 | 50639 | 20563 | 71370 | 81487 |
| 29766 | 83482 | 66202 | 02488 | 72704 | 97821 | 70614 | 53616 | 39050 | 30355 | 18340 | 97298 | 41795 | 35185 |
| 31771 | 70640 | 34779 | 41831 | 33456 | 53194 | 19602 | 74194 | 61154 | 51774 | 76822 | 73794 | 54182 | 45264 |
| 77522 | 87188 | 83577 | 99067 | 83235 | 48662 | 31503 | 54829 | 54723 | 13177 | 15387 | 26073 | 68915 | 88415 |

TABLE B

| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) |
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| 72919 | 54618 | 40616 | 33287 | 51274 | 78491 | 53604 | 66742 | 97777 | 64468 | 9822 |
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| 29830 | 34899 | 85457 | 19548 | 83355 | 52479 | 77801 | 01596 | 48890 | 56104 | 6873 |
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| 75159 | 14809 | 11930 | 83531 | 51239 | 86298 | 72661 | 63015 | 98804 | 98491 | 9956 |
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| 92934 | 30650 | 16449 | 15805 | 61551 | 38689 | 59179 | 85485 | 18537 | 70496 | 9869 |
| 80614 | 10150 | 09389 | 61892 | 79477 | 14522 | 40270 | 45744 | 29582 | 29717 | 3959 |
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| 12324 | 61149 | 85643 | 64999 | 63738 | 46671 | 25408 | 69313 | 54455 | 04917 | 3504 |
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TABLE C

| (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) |
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| 68123 | 17730 | 95862 | 08034 | 19473 | 63971 | 37271 | 31445 | 49019 | 49405 | 46925 |
| 61662 | 64130 | 16688 | 37275 | 51262 | 11569 | 08697 | 91120 | 64156 | 40365 | 74297 |
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| 76638 | 48423 | 25018 | 99041 | 77529 | 81360 | 18180 | 97421 | 55541 | 90275 | 18213 |
| 44115 | 01601 | 50541 | 00147 | 77685 | 58788 | 33016 | 61173 | 93049 | 04694 | 43534 |
| 40617 | 72876 | 33967 | 73830 | 15405 | 96554 | 88265 | 34537 | 38526 | 67924 | 40474 |
| 11622 | 96297 | 24160 | 09903 | 14047 | 22917 | 60718 | 66487 | 46346 | 30949 | 03173 |
| 70119 | 94739 | 25875 | 38829 | 68377 | 43918 | 77653 | 04127 | 69930 | 43283 | 35766 |
| 32422 | 76791 | 39725 | 53711 | 93385 | 13421 | 67957 | 20384 | 58731 | 53396 | 59723 |
| 79974 | 45929 | 85113 | 72268 | 09858 | 52104 | 32014 | 53115 | 03727 | 98624 | 84616 |
| 54939 | 21410 | 86980 | 91772 | 93307 | 34116 | 49516 | 42148 | 57740 | 31198 | 70336 |
| 62319 | 08598 | 09066 | 95288 | 04794 | 01534 | 92058 | 03157 | 91758 | 80611 | 45357 |
| 62297 | 80198 | 19347 | 73234 | 86265 | 49096 | 97021 | 92582 | 61422 | 75890 | 86442 |
| 62311 | 72844 | 60203 | 46412 | 65943 | 79232 | 45702 | 67055 | 39024 | 57383 | 44424 |
| 10854 | 99058 | 18260 | 38765 | 90038 | 94209 | 04055 | 27393 | 61517 | 23002 | 96560 |
| 70418 | 57012 | 72122 | 36634 | 97283 | 95943 | 78363 | 36498 | 40662 | 94188 | 18202 |
| 23309 | 57040 | 29285 | 67870 | 21913 | 72958 | 75637 | 99936 | 58715 | 07943 | 23748 |
| 61658 | 15001 | 94055 | 36308 | 41161 | 37341 | 81838 | 19389 | 80336 | 46346 | 91895 |
| 04184 | 54967 | 72938 | 56834 | 23777 | 98392 | 31417 | 98547 | 92058 | 02277 | 50315 |
| 44369 | 66130 | 72936 | 69848 | 59973 | 08144 | 61070 | 73094 | 27059 | 69181 | 55623 |
| 26141 | 68779 | 66388 | 75242 | 82690 | 74099 | 77885 | 23813 | 10054 | 11900 | 44653 |
| 29608 | 54553 | 25971 | 69573 | 83854 | 24715 | 48866 | 65745 | 31131 | 47636 | 45137 |
| 29554 | 84580 | 37859 | 28504 | 61980 | 34997 | 41825 | 11623 | 07320 | 15003 | 56774 |
| 05748 | 51276 | 57143 | 31986 | 99915 | 45821 | 97702 | 87125 | 44488 | 77613 | 56823 |
| 98420 | 72925 | 40729 | 22337 | 48293 | 86847 | 43186 | 42951 | 37804 | 85129 | 28993 |
| 87729 | 81679 | 59126 | 59437 | 33225 | 31280 | 41232 | 34750 | 91097 | 60752 | 69783 |
| 56958 | 20575 | 76746 | 49878 | 06846 | 32828 | 24425 | 30249 | 78801 | 26977 | 92074 |
| 58085 | 06766 | 60227 | 96414 | 32671 | 45587 | 79620 | 84831 | 38156 | 74211 | 82752 |
| 25596 | 02678 | 54592 | 63607 | 82096 | 21913 | 75544 | 55228 | 89796 | 05694 | 91552 |
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| 62462 | 02798 | 54977 | 48349 | 66738 | 60184 | 75679 | 38120 | 17640 | 36242 | 99357 |
| 59337 | 01695 | 60666 | 97410 | 55064 | 17427 | 89180 | 74018 | 44865 | 53197 | 74810 |
| 60337 | 27976 | 70661 | 08250 | 69599 | 60264 | 84549 | 78007 | 88450 | 06488 | 72274 |
| 70348 | 11317 | 71623 | 55510 | 64756 | 87759 | 92354 | 78694 | 63638 | 80939 | 98644 |
| 55866 | 96283 | 46620 | 52087 | 80817 | 74533 | 68407 | 55862 | 32476 | 19326 | 95558 |
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| 17772 | 67831 | 33317 | 00520 | 90401 | 41700 | 95510 | 61166 | 33757 | 23279 | 85523 |
| 78784 | 09977 | 29398 | 93896 | 78227 | 90110 | 81378 | 96689 | 37008 | 04050 | 04228 |
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| 56186 | 99098 | 48850 | 72527 | 08486 | 10951 | 26832 | 39763 | 02485 | 71688 | 90936 |
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| 28260 | 79708 | 00770 | 88643 | 21188 | 01850 | 69689 | 49426 | 49128 | 14660 | 14143 |
| 04172 | 73085 | 11795 | 52594 | 13287 | 82531 | 04388 | 64693 | 11934 | 35051 | 68576 |
| 65636 | 21828 | 39539 | 18988 | 53609 | 04001 | 19648 | 14083 | 49623 | 10840 | 31915 |
| 64315 | 70836 | 82857 | 35335 | 87900 | 36194 | 31567 | 53506 | 34304 | 39910 | 79630 |
| 32836 | 27573 | 11479 | 94114 | 81641 | 00496 | 36058 | 75899 | 46620 | 70024 | 88753 |
| 09636 | 84668 | 42486 | 71303 | 19512 | 50277 | 71508 | 20116 | 79520 | 06269 | 74173 |

TABLE D

| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) |
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| 18806 | 70257 | 96424 | 13606 | 14356 | 76599 | 25390 | 63236 | 04513 | 16358 | 30540 | 10551 | 32498 | 18685 |
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| 93640 | 45982 | 40011 | 74142 | 29106 | 45729 | 43406 | 21457 | 04301 | 39651 | 76025 | 73819 | 11462 | 97385 |
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| 89445 | 51039 | 73837 | 26720 | 38650 | 47322 | 68474 | 95047 | 20404 | 41577 | 46865 | 39849 | 78735 | 99192 |
| 40867 | 96834 | 02162 | 41517 | 88937 | 26099 | 56047 | 49164 | 35127 | 64916 | 75481 | 79160 | 14014 | 00445 |
| 92946 | 56944 | 93407 | 05010 | 54896 | 33173 | 30548 | 23667 | 43171 | 47849 | 40449 | 91072 | 91092 | 17613 |
| 75898 | 02275 | 90768 | 31902 | 52114 | 36634 | 46803 | 97970 | 92216 | 55398 | 75320 | 70475 | 82931 | 20172 |
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| 86347 | 03703 | 36778 | 72501 | 95229 | 65735 | 14269 | 50220 | 77270 | 68604 | 05677 | 23347 | 43686 | 31584 |
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| 75483 | 74009 | 73699 | 05870 | 36804 | 89338 | 73891 | 40740 | 98753 | 74566 | 74733 | 34777 | 05786 | 38294 |
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| 87363 | 59239 | 42023 | 78056 | 51254 | 95644 | 90527 | 41398 | 74996 | 94977 | 22149 | 96616 | 54435 | 52469 |
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TABLE C

| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) |
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| 57729 | 88646 | 76487 | 11622 | 96297 | 24160 | 09903 | 14047 | 22917 | 60718 | 66487 | 46346 | 30949 | 03173 |
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| 86299 | 22510 | 33571 | 23309 | 57040 | 29285 | 67870 | 21913 | 72958 | 75637 | 99936 | 58715 | 07943 | 23748 |
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| 83125 | 85077 | 60490 | 44369 | 66130 | 72936 | 69848 | 59973 | 08144 | 61070 | 73094 | 27059 | 69181 | 55623 |
| 55503 | 21383 | 02464 | 26141 | 68779 | 66388 | 75242 | 82690 | 74099 | 77885 | 23813 | 10054 | 11900 | 44653 |
| 47019 | 06683 | 33203 | 29608 | 54553 | 25971 | 69573 | 83854 | 24715 | 48866 | 65745 | 31131 | 47636 | 45137 |
| 84828 | 61152 | 79526 | 29554 | 84580 | 37859 | 28504 | 61980 | 34997 | 41825 | 11623 | 07320 | 15003 | 56774 |
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| 36458 | 28285 | 30424 | 98420 | 72925 | 40729 | 22337 | 48293 | 86847 | 43186 | 42951 | 37804 | 85129 | 28993 |
| 95752 | 96065 | 36847 | 87729 | 81679 | 59126 | 59437 | 33225 | 31280 | 41232 | 34750 | 91097 | 60752 | 69783 |
| 26768 | 02513 | 58454 | 56958 | 20575 | 76746 | 49878 | 06846 | 32828 | 24425 | 30249 | 78801 | 26977 | 92074 |
| 42613 | 72456 | 43636 | 58085 | 06766 | 60227 | 96414 | 32671 | 45587 | 79620 | 84831 | 38156 | 74211 | 82752 |
| 95457 | 12176 | 65482 | 25596 | 02678 | 54592 | 63607 | 82096 | 21913 | 75544 | 55228 | 89796 | 05694 | 91552 |
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| 66954 | 53574 | 64776 | 92345 | 95110 | 59448 | 77249 | 54044 | 67942 | 24145 | 42294 | 27427 | 84875 | 37022 |
| 17457 | 44151 | 14113 | 62462 | 02798 | 54977 | 48349 | 66738 | 60184 | 75679 | 38120 | 17640 | 36242 | 99357 |
| 03704 | 23322 | 83214 | 59337 | 01695 | 60666 | 97410 | 55064 | 17427 | 89180 | 74018 | 44865 | 53197 | 74810 |
| 21538 | 16997 | 33210 | 60337 | 27976 | 70661 | 08250 | 69599 | 60264 | 84549 | 78007 | 88450 | 06488 | 72274 |
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| 31048 | 40058 | 94953 | 55866 | 96283 | 46620 | 52087 | 80817 | 74533 | 68407 | 55862 | 32476 | 19326 | 95558 |
| 69799 | 83300 | 16498 | 80733 | 96422 | 58078 | 99643 | 39847 | 96884 | 84657 | 33697 | 39578 | 90197 | 80532 |
| 90595 | 65017 | 59231 | 17772 | 67831 | 33317 | 00520 | 90401 | 41700 | 95510 | 61166 | 33757 | 23279 | 85523 |
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| 63491 | 84886 | 67118 | 62063 | 74958 | 20946 | 28147 | 39338 | 32169 | 03713 | 93510 | 61244 | 73774 | 01245 |
| 92003 | 76568 | 41034 | 28260 | 79708 | 00770 | 88643 | 21188 | 01850 | 69689 | 49426 | 49128 | 14660 | 14143 |
| 52360 | 46658 | 66511 | 04172 | 73085 | 11795 | 52594 | 13287 | 82531 | 04388 | 64693 | 11934 | 35051 | 68576 |
| 74622 | 12142 | 68358 | 65635 | 21828 | 39539 | 18988 | 53609 | 04001 | 19648 | 14083 | 49623 | 10840 | 31915 |
| 04157 | 50079 | 61343 | 64315 | 70836 | 82857 | 35335 | 87900 | 36194 | 31567 | 53506 | 34304 | 39910 | 79630 |
| 86003 | 60070 | 66241 | 32836 | 27573 | 11479 | 94114 | 81641 | 00496 | 36058 | 75899 | 46620 | 70024 | 88753 |
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TABLE D

| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) |
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| 93640 | 45982 | 40011 | 74142 | 29106 | 45729 | 43406 | 21457 | 04301 | 39651 | 760 |
| 47630 | 45980 | 76619 | 57138 | 57492 | 00030 | 77897 | 76236 | 64990 | 35985 | 577 |
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| 89445 | 51039 | 73837 | 26720 | 38650 | 47322 | 68474 | 95047 | 20404 | 41577 | 468 |
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| 92946 | 56944 | 93407 | 05010 | 54896 | 33173 | 30548 | 23667 | 43171 | 47849 | 404 |
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| 52062 | 95519 | 54087 | 14072 | 50953 | 63477 | 64635 | 34552 | 75243 | 70222 | 750 |
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| 22553 | 61317 | 08968 | 67521 | 16627 | 48855 | 97263 | 94242 | 93354 | 72446 | 288 |
| 95216 | 75263 | 60351 | 02643 | 00063 | 20824 | 67468 | 89441 | 84055 | 47035 | 297 |
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| 37444 | 56047 | 23208 | 34710 | 12147 | 28658 | 58817 | 98807 | 56775 | 08129 | 087 |
| 99633 | 00363 | 16853 | 20789 | 87674 | 03938 | 36077 | 41012 | 08813 | 51168 | 788 |
| 87363 | 59239 | 42023 | 78056 | 51254 | 95644 | 90527 | 41398 | 74996 | 94977 | 221 |
| 23923 | 87269 | 85277 | 347 | | | | | | | |

TABLE E

| (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) |
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| 62941 | 02349 | 71389 | 45605 | 60947 | 60775 | 73181 | 43264 | 56895 | 04832 | 59604 |
| 73652 | 98210 | 44546 | 27174 | 27499 | 53523 | 63110 | 57106 | 20865 | 91683 | 80688 |
| 07607 | 11826 | 41326 | 29664 | 01603 | 23156 | 89223 | 43429 | 95353 | 44662 | 59433 |
| 53555 | 96810 | 17100 | 35066 | 00815 | 01552 | 06392 | 31437 | 70385 | 45863 | 75971 |
| 81009 | 81060 | 33449 | 68055 | 83844 | 90942 | 74857 | 52419 | 68723 | 47830 | 63010 |
| 10329 | 56136 | 80647 | 51404 | 06626 | 10042 | 93629 | 37609 | 57215 | 08409 | 81906 |
| 59243 | 57361 | 65304 | 93258 | 56760 | 63348 | 24949 | 11889 | 29793 | 37457 | 59377 |
| 23581 | 24548 | 56415 | 61927 | 64416 | 29934 | 00755 | 09418 | 14230 | 62887 | 92683 |
| 83411 | 66504 | 02036 | 02922 | 63569 | 17906 | 38076 | 32135 | 19096 | 96970 | 75917 |
| 27585 | 45068 | 05520 | 56321 | 22693 | 35089 | 07694 | 04252 | 23791 | 60249 | 83010 |
| 87026 | 99717 | 01542 | 72990 | 43413 | 59744 | 44595 | 71326 | 91382 | 45114 | 20245 |
| 98026 | 05394 | 61840 | 83089 | 09224 | 78530 | 33996 | 49965 | 04851 | 18280 | 14039 |
| 98536 | 38155 | 42661 | 02363 | 67625 | 34683 | 95372 | 74733 | 63558 | 09665 | 22610 |
| 01386 | 74319 | 04318 | 99387 | 86874 | 12549 | 38369 | 54952 | 91579 | 26023 | 81076 |
| 20345 | 18134 | 90062 | 10761 | 54548 | 49505 | 52685 | 63903 | 13193 | 33905 | 66936 |
| 03206 | 92012 | 42710 | 34650 | 73236 | 66167 | 21788 | 03581 | 40699 | 10396 | 81827 |
| 89880 | 78101 | 44392 | 53767 | 15220 | 66319 | 72953 | 14071 | 59148 | 95154 | 72852 |
| 30496 | 23469 | 42846 | 94810 | 16151 | 08029 | 50554 | 03891 | 38313 | 34016 | 18671 |
| 72521 | 35342 | 56119 | 97190 | 43635 | 84249 | 61254 | 80993 | 55431 | 90793 | 62603 |
| 82854 | 55846 | 18076 | 12415 | 30193 | 42776 | 85611 | 57635 | 51362 | 79907 | 77364 |
| 52433 | 22184 | 33998 | 87436 | 37430 | 45246 | 11400 | 20986 | 43996 | 73122 | 88474 |
| 25442 | 83668 | 66236 | 79655 | 88312 | 93047 | 12088 | 86937 | 70794 | 01041 | 74867 |
| 63469 | 50803 | 70696 | 13558 | 98995 | 58159 | 04700 | 90443 | 13168 | 31553 | 67891 |
| 46012 | 97765 | 27552 | 49617 | 51734 | 20849 | 74019 | 67906 | 00880 | 82899 | 66065 |
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| 46061 | 30946 | 22210 | 79302 | 40300 | 08852 | 27528 | 84648 | 79589 | 95295 | 72895 |
| 18198 | 19468 | 76358 | 69203 | 02760 | 28625 | 70476 | 76410 | 32988 | 10194 | 94917 |
| 63107 | 30806 | 80857 | 84383 | 78450 | 26245 | 91763 | 73117 | 33047 | 03577 | 62599 |
| 35132 | 42163 | 69332 | 98851 | 50252 | 56911 | 62693 | 73817 | 98693 | 18728 | 94741 |
| 66393 | 39249 | 51463 | 95963 | 07929 | 66728 | 47761 | 81472 | 44806 | 15592 | 71357 |
| 58613 | 88717 | 29289 | 77360 | 09030 | 39605 | 87507 | 85446 | 51257 | 89555 | 75520 |
| 16006 | 16767 | 57345 | 42285 | 56670 | 88445 | 85799 | 76200 | 21795 | 38894 | 58070 |
| 35829 | 77516 | 98468 | 51686 | 48140 | 13583 | 94911 | 13318 | 64741 | 64336 | 95103 |
| 03523 | 87192 | 66483 | 55649 | 36764 | 86132 | 12463 | 28385 | 94242 | 32063 | 45233 |
| 85117 | 74078 | 64120 | 04643 | 14351 | 71381 | 28133 | 68269 | 65145 | 28152 | 39087 |
| 05221 | 94119 | 20108 | 78101 | 81276 | 00835 | 63835 | 87174 | 42446 | 08882 | 27067 |
| 96085 | 62180 | 27453 | 18567 | 55524 | 86088 | 00069 | 59254 | 24654 | 77371 | 26409 |
| 49536 | 56199 | 05993 | 71201 | 78852 | 65889 | 32719 | 13788 | 23937 | 90740 | 16866 |
| 33175 | 04994 | 09879 | 70337 | 11861 | 69032 | 51915 | 23510 | 32050 | 52052 | 84004 |
| 55591 | 21725 | 43827 | 78862 | 67699 | 01069 | 07050 | 73324 | 06732 | 27510 | 33761 |
| 81724 | 24305 | 37661 | 18956 | 50064 | 39500 | 17450 | 18030 | 63124 | 48061 | 59412 |
| 69995 | 14762 | 69734 | 89150 | 93126 | 17700 | 94400 | 76075 | 08317 | 27324 | 72723 |
| 18983 | 28387 | 99781 | 52977 | 01657 | 92602 | 41043 | 05686 | 15650 | 89970 | 95877 |
| 76603 | 54088 | 91095 | 00010 | 13800 | 76690 | 75133 | 60486 | 28491 | 03845 | 11507 |
| 55863 | 22672 | 91609 | 51514 | 98135 | 42870 | 48578 | 29036 | 69876 | 86563 | 61729 |
| 30965 | 17453 | 65623 | 93058 | 08313 | 99293 | 00990 | 13595 | 77457 | 79969 | 11339 |
| 84641 | 18273 | 49604 | 47418 | 90974 | 83965 | 62732 | 85161 | 54330 | 22406 | 86253 |
| 07551 | 83532 | 68130 | 56970 | 33273 | 61993 | 88407 | 69399 | 17301 | 70975 | 99129 |

TABLE F

| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) |
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| 82888 | 41316 | 92617 | 31346 | 89263 | 06589 | 07121 | 07151 | 23905 | 98435 | 50453 | 12983 | 04738 | 76421 |
| 71006 | 99318 | 19269 | 35233 | 79183 | 78538 | 06326 | 62715 | 28701 | 52809 | 56581 | 05925 | 85210 | 17745 |
| 05937 | 00875 | 32264 | 82808 | 00229 | 03868 | 71072 | 11519 | 44876 | 34508 | 07889 | 62424 | 54319 | 32442 |
| 06021 | 04370 | 93070 | 90737 | 05354 | 68427 | 25554 | 11165 | 00123 | 80338 | 03876 | 85648 | 24978 | 01687 |
| 54789 | 10960 | 44023 | 57857 | 56556 | 83993 | 70787 | 28193 | 65872 | 33723 | 00125 | 99818 | 85571 | 69509 |
| 90400 | 05707 | 29128 | 14859 | 84117 | 72206 | 53740 | 00464 | 51853 | 78852 | 83593 | 82926 | 48985 | 64355 |
| 51424 | 01651 | 99970 | 73521 | 82356 | 03297 | 36288 | 93531 | 69269 | 84798 | 78968 | 06336 | 95618 | 89718 |
| 79743 | 88757 | 43370 | 86536 | 07166 | 06401 | 14413 | 23643 | 21527 | 91902 | 91384 | 31444 | 54783 | 38760 |
| 77418 | 00322 | 98854 | 51507 | 00565 | 33066 | 65791 | 47857 | 32483 | 38493 | 52606 | 91078 | 13631 | 67863 |
| 17580 | 49302 | 16408 | 05678 | 75532 | 46218 | 74359 | 77556 | 82242 | 00134 | 70184 | 09027 | 79459 | 18730 |
| 15489 | 45559 | 88548 | 64330 | 42126 | 43145 | 81287 | 73884 | 69312 | 03395 | 06879 | 49662 | 40000 | 61598 |
| 56342 | 66773 | 18536 | 32600 | 73958 | 75993 | 84250 | 19254 | 06677 | 54192 | 53422 | 58200 | 74464 | 73949 |
| 20202 | 19216 | 23762 | 47856 | 04623 | 70728 | 86657 | 70801 | 53719 | 25214 | 65635 | 07565 | 49977 | 45525 |
| 84877 | 51788 | 69357 | 67914 | 55372 | 97225 | 52837 | 46723 | 00256 | 96221 | 26641 | 00309 | 36009 | 48392 |
| 01647 | 00311 | 44989 | 21900 | 96079 | 15793 | 13148 | 01433 | 78721 | 02647 | 25454 | 53913 | 97554 | 41578 |
| 45652 | 89311 | 45302 | 14539 | 32045 | 86727 | 40595 | 55953 | 93448 | 07805 | 53622 | 27330 | 18749 | 57867 |
| 79975 | 06153 | 08932 | 59185 | 71386 | 19070 | 87098 | 19392 | 13899 | 56096 | 83645 | 45871 | 35950 | 52278 |
| 49744 | 54713 | 37053 | 77467 | 15348 | 03383 | 96086 | 93295 | 12413 | 55774 | 97318 | 66402 | 11209 | 52495 |
| 40922 | 94903 | 29638 | 46870 | 14108 | 84391 | 87313 | 65969 | 43349 | 85142 | 25650 | 01896 | 48680 | 51236 |
| 53319 | 48020 | 77444 | 51447 | 07916 | 99506 | 83504 | 22290 | 63835 | 45589 | 04884 | 92760 | 70462 | 00538 |
| 76682 | 10559 | 85446 | 56236 | 85919 | 76388 | 59850 | 03262 | 60347 | 31077 | 07165 | 26588 | 31296 | 56112 |
| 48869 | 97229 | 69581 | 84581 | 71728 | 45150 | 16901 | 88717 | 62888 | 24828 | 89469 | 35483 | 76532 | 30256 |
| 95961 | 19279 | 38078 | 17473 | 43945 | 21562 | 99037 | 52140 | 73771 | 56084 | 08775 | 94820 | 78139 | 25987 |
| 16521 | 25945 | 94076 | 91281 | 92272 | 41233 | 58614 | 18912 | 58454 | 34011 | 85969 | 83621 | 92099 | 19131 |
| 78282 | 26332 | 44072 | 55104 | 16895 | 98311 | 56005 | 23331 | 21939 | 03463 | 53828 | 78930 | 30987 | 40988 |
| 43473 | 39179 | 53174 | 43498 | 72674 | 13087 | 54261 | 01844 | 45738 | 93150 | 13240 | 16694 | 59155 | 67589 |
| 06613 | 31352 | 09177 | 21367 | 64725 | 23784 | 18125 | 74873 | 83971 | 92678 | 96950 | 69821 | 41119 | 43312 |
| 48734 | 39737 | 03448 | 99009 | 98136 | 34562 | 30339 | 93143 | 07350 | 94289 | 76144 | 47238 | 08110 | 00037 |
| 54832 | 70111 | 48339 | 75270 | 11652 | 41697 | 43277 | 58089 | 70520 | 96997 | 71007 | 87803 | 52458 | 06637 |
| 55844 | 69515 | 22658 | 75438 | 83086 | 41325 | 04694 | 40359 | 28351 | 53492 | 73134 | 02370 | 72313 | 53039 |
| 42829 | 54398 | 93338 | 90705 | 00626 | 97752 | 93482 | 27726 | 51835 | 23966 | 50279 | 26329 | 25754 | 43530 |
| 81128 | 63461 | 10925 | 44382 | 73365 | 98875 | 77605 | 27351 | 49177 | 36914 | 50258 | 62361 | 38229 | 89608 |
| 62885 | 26354 | 10368 | 78026 | 00186 | 46783 | 02059 | 98892 | 98061 | 15330 | 31705 | 71923 | 29266 | 72716 |
| 19525 | 10375 | 27010 | 42791 | 49471 | 90607 | 98103 | 31752 | 04842 | 13693 | 84292 | 48485 | 76178 | 41716 |
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TABLE E

| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 85018 | 23508 | 91507 | 76455 | 54941 | 72711 | 39406 | 94620 | 27963 | 96478 | 21559 | 19246 | 88097 | 44926 |
| 11904 | 73678 | 08272 | 62941 | 02349 | 71389 | 45605 | 60947 | 60775 | 73181 | 43264 | 56895 | 04832 | 59604 |
| 75344 | 98489 | 86268 | 73652 | 98210 | 44546 | 27174 | 27499 | 53523 | 63110 | 57106 | 20865 | 91683 | 80688 |
| 65566 | 65614 | 01443 | 07607 | 11826 | 41326 | 29664 | 01603 | 23156 | 89223 | 43429 | 95353 | 44662 | 59433 |
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| 94096 | 74920 | 25822 | 98026 | 05394 | 61840 | 83089 | 09224 | 78530 | 33996 | 49965 | 04851 | 18280 | 14039 |
| 83160 | 88362 | 09350 | 98536 | 38155 | 42661 | 02363 | 67625 | 34683 | 95372 | 74733 | 63558 | 09665 | 22610 |
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| 33762 | 83193 | 58045 | 89880 | 78101 | 44392 | 53767 | 15220 | 66319 | 72953 | 14071 | 59148 | 95154 | 72852 |
| 49665 | 85397 | 85137 | 30496 | 23469 | 42846 | 94810 | 16151 | 08029 | 50554 | 03891 | 38313 | 34016 | 18671 |
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| 22145 | 85304 | 35348 | 82854 | 55846 | 18076 | 12415 | 30193 | 42776 | 85611 | 57635 | 51362 | 79907 | 77364 |
| 27153 | 08662 | 61078 | 52433 | 22184 | 33998 | 87436 | 37430 | 45246 | 11400 | 20986 | 43996 | 73122 | 88474 |
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| 43815 | 43272 | 73778 | 63469 | 50083 | 70696 | 13558 | 98995 | 58159 | 40700 | 90443 | 13168 | 31553 | 67891 |
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| 16680 | 55936 | 82453 | 19532 | 49988 | 13176 | 94219 | 88698 | 41755 | 56216 | 66882 | 17748 | 04963 | 54859 |
| 86938 | 60429 | 01137 | 86168 | 78257 | 86249 | 46134 | 51865 | 09836 | 73966 | 65711 | 41699 | 11732 | 17173 |
| 33944 | 29219 | 73161 | 46061 | 30946 | 22210 | 79302 | 40300 | 08852 | 27528 | 84648 | 79589 | 95295 | 72895 |
| 16045 | 67736 | 18608 | 18198 | 19468 | 76358 | 69203 | 02760 | 28625 | 70476 | 76410 | 32988 | 10194 | 94917 |
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| 61471 | 45322 | 35340 | 35132 | 42163 | 69332 | 98851 | 50252 | 56911 | 62693 | 73817 | 98693 | 18728 | 94741 |
| 47422 | 21296 | 16785 | 66393 | 39249 | 51463 | 95963 | 07929 | 66728 | 47761 | 81472 | 44806 | 15592 | 71357 |
| 24133 | 39719 | 14484 | 58613 | 88717 | 29289 | 77360 | 09030 | 39605 | 87507 | 85446 | 51257 | 89555 | 75520 |
| 67253 | 67064 | 10748 | 16006 | 16767 | 57345 | 42285 | 56670 | 88445 | 85799 | 76200 | 21795 | 38894 | 58070 |
| 62382 | 76941 | 01635 | 35829 | 77516 | 98468 | 51686 | 48140 | 13583 | 94911 | 13318 | 64741 | 64336 | 95103 |
| 98011 | 16503 | 09201 | 03523 | 87192 | 66483 | 55649 | 36764 | 86132 | 12463 | 28385 | 94242 | 32063 | 45233 |
| 37366 | 24386 | 20654 | 85117 | 74078 | 64120 | 04643 | 14351 | 71381 | 28133 | 68269 | 65145 | 28152 | 39087 |
| 73587 | 83993 | 54176 | 05221 | 94119 | 20108 | 78101 | 81276 | 00835 | 63835 | 87174 | 42446 | 08882 | 27067 |
| 33583 | 68291 | 50547 | 96085 | 62180 | 27453 | 18567 | 55524 | 86088 | 00069 | 59254 | 24654 | 77371 | 26409 |
| 02878 | 33223 | 39199 | 49536 | 56199 | 05993 | 71201 | 78852 | 65889 | 32719 | 13788 | 23937 | 90740 | 16866 |
| 91498 | 41673 | 17195 | 33175 | 04994 | 09879 | 70337 | 11861 | 69032 | 51915 | 83510 | 32050 | 52052 | 24004 |
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| 12997 | 55013 | 18662 | 81724 | 24305 | 37661 | 18956 | 50064 | 39500 | 17450 | 18030 | 63124 | 48061 | 59412 |
| 96098 | 13651 | 15393 | 69995 | 14762 | 69734 | 89150 | 93126 | 17700 | 94400 | 76075 | 08317 | 27324 | 72723 |
| 97627 | 17837 | 10472 | 18983 | 28387 | 99781 | 52977 | 01657 | 92602 | 41043 | 05686 | 15650 | 29970 | 95877 |
| 40064 | 47981 | 31484 | 76603 | 54088 | 91095 | 00010 | 13800 | 76690 | 75133 | 60486 | 28491 | 03845 | 11507 |
| 16839 | 68743 | 71374 | 55863 | 22672 | 91609 | 51514 | 98135 | 42870 | 48578 | 29036 | 69876 | 86563 | 61729 |
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TABLE F

| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) |
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| 77418 | 00322 | 98854 | 51507 | 00565 | 33066 | 65791 | 47857 | 32483 | 38493 | 526 |
| 17580 | 49302 | 16408 | 05678 | 75532 | 46218 | 74359 | 77556 | 82242 | 00134 | 701 |
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| 49744 | 54713 | 37053 | 77467 | 15348 | 03383 | 96086 | 93296 | 12413 | 55774 | 973 |
| 40922 | 94903 | 29638 | 46870 | 14108 | 84391 | 87313 | 65969 | 43349 | 85142 | 256 |
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| 54832 | 70111 | 48339 | 75270 | 11652 | 41697 | 43277 | 58089 | 70520 | 96997 | 710 |
| 55844 | 69515 | 28658 | 75438 | 83086 | 41325 | 04694 | 40359 | 28351 | 53492 | 731 |
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| 49129 | 12491 | 62558 | 64323 | 44856 | 89045 | 76871 | 80449 | 81351 | 73642 | 486 |
| 19937 | 75104 | 57780 | 95871 | 94547 | 53541 | 77723 | 54114 | 90290 | 62627 | 681 |
| 52571 | 67962 | 72775 | 28480 | 87411 | 12075 | 45177 | 08796 | 99297 | 48807 | 883 |
| 54943 | 80723 | 81195 | 84069 | 28144 | 48106 | 04169 | 16575 | 62665 | 97861 | 716 |
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TABLE G

| (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) |
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| 44358 | 69844 | 73042 | 88091 | 07288 | 74971 | 47066 | 36927 | 53520 | 58309 | 58605 |
| 37459 | 31945 | 03627 | 47690 | 97813 | 45272 | 42789 | 99315 | 26662 | 15833 | 37246 |
| 01200 | 84800 | 27930 | 98937 | 76108 | 11043 | 29101 | 01767 | 78894 | 92922 | 66537 |
| 32037 | 96699 | 56314 | 75755 | 68667 | 04730 | 15256 | 13957 | 52743 | 42306 | 87515 |
| 11867 | 47523 | 24094 | 23334 | 78839 | 81588 | 67374 | 43855 | 24512 | 81956 | 75721 |
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| 88091 | 34749 | 56784 | 98486 | 06018 | 27447 | 00884 | 29564 | 51522 | 35571 | 69208 |
| 12225 | 28483 | 35358 | 99941 | 63054 | 54358 | 80748 | 54049 | 85937 | 64718 | 21466 |
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| 37777 | 20085 | 38703 | 31753 | 18608 | 52524 | 08585 | 91711 | 63572 | 57007 | 11379 |
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| 62864 | 03421 | 34292 | 36084 | 39604 | 89838 | 03635 | 30064 | 72710 | 26327 | 65521 |
| 03348 | 91237 | 28372 | 65330 | 00966 | 73904 | 17477 | 34953 | 08975 | 83142 | 48425 |
| 48478 | 14007 | 11384 | 19576 | 68138 | 30774 | 51898 | 24711 | 72537 | 18360 | 95682 |
| 01236 | 27444 | 47010 | 80938 | 15828 | 86484 | 92753 | 04322 | 27171 | 41828 | 79025 |
| 40190 | 41294 | 72776 | 38528 | 22272 | 34709 | 34561 | 65554 | 53461 | 61776 | 03585 |
| 34437 | 98365 | 17630 | 42196 | 49736 | 39619 | 16731 | 71792 | 38047 | 85559 | 56700 |
| 73821 | 80904 | 05950 | 63441 | 86109 | 79900 | 14063 | 03152 | 39235 | 74289 | 42342 |
| 40601 | 57718 | 93925 | 67763 | 67671 | 21739 | 87534 | 83385 | 91492 | 45796 | 04621 |
| 49608 | 36893 | 43453 | 38580 | 27639 | 52832 | 01522 | 11108 | 59992 | 23168 | 04414 |
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| 42262 | 74097 | 44317 | 40304 | 05346 | 90342 | 73324 | 81555 | 82769 | 23559 | 55238 |
| 08075 | 69395 | 08189 | 66668 | 11663 | 84852 | 93146 | 27182 | 34936 | 97267 | 63996 |
| 54767 | 67683 | 57818 | 98756 | 49119 | 91258 | 71916 | 65948 | 24841 | 38607 | 39412 |
| 06011 | 80623 | 36021 | 81846 | 71868 | 98242 | 72307 | 25917 | 56240 | 73499 | 45106 |
| 51092 | 89263 | 82352 | 95072 | 68828 | 28001 | 48991 | 19201 | 90963 | 34192 | 63336 |
| 86311 | 57615 | 69666 | 60651 | 49084 | 39681 | 66415 | 10201 | 53931 | 44245 | 42850 |
| 47133 | 89534 | 37085 | 28495 | 39162 | 89121 | 52021 | 23143 | 14829 | 55792 | 84641 |
| 35258 | 70734 | 59465 | 49227 | 01431 | 90694 | 96186 | 57811 | 54512 | 30108 | 01261 |
| 73077 | 74726 | 86176 | 31623 | 14569 | 89225 | 09606 | 73432 | 95276 | 21237 | 36507 |
| 84780 | 92759 | 09781 | 06912 | 96802 | 92502 | 97497 | 67702 | 49763 | 25950 | 49924 |
| 57546 | 45467 | 06653 | 99212 | 60612 | 26046 | 53553 | 59757 | 70491 | 69632 | 46009 |
| 57014 | 52797 | 83779 | 56495 | 33104 | 26858 | 07662 | 41253 | 97688 | 76883 | 29444 |
| 69351 | 98168 | 81043 | 26682 | 00063 | 96223 | 30436 | 21987 | 16450 | 56574 | 45011 |
| 64992 | 25021 | 45680 | 46501 | 92943 | 99165 | 20707 | 43410 | 53746 | 54716 | 17090 |
| 23801 | 34422 | 13728 | 35016 | 80605 | 86628 | 21689 | 34082 | 26035 | 11928 | 41817 |
| 15663 | 45983 | 29425 | 12085 | 96233 | 29036 | 91135 | 28258 | 27709 | 90674 | 09705 |
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TABLE H

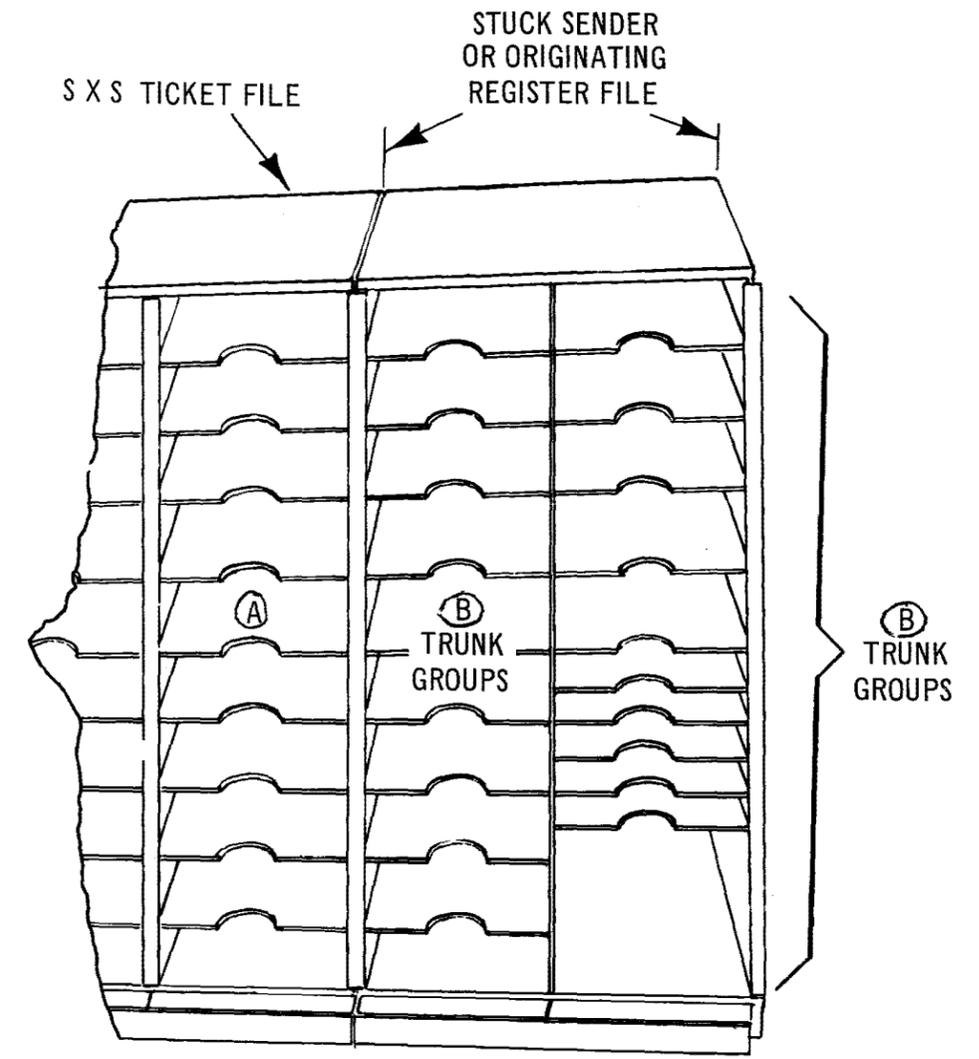
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| 60359 | 07603 | 81594 | 66235 | 48154 | 61257 | 27978 | 64695 | 63165 | 44593 | 08210 | 16863 | 09655 | 00855 |
| 34992 | 97880 | 79115 | 47587 | 76167 | 47086 | 57064 | 16730 | 74172 | 60317 | 83215 | 38133 | 06303 | 05466 |
| C4887 | 64208 | 71842 | 97885 | 32616 | 23280 | 11783 | 19852 | 64266 | 24446 | 14189 | 77419 | 30991 | 92130 |
| 09332 | 86232 | 88199 | 66094 | 72594 | 30100 | 23673 | 68705 | 66989 | 42666 | 81857 | 34651 | 36167 | 24221 |
| 42326 | 62962 | 06485 | 04978 | 96639 | 96214 | 91478 | 12408 | 21457 | 19862 | 99102 | 91426 | 10181 | 51762 |
| 49187 | 42836 | 17042 | 35179 | 31880 | 48444 | 89877 | 50915 | 37426 | 21556 | 25999 | 84256 | 82314 | 18813 |
| 09228 | 57404 | 42180 | 07949 | 98750 | 31506 | 78442 | 45809 | 12725 | 49774 | 11276 | 46371 | 81681 | 00623 |
| 69720 | 73477 | 91252 | 48009 | 81393 | 76401 | 48168 | 25967 | 33372 | 84414 | 21506 | 46131 | 46046 | 12354 |
| 82222 | 13787 | 96611 | 95251 | 34753 | 66674 | 44326 | 66070 | 61131 | 70620 | 42865 | 89251 | 54844 | 04013 |
| 30703 | 00513 | 54586 | 05623 | 43999 | 55387 | 67189 | 95058 | 91174 | 13121 | 27557 | 16512 | 77963 | 40635 |
| 86369 | 62151 | 70713 | 41166 | 79321 | 52215 | 94358 | 28962 | 35868 | 22796 | 87221 | 40014 | 68875 | 71420 |
| 83331 | 99035 | 68506 | 96734 | 91074 | 24356 | 03035 | 66926 | 32197 | 54944 | 76781 | 86722 | 11769 | 27368 |
| 43053 | 60600 | 98921 | 43720 | 77342 | 26186 | 64554 | 46226 | 64244 | 10703 | 49564 | 69737 | 32948 | 43060 |
| 57104 | 49148 | 18487 | 01775 | 71782 | 04679 | 64369 | 06208 | 71669 | 63046 | 10470 | 54194 | 96709 | 86502 |
| 33177 | 11409 | 13925 | 18130 | 54242 | 13460 | 39174 | 63528 | 22670 | 31810 | 04313 | 50669 | 20653 | 31779 |
| 05424 | 76714 | 05732 | 29415 | 01183 | 45054 | 13493 | 44006 | 61641 | 80304 | 96504 | 52181 | 05359 | 72203 |
| 92950 | 58665 | 41191 | 69259 | 50244 | 55322 | 75137 | 90193 | 31989 | 17381 | 43795 | 26981 | 15326 | 02303 |
| 54925 | 20502 | 71767 | 82737 | 64847 | 04496 | 35921 | 42670 | 08584 | 54090 | 52907 | 75331 | 09155 | 54187 |
| 41980 | 43710 | 55304 | 57526 | 29616 | 92314 | 85883 | 21584 | 55045 | 81997 | 62277 | 58884 | 01590 | 13532 |
| 83825 | 70977 | 67987 | 61545 | 92066 | 71215 | 93967 | 63071 | 69928 | 98917 | 05699 | 35957 | 04679 | 58769 |
| 84047 | 83627 | 37763 | 07081 | 33048 | 57895 | 42182 | 73279 | 08032 | 19165 | 01701 | 35656 | 03328 | 81785 |
| 12776 | 69127 | 67921 | 57611 | 85876 | 30744 | 40886 | 68396 | 79787 | 76434 | 71221 | 86769 | 15104 | 19062 |
| 81419 | 55440 | 69506 | 09115 | 45032 | 48343 | 78352 | 39075 | 31689 | 76469 | 64918 | 15149 | 88457 | 97144 |
| 59844 | 03603 | 96297 | 58028 | 93069 | 35674 | 38479 | 54639 | 54455 | 10300 | 73946 | 94827 | 53164 | 07458 |
| 18350 | 74940 | 07044 | 11210 | 53622 | 00779 | 36027 | 51496 | 01694 | 57895 | 84570 | 18271 | 54461 | 42210 |
| 79960 | 18784 | 13376 | 03415 | 84450 | 78874 | 22050 | 19730 | 92598 | 54291 | 60688 | 73188 | 03446 | 49864 |
| 45420 | 24157 | 16374 | 22384 | 56892 | 84941 | 97157 | 99656 | 33978 | 81436 | 10955 | 98991 | 10456 | 35727 |
| 13945 | 09559 | 68152 | 56960 | 39453 | 51654 | 10617 | 55626 | 47933 | 85161 | 52998 | 75414 | 59552 | 03546 |
| 91206 | 33871 | 60730 | 96821 | 95808 | 29763 | 39678 | 73104 | 43398 | 38181 | 44314 | 58343 | 28884 | 94613 |
| 24847 | 08724 | 81499 | 72905 | 95102 | 63004 | 22223 | 19808 | 90777 | 54986 | 97234 | 18458 | 22889 | 83960 |
| 94303 | 08209 | 27804 | 49372 | 66392 | 50578 | 02966 | 90907 | 33164 | 83044 | 97985 | 78526 | 00983 | 29271 |
| 22732 | 95331 | 60954 | 93333 | 71142 | 38827 | 48222 | 21779 | 35598 | 95957 | 58844 | 82319 | 19780 | 08330 |
| 82809 | 24004 | 65983 | 01091 | 70431 | 91145 | 88207 | 52216 | 94846 | 75303 | 85105 | 89486 | 08182 | 56504 |
| 62700 | 79965 | 09610 | 97213 | 48579 | 43574 | 37652 | 12447 | 80233 | 42473 | 94585 | 84840 | 99926 | 74778 |
| 89870 | 73755 | 48525 | 32765 | 50818 | 71468 | 37876 | 28334 | 07762 | 16180 | 45346 | 78324 | 20422 | 85784 |
| 81493 | 24124 | 67928 | 12735 | 41249 | 24180 | 54740 | 44290 | 58903 | 38681 | 04066 | 69393 | 84595 | 42173 |
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| 00107 | 21861 | 60367 | 48999 | 71634 | 34053 | 28265 | 02064 | 06290 | 10620 | 17941 | 81086 | 51759 | 57028 |
| 09657 | 36088 | 05976 | 88267 | 62683 | 67675 | 85265 | 10886 | 06525 | 37911 | 82332 | 55752 | 25054 | 30436 |
| 93948 | 38350 | 63464 | 08008 | 96607 | 73505 | 75513 | 91238 | 11042 | 40972 | 62837 | 30260 | 84002 | 99947 |
| 42746 | 29761 | 72298 | 48186 | 88584 | 90141 | 72879 | 54531 | 99127 | 60063 | 22374 | 76895 | 63812 | 94877 |
| 12939 | 04181 | 27698 | 48297 | 20574 | 30169 | 45545 | 04462 | 91067 | 43847 | 62739 | 311 | | |

TABLE G

| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 31630 | 67734 | 78201 | 94545 | 80152 | 62327 | 83165 | 31035 | 82295 | 11824 | 06765 | 29501 | 62849 | 50419 |
| 25101 | 98983 | 36993 | 40028 | 58036 | 14075 | 05980 | 57094 | 45527 | 18766 | 77741 | 12985 | 14112 | 65058 |
| 86207 | 09805 | 46240 | 70644 | 76012 | 37000 | 98321 | 97197 | 30645 | 56169 | 09363 | 44394 | 29087 | 96569 |
| 31611 | 47643 | 28795 | 48115 | 17223 | 63161 | 29677 | 69820 | 77159 | 20762 | 94296 | 94528 | 82984 | 71418 |
| 10649 | 89132 | 59781 | 12373 | 35999 | 30832 | 02508 | 93055 | 57173 | 79848 | 25439 | 18861 | 26742 | 54970 |
| 68210 | 16228 | 34801 | 40972 | 22887 | 89759 | 09095 | 00587 | 03998 | 13659 | 64179 | 98567 | 69313 | 84637 |
| 32367 | 69587 | 66162 | 44358 | 69844 | 73042 | 88091 | 07288 | 74971 | 47066 | 36927 | 53520 | 58309 | 58605 |
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TABLE H

| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) |
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| 84047 | 83627 | 37763 | 07081 | 33048 | 57895 | 42182 | 73279 | 08032 | 19165 | 0172 |
| 12776 | 69127 | 67921 | 57611 | 85876 | 30744 | 40886 | 68396 | 79787 | 76434 | 7123 |
| 81419 | 55440 | 69506 | 09115 | 45032 | 48343 | 78352 | 39075 | 31689 | 76469 | 6493 |
| 59844 | 03603 | 96297 | 58028 | 93069 | 35674 | 38479 | 54639 | 54455 | 10300 | 7394 |
| 18350 | 74940 | 07044 | 11210 | 53622 | 00779 | 36027 | 51496 | 01694 | 57895 | 8457 |
| 79960 | 18784 | 13376 | 03415 | 84450 | 78874 | 22050 | 19730 | 92598 | 54291 | 6061 |
| 45420 | 24157 | 16374 | 22384 | 56892 | 84941 | 97157 | 99656 | 33978 | 81436 | 1099 |
| 13945 | 09559 | 68152 | 56960 | 39453 | 51654 | 10617 | 55628 | 47933 | 85161 | 5299 |
| 91206 | 33871 | 60730 | 96821 | 95808 | 29763 | 39678 | 73104 | 43398 | 38181 | 4433 |
| 24847 | 08724 | 81499 | 72905 | 95102 | 63004 | 22223 | 19808 | 90777 | 54986 | 9723 |
| 94303 | 08209 | 27804 | 49372 | 66392 | 50578 | 02966 | 90907 | 33164 | 83044 | 9799 |
| 22732 | 95331 | 60954 | 93333 | 71142 | 38827 | 48222 | 21779 | 35598 | 95957 | 5888 |
| 82809 | 24004 | 65983 | 01091 | 70431 | 91145 | 88207 | 52216 | 94846 | 75303 | 8518 |
| 62700 | 79965 | 09610 | 97213 | 48579 | 43574 | 37652 | 12447 | 80233 | 42473 | 9458 |
| 89870 | 73755 | 48525 | 32765 | 50818 | 71468 | 37876 | 28334 | 07762 | 16180 | 4533 |
| 81493 | 24124 | 67928 | 12735 | 41249 | 24180 | 54740 | 44290 | 58903 | 38681 | 0408 |
| 43630 | 32189 | 08532 | 43055 | 08080 | 84208 | 06295 | 07813 | 24068 | 67549 | 4301 |
| 60234 | 18992 | 13283 | 96334 | 39746 | 07272 | 25295 | 07871 | 34201 | 49620 | 5219 |
| 00107 | 21861 | 60367 | 48999 | 71634 | 34053 | 28265 | 02064 | 06290 | 10620 | 1799 |
| 09657 | 36088 | 05976 | 88267 | 62683 | 57675 | 85265 | 10886 | 06528 | 37911 | 8233 |
| 93948 | 38350 | 63464 | 08008 | 96607 | 73505 | 75513 | 91238 | 11042 | 40972 | 6288 |
| 42746 | 29761 | 72298 | 48186 | 88584 | 90141 | 72879 | 54531 | 99127 | 60063 | 2233 |



A Major Equipment Groups (See Fig. 26)
B Trunk Groups (Show Office Code or Name of Trunk Group)

STUCK SENDER OR ORIGINATING REGISTER TICKET FILE

STUCK SENDER TALLY SHEET

OFFICE _____

PERIOD _____

| SENDER | | TALLY | SENDER | | TALLY |
|--------|-----|-------|--------|-----|-------|
| FR | SDR | | FR | SDR | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Fig. 41