MATCHING LOSS PROBLEM ANALYSIS PROCEDURES NETWORK ADMINISTRATION 1/1A ESS™ SWITCH

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1. GENERAL

1.01 This section describes analysis procedures related to matching loss service problems encountered in 1/1A ESS Switches. Its intent is to provide a systematic approach for the Network Administrator when attempting to identify potential or actual matching loss problems.

1.02 This Section was reissued to correct the "%IAML" formula, add Network Administration responsibilities related to matching loss, and make the changes necessary to eliminate the matching loss Section 231-070-715. Since this is a general revision, no revision arrows have been used.

1.03 The title for each figure includes a number(s) in parentheses which identifies the paragraph(s) in which the figure is referenced.

1.04 Matching loss analysis considerations are provided in Part 9. Matching loss analysis procedures and problem solving flowcharts are provided in Part 10. The Network Administration Center (NAC) NO. 2 Switching Control Center System (No. 2 SCCS) work station is recommended for use with these analysis procedures.

1.05 Following is a listing of the Network Administration responsibilities associated with matching loss such as:

- Busy Hour Determination
- Data Collection
- Data Review
- Data Analysis
- Matching Loss Results.

2. MATCHING LOSS DEFINITIONS

2.01 Matching loss is a measure of customer attempts to make calls that do not complete due to the inability of the switching machine to provide a talking and/or service path. In order to be considered as a matching loss, the called line must be idle or the service circuit or outgoing trunk must be available.

2.02 The types of Matching Loss (ML) are as follows:

- Incoming Matching Loss
- Outgoing Matching Loss
- Intraoffice Matching Loss
- Tandem Matching Loss

- Originating Matching Loss.

A. Incoming Matching Loss

2.03 The Incoming Matching Loss (IML) is a measurement of the 1/1A ESS failures to:

- Match a talking path between the incoming trunk and the called line
- Find a path between the trunk and a service circuit (last trial failure)
- Find a path between the called line and a ringing circuit (last trial failure).

The IML is recorded on the IML register equipment group or office count (EGO) 016. The calculation to derive the percentage of IML is as follows:

$$\text{Percentage of IML} = \frac{\text{Incoming Matching Loss (EGO 016)}}{\text{Incoming Calls PC (EGO 015)} - \text{Tandem Calls PC (EGO 131)}} \times 100$$

B. Outgoing Matching Loss

2.04 The outgoing matching loss (OROUT ML) is a measurement of the 1/1A ESS failures to:

- Find a path between the outgoing trunk and a transmitter
- Match a talking path between the calling line and an outgoing trunk.

The OROUT ML is recorded on the outgoing calls overflow register (EGO 033). The calculation to derive the percentage of OROUT ML is as follows:

$$\text{Percentage of OROUT ML} = \frac{\text{Outgoing Calls Ovfl (EGO 033)}}{\text{Originating Calls PC (EGO 014)} - \text{Intraoffice Calls PC (EGO 031)} - \text{PD Abandoned PC (EGO 021)} - \text{PD Timed-Out PC (EGO 022)}} \times 100$$

C. Intraoffice Matching Loss

2.05 The intraoffice matching loss (IAML) is a measurement of the 1/1A ESS failures to:

- Match a talking path between the calling line and the called line through line-to-line junctors or intraoffice trunks
- Find a path between a line and the appropriate service circuit on an intraoffice call.

An IAML is scored when all intraoffice trunks are found busy. The IAML is recorded on the intraoffice calls overflow register (EGO 032). The calculation for deriving percentage of the IAML is as follows:

$$\text{Percentage of IAML} = \frac{\text{Intraoffice Calls Ovfl (EGO 032)} - \text{IAO Trunk OFL}}{\text{Intraoffice Calls PC (EGO 031)} - \text{IAO Trunk OFL}} \times 100$$

D. Tandem Matching Loss

2.06 The tandem matching loss (TML) is a measure of the 1/1A failures to:

- Find a path between a tandem trunk and an appropriate service circuit.
- Find a talking path between a tandem trunk and another appropriate tandem trunk.

To score this register, the trunk groups must appear on the tandem table record, ESS 1209B form. The TML is recorded on the tandem call attempts overflow register (EGO 132). The calculation to derive the percentage of TML is as follows:

$$\text{Percentage of TML} = \frac{\text{Tandem Call Attempts Ovfl (EGO 132)}}{\text{Tandem Call Attempts PC (EGO 131)}} \times 100$$

E. Originating Matching Loss

2.07 Matching loss is further categorized by combining outgoing matching loss and intraoffice matching loss, and the result is referred to as originating matching loss (ORIG ML). The calculation to derive the percentage of ORIG ML is as follows:

$$\text{Percentage of ORIG ML} = \frac{\text{Outgoing Calls OFL (EGO 033)} + \text{Intraoffice Calls OFL (EGO 032)} - \text{Intraoffice Trunk OFL}}{\text{Originating Calls PC (EGO 014)}} \times 100$$

F. Incoming First Failure to Match

2.08 The incoming first failure to match (IFFM) register (EGO 205) scores on a first try failure of the No. 1/1A ESS machine to reserve a talking path between the incoming trunk and the called line or initially selected PBX trunk, provided such line or trunk is terminated on the line link network (LLN). The incoming calls peg count scores the total number of incoming terminating and tandem calls.

Therefore, tandem calls peg count must be subtracted. In addition, line busy-incoming peg count must also be subtracted as calls to busy lines (without call waiting) do not cause the ESS to try to set up a talking path. An IFFM is not service affecting; however, this measurement may be used as an indicator of possible IML problems. The calculation to derive percentage of IFFM is as follows:

$$\text{Percentage of IFFM} = \frac{\text{IFFM PC (EGO 205)}}{\text{Incoming Calls PC (EGO 015)} - \text{Tandem Calls PC (EGO 131)} - \text{Line Busy–Incoming PC (EGO 028)}} \times 100$$

G. Tandem First Failure to Match

2.09 The tandem first failure to match (TFFM) register (EGO 202) counts the number of times on a first try that the ESS fails to reserve a talking path between the incoming tandem trunk and the initially selected outgoing trunk or tone or announcement circuit group is busy. The calculation for percent TFFM is as follows:

$$\text{Percentage of TFFM} = \frac{\text{TFFM PC (EGO 202)}}{\text{Tandem Call Attempt PC (EGO 131)}} \times 100$$

H. EGO Number Description

2.10 The EGO numbers in this section identify traffic registers used for matching loss measurements. For a detailed description of these registers, refer to the ESS Translation Guide, TG-1A, Division 4, Section 1.

3. MATCHING LOSS RESULTS AND NSPMP

3.01 Matching loss (ML) and 1/1A ESS switches measures the degree to which the equipment fails to establish talking paths from incoming trunks and originating lines to called lines, trunks, or service circuits.

3.02 The only reportable matching loss results for the Network Switching Performance Measurement Plan (NSPMP) is a Weighted Percentage Matching Loss - Total Month. This measurement combines IML with IAML and is reported under "Matching Loss." The average busy hour NSPMP soft spot threshold for IML is 1.8 percent.

3.03 For NSPMP purposes, a weighted percentage ML for total month is derived by calculating a busy hour percentage of IML and a percentage of intraoffice matching loss (IAML). These two measurements are combined based on the relative number (weight) of intraoffice and incoming call attempts. For more information on the use of matching loss results for NSPMP, refer to Section 780-350-060.

3.04 Matching loss and Dial Tone Speed (DTS) results may be collected using a mechanized system, e.g., Engineering and Administrative Data Acquisition System (EADAS) or they may be collected manually. Section 780-350-060 provides worksheets for those locations not using a mechanized system. These worksheets are not required for locations on EADAS (or equivalent) as the result may be taken directly from the EADAS printouts and entered on the appropriate NSPMP report forms.

4. MATCHING LOSS ENGINEERED SERVICE STANDARDS

4.01 The Network Administrator should also be aware of the engineered service standards. They are as follows:

(a) ***Line-to-Trunk Connections (Outgoing)***: The design objective for final failure matching loss is 1.0 percent for average busy season busy hour (ABSBH) or 2.0 percent with a carried load at 15 percent above ABSBH.

(b) ***Trunk-to-Line Connections (Incoming)***: The design objective for IFFM is 2.3 percent ABSBH or 7.0 percent with a carried load at 15 percent above ABSBH.

(c) ***Line-to-Line Connections (Intraoffice)***: The design objective for final failure matching loss is 2.0 percent ABSBH or 12 percent with a carried level at 15 percent above ABSBH.

(d) ***Trunk-to-Trunk Connections***: Criteria for local and tandem trunk-to-trunk connections are as follows:

(1) ***Trunk-to-Trunk Connections (Local)***: The design objective for first failure to match is 2.0 percent ABSBH.

The design objective for final failure matching loss is 0.5 percent ABSBH or 2.0 percent with a carried load of 15 percent above ABSBH. These criteria also apply to offices handling minimal tandem traffic, specifically offices in which twice the trunk-to-trunk junctor usage does not exceed 20 percent of the total trunk link network (TLN) usage.

(2) ***Trunk-to-Trunk Connecting (Tandem):*** The design objective for first failure matching loss (TFFM) is 2.0 percent of the 10 high day busy hour (10 HDBH). The design objective for final failure TANDEM matching loss (TML) is 0.5 percent 10 HDBH or 2.0 percent with a carried load of 15 percent above 10 HDBH. These criteria apply to 1/1A ESS offices when used as local/toll, local/tandem, local/toll/tandem and toll/tandem.

5. MATCHING LOSS DATA

A. Busy Hour Determination

5.01 Busy hour determination involves the selection of the time consistent hour with the greatest percentage of weighted matching loss (IML and IAOML). Refer to the following sections for busy hour determination procedures.

- Section 780-200-031 Busy Hour Determination - End Office
- Section 780-350-060 Matching Loss and Dial Tone Delay Collection Procedures for NSPMP
- Section 231-070-558 COER - Busy Hour Determination Procedures

B. Data Collection

5.02 Data Counts are collected in accordance with the 1/1A ESS switch H schedule assignments. Data Counts are output from the 1/1A ESS switch via the traffic channel.

5.03 All matching loss data counts are assigned to the H schedule in the 1/1A ESS switch. Refer to Section 231-070-515 for information on H schedule data count assignments. Refer to Section 231-070-505 for information on H schedule data collection scheduling.

5.04 The H schedule output over the traffic channel is used to prepare the matching loss data report. The data may be input to a mechanized equipment report system. The Central Office Equipment Report (COER) system is used as an example in this section. Refer to Section 231-070-555 for COER administrative guidelines. A COER report will contain the following:

- Percentage of incoming matching loss
- Percentage of outgoing matching loss
- Percentage of intraoffice matching loss
- Percentage of incoming first failure to match
- Percentage of tandem first failure to match.

C. Data Reliability Analysis

5.05 Data should be analyzed for accuracy. In mechanized systems such as COER, the system analyzes the data and prepares exception and reliability reports.

5.06 Section 231-070-557 provides procedures to analyze exception and reliability reports generated by the COER system.

6. EADAS REPORTS

6.01 Matching loss results are part of the Engineering and Administrative Data Acquisition (EADAS) reports. A brief description of these reports is contained in the following paragraphs. Refer to OPA-3B257-XX for a detailed description and examples of EADAS reports.

A. Ineffective Attempt Service Exception Report

6.02 Matching loss results are part of the Ineffective Attempt Service Exception Report. The intent of the ineffective attempt (IA) report is to provide the Network Administrator with an alert that an abnormal level of IAs has occurred and that corrective action may be required.

6.03 The report consists of seven sections:

- Percentage of IAs
- Percentage of OML
- Percentage of IML
- Percentage of No Circuits
- Transmitter Overflow Data
- Miscellaneous Service Circuit Data
- Percentage of Miscellaneous IAs.

6.04 The first part of the report shows the total office percentage of IAs with appropriate supportive data. This percentage is the key to the report. If the percentage of IAs is in violation of the user-defined threshold value, the report is generated; if not, the report is not printed.

6.05 The remaining six parts of the report are intended to supply to the network administrator a supportive breakdown of the causes for the percentage of IA which generated the report.

6.06 The general rule for line printing is that when a threshold test fails, the entire line which contained the threshold item is printed "flagged" with an asterisk and its supporting data line will accompany this flagged line. If the item does not violate its threshold, the line with the threshold item is printed (unflagged) and without supporting data.

B. Load Service Summary Report

6.07 The Load Service Summary Report is intended to provide a general profile of the overall office load and service levels on a scheduled basis. Provided within the report contents is the ability to (1) monitor key service indicators and (2) obtain information about overall office traffic volumes.

6.08 The report consists of seven sections:

- Office Load Volumes
- Total RSS Load Volumes
- Ineffective Attempts
- Dial Tone Results
- RADR Results
- Network Management
- RSS Load Service Summary.

C. Raw Register Dump

6.09 The dump register allows network terminal users to request dumps of raw register data which have accumulated during a previous data collection interval. The dump commands allow the user to obtain dumps varying from ten registers to the entire block of data within the specified interval. It should be noted that the active set of registers (registers collecting current half-hour of data) is not available to EADAS; therefore, active register dumps are not possible.

6.10 The exact steps required for demand reporting are contained in OPA-3B257-XX.

D. Outgoing Trunk Overflow Exception Report

The Outgoing Trunk Overflow Exception Report is designed as an aid to the Network Administrator when attempting to analyze trunk group overflow and peg count measurements on final trunk groups. For ESS entities, the Outgoing Trunk Overflow Exception Report is generated from the C schedule data and prints when user-defined thresholds are exceeded. This exception report is designed to notify the user when the final outgoing trunk overflows becomes excessive, where alternate routing is involved, and to pinpoint the tributaries which may be contributing to the problem.

E. Trunk Overflow Summary Report

6.11 The Trunk Overflow Summary Report gives overflow information on selected outgoing trunk groups during selected hours of the day.

6.12 It is the intent of the Trunk Overflow Summary Report to provide a listing of hourly peg count, overflow, percentage of overflow, and maintenance busy data for each trunk group designated by the network administrator in the trunk group file.

7. CENTRAL OFFICE EQUIPMENT REPORTS

7.01 Matching loss data can be obtained from the Central Office Equipment Reports (COERs) system. The data from these reports are useful in developing matching loss trends which may identify potential matching loss problems before they become serious.

7.02 The COER gathers matching loss data for only a few study hours each day. EADAS gathers matching loss data for all 24 hours each day. Matching loss may occur any time during the day. Consequently, EADAS is the primary matching loss analysis tool.

7.03 Comparison of COER and exception reports may aid the Network Administrator in determining to what extent the exception report measurements are deviating from the current study hour results.

7.04 COER matching loss report details are provided in the 1ESS COER lessons. The matching loss report contains the following data

- Incoming Matching Loss
- Outgoing Matching Loss
- Intraoffice Matching Loss

8. OTHER ESS MESSAGES

8.01 Other ESS messages such as TC15, TOC01 and TOC02 may also be used for matching loss analysis. In Fig. 1, Sheet 2, TC15 and TOC messages are referrred to for peaking and overload analysis. A brief outline for these messages is provided in the following paragraphs.

A. TC-15

8.02 TC-15 messages that may be used for matching loss analysis is as follows:

- Incoming Calls Peg Count
- Incoming-Terminating Calls First Failure To Match
- Tandem Calls Attempts Peg Count
- Tandem Calls First Failure To Match
- Intraoffice Calls Peg Count
- Intraoffice Calls Overflow

8.03 For a complete list and detailed description of TC-15 messages, refer to the Output Message manuals:

- OM - 1A001 (1ESS)
- OM - 6A001 (1AESS)

B. TOC01 and TOC02

8.04 TOC01 and TOC02 messages that may be used for matching loss analysis is as follows:

- Incoming Trunk Overload
- Multi-Frequency Receiver Overload
- Receiver Queue Overload
- Trunk Link Network Matching List

8.05 For a complete list and detailed description of TOC01 and TOC02 messages, refer to the Output Message manuals:

- OM - 1A001 (1ESS)
- OM - 6A001 (1AESS)

9. POSSIBLE CAUSES OF MATCHING LOSS

9.01 Matching loss problems may be caused by one of the following:

- Load imbalance on switch and/or quarter switch in the line link network.
- Load imbalance by class of service or features.
- Junctors assigned inefficiently. Example, too many trunk-to-trunk (T-T) junctors and too few line-to-trunk (L-T) junctors.
- Traffic load that exceeds engineered capacity in line link networks, trunk link networks, or junctor paths.

9.02 For a listing of possible causes of matching loss refer to Table A.

10. ANALYSIS PROCEDURE FLOWCHARTS

10.01 This part describes the use of analysis flowcharts provided in this section as an aid to the Network Administrator in solving matching loss problems. The flowcharts are contained in Fig. 1, Sheets 1 through 8. The use of the flowcharts is dependent upon the circumstances at the time of observation of the matching loss problem. For example, if the Network Administrator becomes aware of excessive matching loss and at the same time already knows of conditions existing in the office which would account for the problem, then there is no need of the flowcharts. However, for

more complex matching loss problems, when causes are not readily apparent, the flowcharts offer a logical and systematic approach to analyzing the available data.

A. Basic IML Analysis

10.02 The basic IML analysis flowchart is referenced due to either an IML problem being obvious on COER printouts or an EADAS Service Exception Report indicating abnormally high IML. The following is a discussion of the flowchart steps depicted in Fig. 1, Sheets 1 and 2.

(1) ***IML Compared to the Objective***: When a network administrator receives COER matching loss results which are at above normal level, or an EADAS Service Exception Report with matching loss flagged, a comparison should be made to determine if the matching loss level is above current objectives and significantly (ie, other than an isolated occurrence) affecting service. Consideration should be given to the time of year (busy season or nonbusy season), time of day (normal busy hour or non-busy hour), and the percentage of enginered capacity that the office is running when the matching loss problem occurs. If the level of matching loss is normal for the time it occurred, then the EADAS report threshold values should be reviewed to see if they are set too low.

(2) ***Frequency of Matching Loss Problems***: Determine how often excessive (exceeding a user defined threshold) matching loss is occurring (either one occurrence, for hours or for a period of days). If only one exception report or other indicator is received, then consider it an isolated case and continue to monitor subsequent data for further indications of an IML problem. If subsequent data does substantiate an IML problem, then analyze all available data for an overload. If the offered load does not account for IML levels, check with maintenance (Fig. 1, Sheet 3 Maintenance Analysis Flowchart) to see if an excessive amount of equipment is out of service and, if there is, have the equipment restored as soon as possible. After any out-of-service equipment is restored, check to see if the problem still exists. If there is still a problem, go the network analysis flowchart (Fig. 1, Sheets 4 through 6).

B. Network Analysis

10.03 The network analysis flowchart (Fig. 1, Sheets 4 through 6) can be used in connection with the basic IML or OML analysis flowcharts, since IML or OML use the same paths, (line to trunk (L-T) or trunk to line (T-L) to complete calls.

(1) ***Determine Most Significant Source of IML (L-T or trunk to trunk*** [T-T]): A NORGEN raw register dump of network peg count and overflow can assist in determining whether L-T or T-T IML is the major part of the matching loss problem. Assume that IML minus the sum of the LLN overflows equals the T-T overflow.

(2) ***Matching loss is Mainly L-T***: If matching loss is mainly L-T, check to see if the LLN and TLN overflows are approximately evenly distributed. If the answer to both question is yes, then go to list C on Table A for possible causes of IML with equally distributed overflows. In most cases where overflows are equally distributed, matching loss is caused by exceeding an engineered capacity in the network or junctor path. If the LLN and TLN overflows are unequally distributed, and equipment has not yet been returned to service determine if service is being affected by the out-of-service equipment. If the problem still exists after restoring equipment (if any) to service, then refer to Table A, lists A and B for additional possible IML causes.

(3) ***Load Imbalance on Switch and/or Quarter Switch if LLN***: Switch and/or quarter-switch imbalances on the LLN can cause IML. The weekly (W) schedule is used to identify these conditions. If imbalances and overloads are identified, the line and number assignment group should be notified and corrective action taken to rebalance the switches.

(4) ***Load Imbalance by Class of Service or Features***: Load imbalances caused by class of service or calling features being inefficiently distributed throughout the concentrators should be corrected as soon as possible. Matching loss problems caused by these types of imbalances should be brought to the attention of the traffic engineer as the engineer should be aware of the reasons for the higher matching loss levels and the effects on office data.

(5) ***Junctor Assignment***: The IML can be the result of inefficiently assigned junctors. For example, too many T-T junctors may be provided while too few L-T junctors are assigned. It may be that a reassignment of junctors is the only solution to an IML problem. The IML attributable to a junctor shortage may be due to inaccurate forecasts of the effects of area transfers, centrex complexes, community of interests, etc. If after the TLN and LLN rebalancing has been accomplished and the IML problem still exists, then the traffic engineer should be requested to review the adequacy of the current junctor assignments.

(6) ***Return to Maintenance Analysis***: If after examination of the junctor, switch, class-of-service, and features balance there is no significant imbalance to be corrected, then return to maintenance and discuss these findings with them. Under these circumstances, a more thorough maintenance analysis may be required to find the cause of the matching loss problem (ie, IML is probably caused by an unusual hardware or software problem not easily detected by the normal maintenance trouble indicators. The problem may require the aid of the Electronic System Assistance Center [ESAC] or other technical assistance as determined by the maintenance personnel.)

(7) ***Source of IML Mostly T-T (Nontandem Office)***: If it is determined that T-T attempts account for most of the IML and the office is not a combined local and tandem office, then complete a maintenance analysis. After the effect of out-of-service equipment has been removed, determine if the problem still exists. If the problem remains, review the T-T junctor balance on the TLNs to see if there is a load imbalance due to inefficient spread of trunks or service circuits. If there is, refer the problem to the group responsible for trunk and service circuits assignment to determine if rebalancing is required. At the same time the T-T load should be checked to see if the T-T capacity is being exceeded. If the capacity is being exceeded and the IML problem persists, then the problem should be referred to the traffic engineer. In either case, the traffic engineer should be made aware of the IML problem. If a peaking problem is apparent, then the trunk assignment group should be advised of the resulting IML condition in the office. List D (Table A) gives possible causes for T-T IML in a nontandem office.

(8) ***Source of IML Mostly T-T (Local and Local Tandem Office)***: If the matching loss analysis is for an office serving local tandem traffic, then a check should be made to determine if tandem matching loss accounts for the T-T matching loss. If it does, then the same steps should be taken as a nontandem office, ie, maintenance analysis, T-T balance check, etc, item (7) of this paragraph. If the tandem matching loss does not confirm the existence of T-T matching loss, then a check should be made to determine if this tandem traffic is scoring the IML peg count. Local tandem calls should not score the IML peg count register.

C. Basic Originating Loss Analysis

10.04 The Basic Originating Matching Loss (ORIG ML) flowchart (Fig. 1, Sheets 7 and 8) can be used upon receiving an EADAS Service Exception Report (see Section 231-070-758 for IA analysis) with ORIG ML being flagged. It can also be used when trying to determine how much ORIG ML is contributing to the generation of an IA exception report. In the latter case, the data has to be obtained from a raw register dump.

10.05 The EADAS exception reports are designed to make a Network Administrator aware of an immediate problem in the office. Whenever possible, a systematic monitoring of ORIG ML with early corrective action is preferable to reacting to an exception report. Many times potential ORIG ML problems can be detected through the use of COER data. However, if an EDAS Service Exception Report is received, the Network Administrator can use the Basic ORIG ML flowchart as follows:

(1) ***Is ORIG ML a Major Contributor***: The matching loss section of the IA exception report separates the ORIG ML results into ORIG ML and IAML. From these figures it can be determined which type of matching loss is the major contributor to the current problem.

(2) ***Does Matching Loss Indicate an Analysis is Required***: Local thresholds should indicate whether the level of matching loss is high enough and/or has occurred frequently enough to require an analysis. If it is determined that no analysis is required, the data should be filed for future reference if an analysis is required at a later date. If an analysis is indicated, then the Network Administrator should go to the network analysis flowcharts since outgoing calls use the same network paths as incoming calls. Therefore, the network flowchart can be used for either IML or ORIG ML.

(3) ***IAML is Major Contributor***: If the data indicates IAML is the major contributor and an analysis is indicated, then the Network Administrator should do the following:

(a) Check all line-to-line junctor (if provided) and intraoffice (IAO) trunk data. Line-to-line usage can be obtained from a EADAS raw register dump or from COER. The line-to-line junctor usage should be compared with the engineered capacity to see if the carried load is as designed. The NN06 output messages should be checked (from the NAC work station) to determine if junctors are out of service. If the NN06 messages indicate junctors not available, then maintenance should be contacted to have the junctors restored to service as soon as possible.

(b) Next, check the usage on the IAO trunks and compare the usage with the engineered capacity of the trunk group.s If the office does not use line-to-line junctors and all IAO trunks are in service and the engineered capacity is being exceeded on a continuing basis, contact the traffic engineer and arrange to increase the number of IAO trunks.

(c) If the office has line-to-line junctors and the junctor load carried is low while the IAO trunks are overflowing, there may be an imbalance of traffic offered to the junctors and office rebalancing may be required. The COER data can be utilized very effectively to monitor junctor usage and develop trends. This imbalance condition can occur due to community of interest calling especially area transfers if the newly served area customers are not spread evely over the existing line link networks.

D. Maintenance Analysis

10.06 The maintenance analysis flowchart (Fig. 1, Sheet 3) is used in connection with the other flowcharts. The chart depicts the steps required to check for out-of-service equipment which may be causing matching loss to occur.

(1) ***Request Fab Status ALL or NN06 Messages***: The Fab Status ALL Request is performed by the maintenance group to obtain the status of all links that have been requested to be taken out of service. This message pertains to line switch frames, line junctor switch frames, trunk switch frames, and trunk junctor switch frames. The NN06 message file (No. 2 SCCS) can be browsed for NN06 messages which indicate the status of the links that have been requested

to be taken out of service. If the NAC work station is arranged so that it can access maintenance files, then the browsing for NN06 messages can be done directly by the Network Administrator.

(2) ***Restore Components as Soon as Possible***: All links should be restored as soon as possible under normal load conditions and quick restoral becomes even more important during an overload condition.

(3) ***Did the Restoral of Equipment Account for the Matching Loss***: After the equipment is restored to service, a check should be made by the network administrator to see if the matching loss problems have been eliminated. (This may require waiting until the results of the next busy hour are received.) If matching loss levels return to an acceptable range, then the analysis ends. If not, then return to the network analysis flowchart and continue the analysis.

11. REFERENCES

11.01 Refer to Section 780-0100-022 for a complete list of recommended documents.

11.02 The following documents provide information in areas related to this section.

SECTION	TITLE
231-070-301	Dial Tone Delay Alarm Circuit (Vaughan Box)
231-070-505	Traffic Measurements - General Description
231-070-515	Traffic Measurements - Hourly Schedules
231-070-555	Central Office Equipment Reports (COER) - Administrative Guidelines
231-070-557	Central Office Equipment Reports (COER) - Exception and Reliability Report Analysis
231-070-558	Central Office Equipment Reports (COER) - Busy Hour Determination
231-070-580	Busy Hour Determination - General
231-070-758	Ineffective Attempts - Problem Analysis Procedures
780-350-060	Matching Loss and Dial Tone Delay Data Collection Procedures for Network Switching Performance measurement Plans

OTHER DOCUMENTS

SECTION	TITLE
TG-1A	Translation Guide

12. ACRONYMS

ACRONYM	DEFINITION
ABSBH	Average Busy Season Busy Hour
AMA	Automatic Message Accounting
BH	Busy Hour
CAMA	Centralized Automatic Message Accounting
CCSA	Common Control Switching Arrangement
CDR	Customer Digit Receiver
COER	Central Office Equipment Reports
CTX	Centrex
DEL	Delay
DP	Dial Pulse
DTS	Dial Tone Speed
EADAS	Engineering and Administrative Data Acquisition System
FALI	Failure
IA	Ineffective Attempt
IAML	Intraoffice Matching Loss
IAO	Intraoffice
IFFM	Incoming First Failure to Match
IML	Incoming Matching Loss
LEN	Line Equipment Number
LLN	Line Link Network
L-L	Line to Line
L-T	Line to Trunk
MEM	Memory
MF	Multi-Frequency
ML	Matching Loss
MSCR	Main Station Call Rate
NAC	Network Administrative Center
NM BLKD	Network Management Blocked
NSPMP	Network Switching Performance Measurement Plan
ORIG ML	Originating Matching Loss
OROUT ML	Outgoing Matching Loss

ACRONYM	DEFINITION
OVFL	Overflow
PCI	Panel Call Indicator
PBX	Private Branch Exchange
PC	Peg Count
PERF	Performance
PG CNT	Peg Count
RP	Revertive Pulse
RSS	Remote Switching Service
TLN	Trunk Link Network
TML	Terminating Matching Loss
T-T	Trunk to Trunk

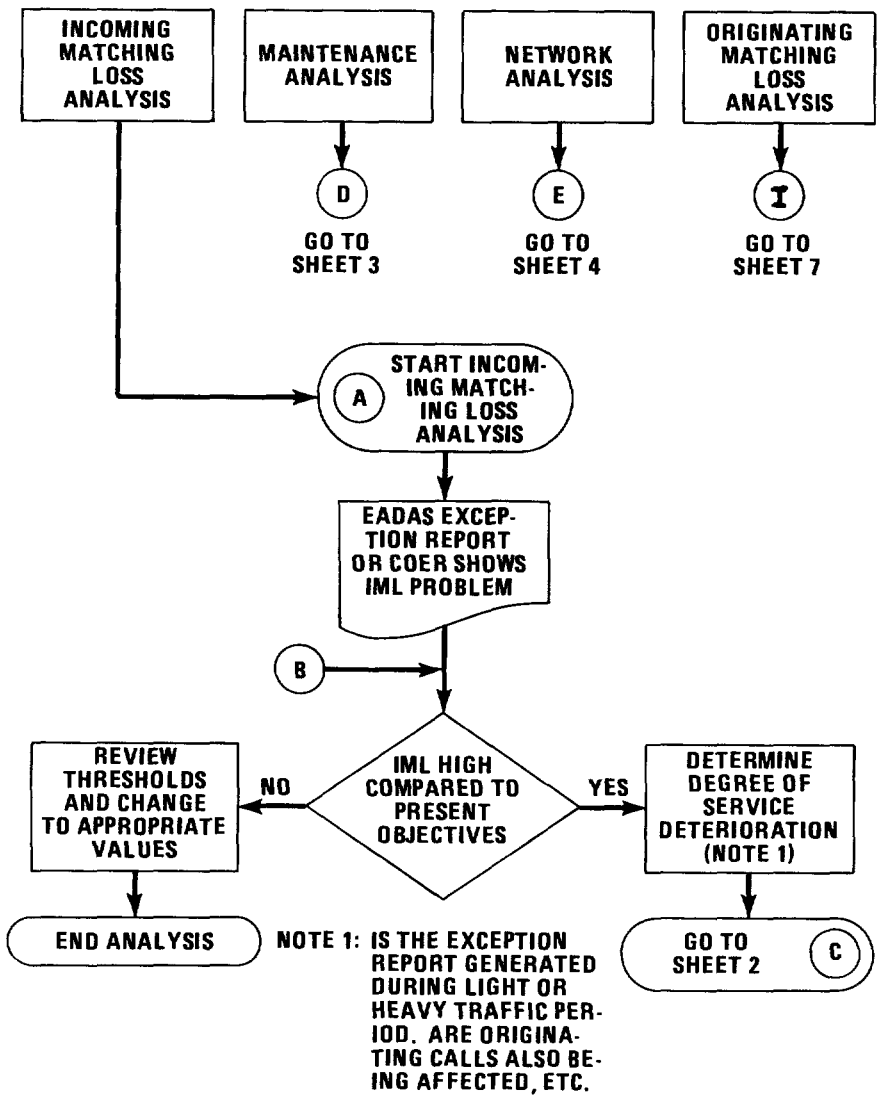

Figure 1 - Analysis Flowchart (Sheet 1 of 8) (10.01, 10.02)

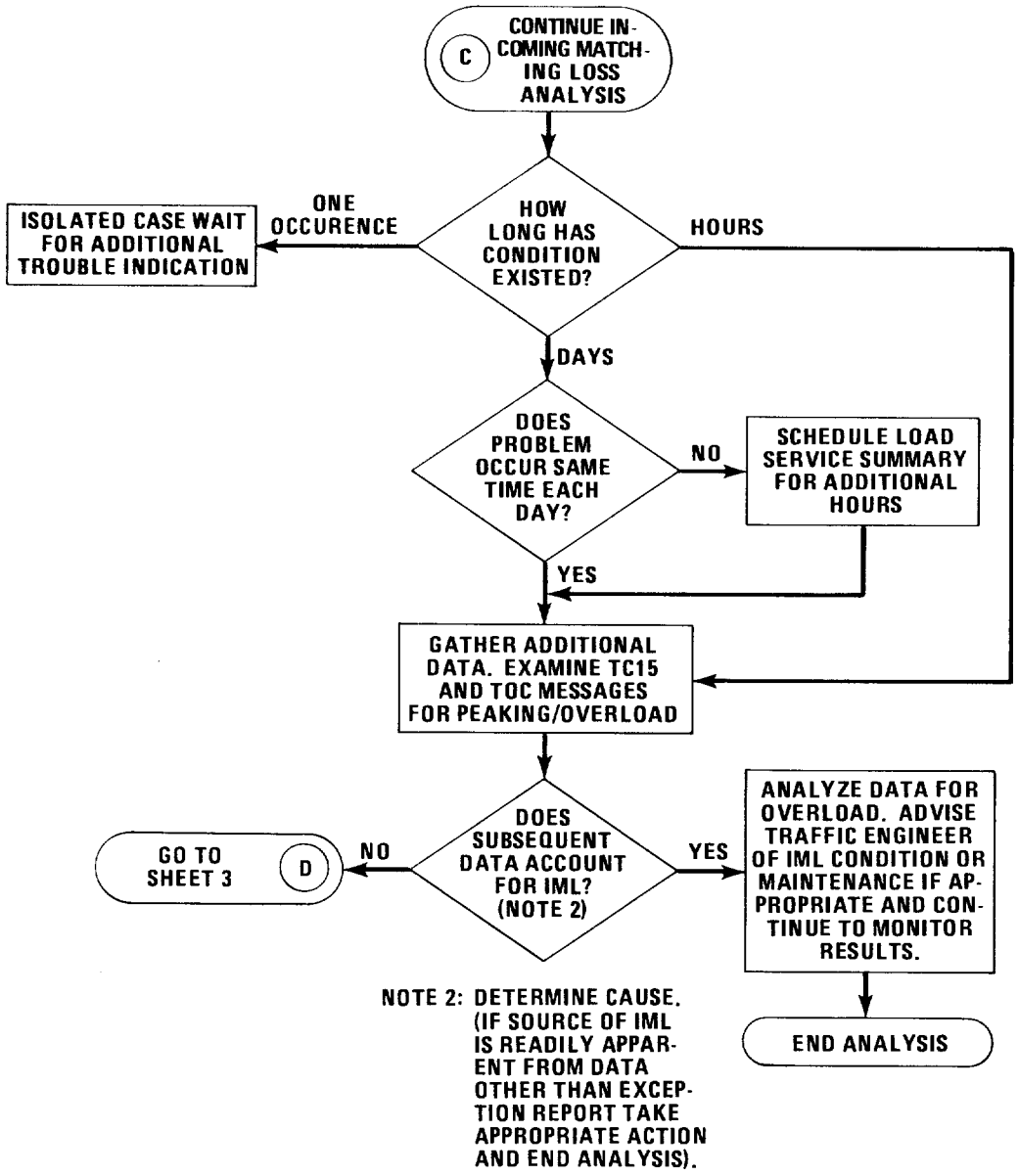

Figure 1 - Analysis Flowchart (Sheet 2 of 8) (10.01, 10.02)

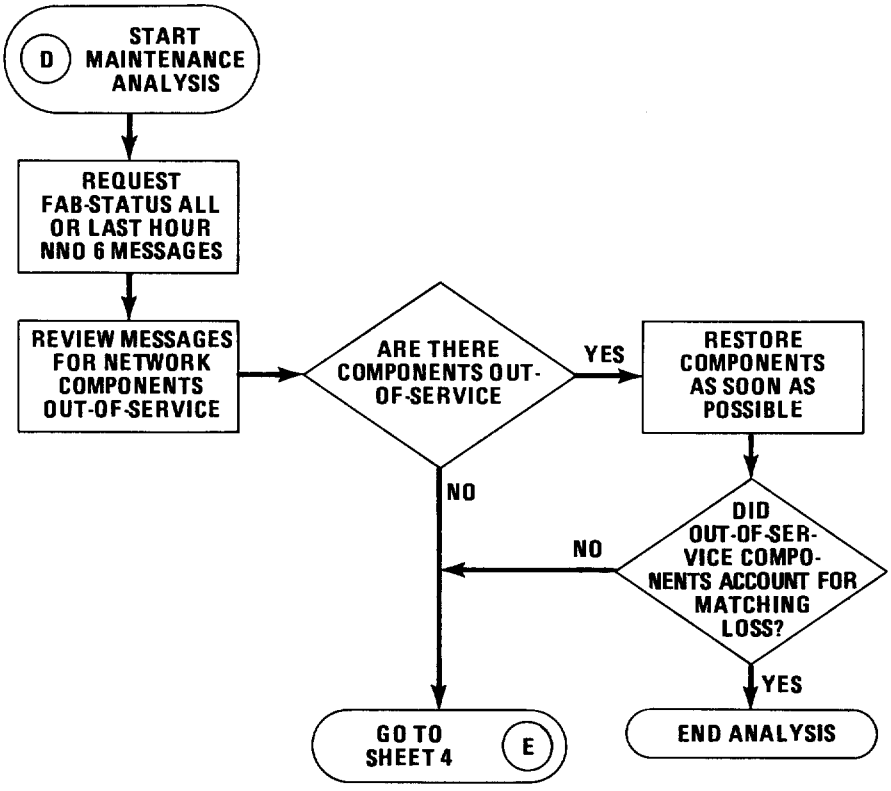

Figure 1 - Analysis Flowchart (Sheet 3 of 8) (10.01, 10.02, 10.06)

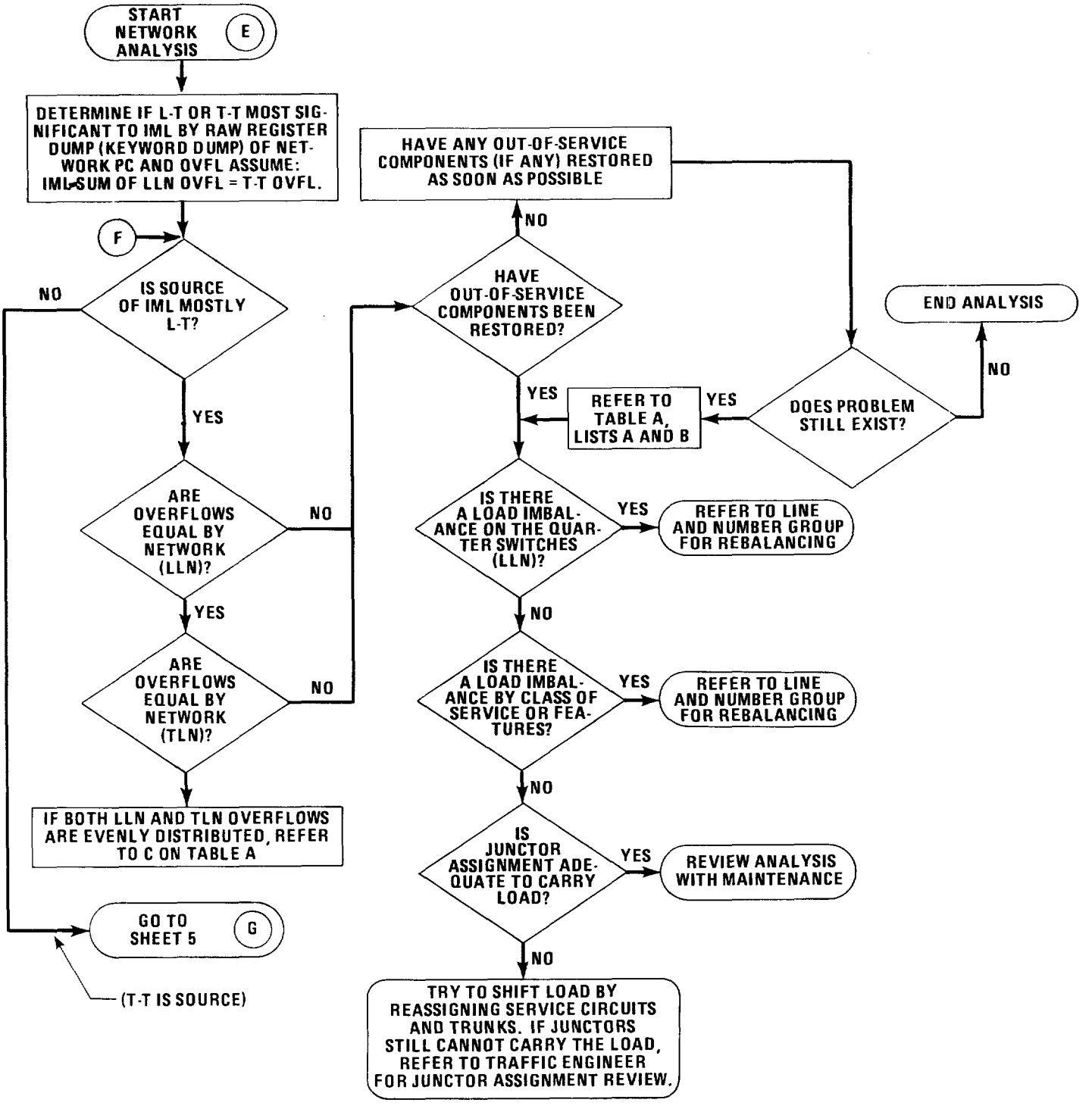

Figure 1 - Analysis Flowchart (Sheet 4 of 8) (10.01, 10.02, 10.03)

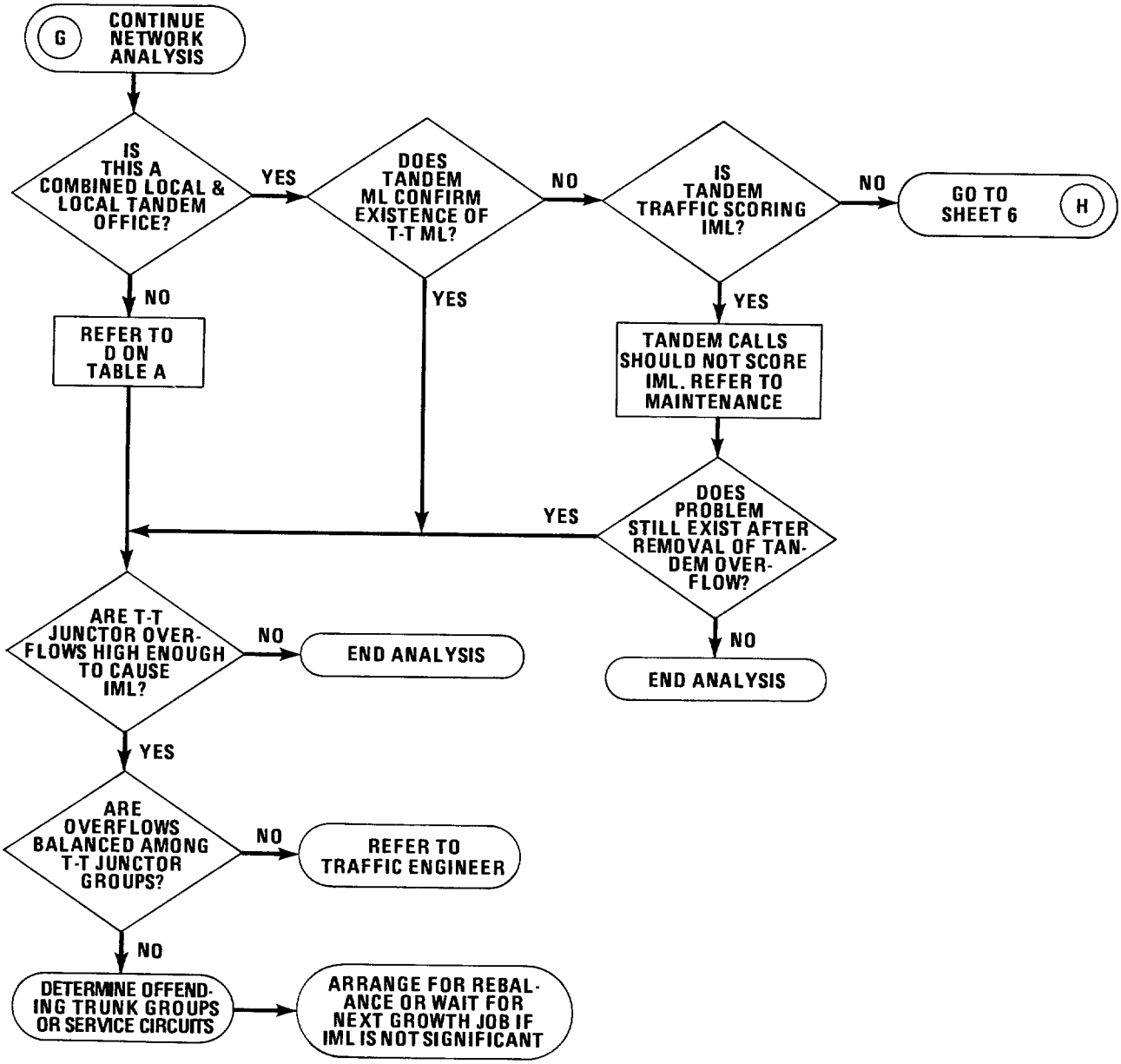

Figure 1 - Analysis Flowchart (Sheet 5 of 8) (10.01, 10.02, 10.03)

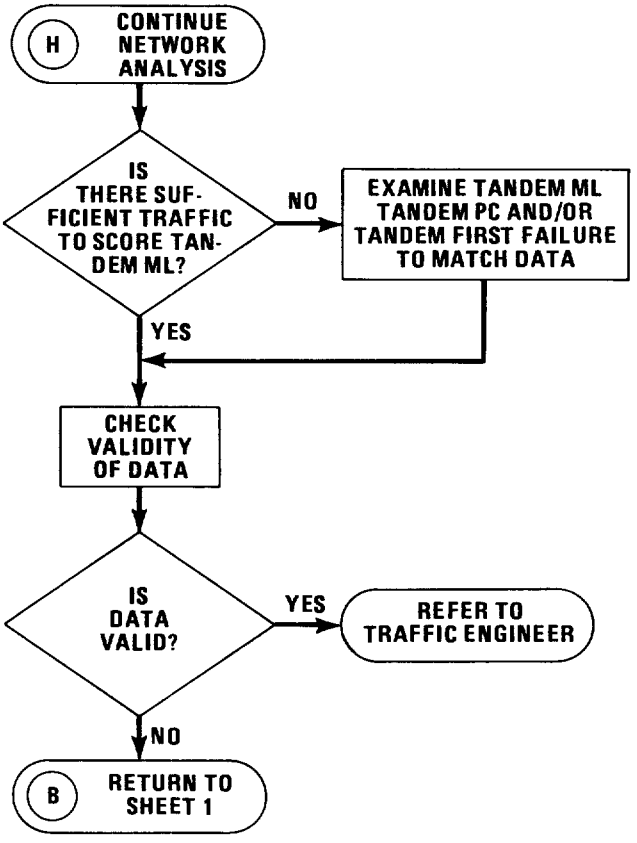

Figure 1 - Analysis Flowchart (Sheet 6 of 8) (10.01, 10.02, 10.03)

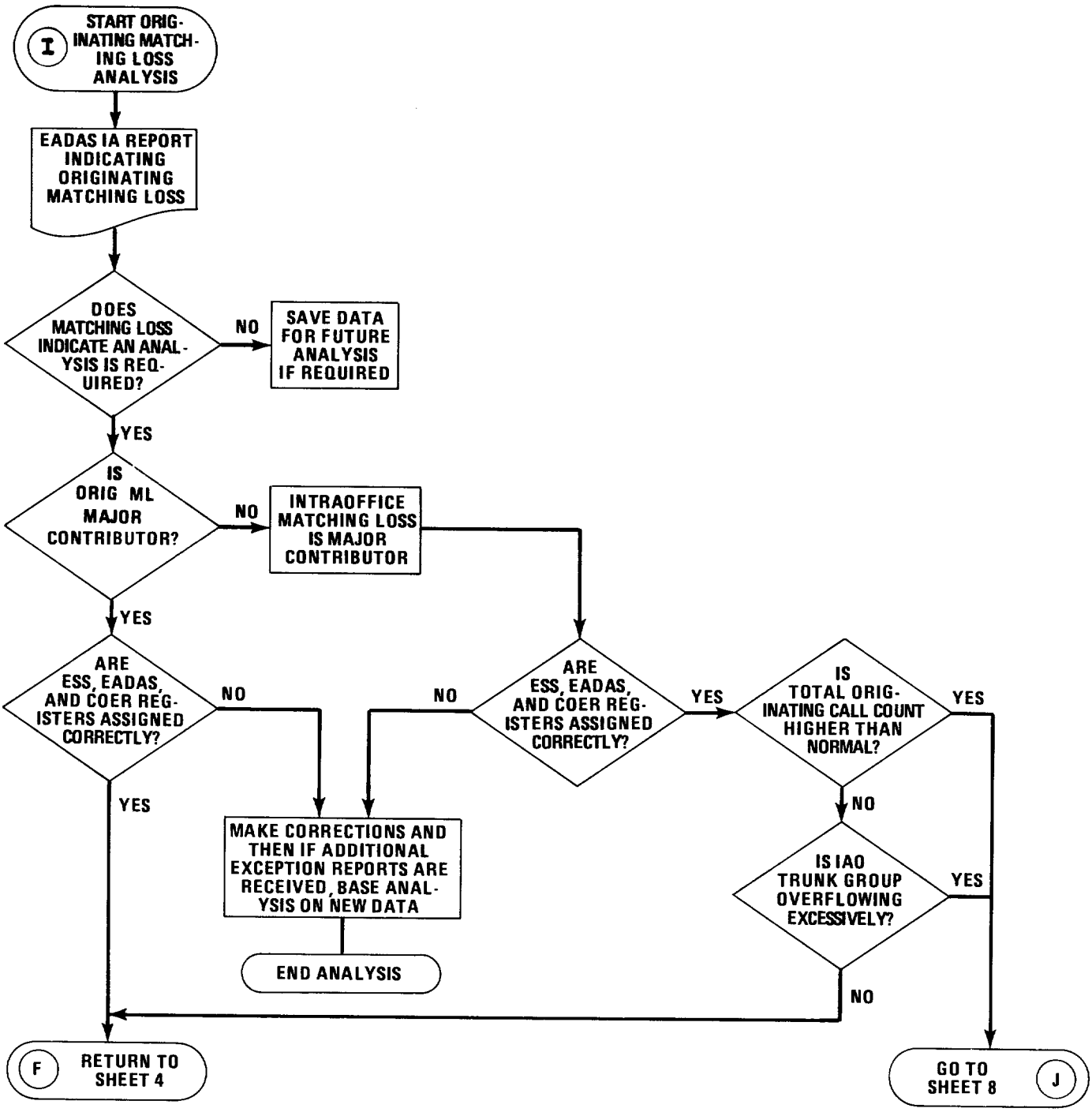

Figure 1 - Analysis Flowchart (Sheet 7 of 8) (10.01, 10.04)

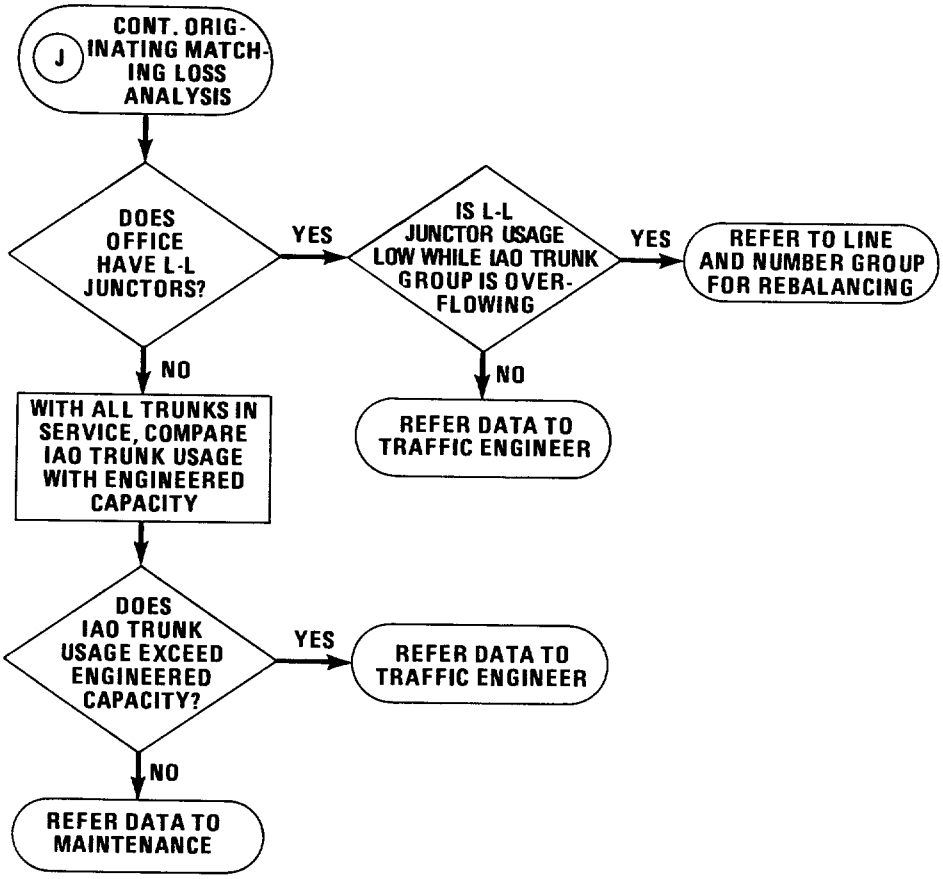

Figure 1 - Analysis Flowchart (Sheet 8 of 8) (10.01, 10.04)

TABLE A

POSSIBLE CAUSES OF MATCHING LOSS

A. LLN OVERFLOW UNEQUALLY DISTRIBUTED	C. LLN AND TLN OVERFLOW EQUALLY DISTRIBUTED
1. Transition Activity 2. Total load imbalance 3. Line-to-trunk imbalance 4. Switch or quarter-switch imbalance • Class of service • Feature 5. Peaking incoming or outgoing calls	1. LLN capacity exceeded 2. Line-trunk junctor capacity exceeded 3. TLN capacity exceeded 4. Peaking incoming or outgoing calls 5. High volume of call-in lines (radio, TV, etc) 6. "A" link blockage 7. Line-to-junctor ratio inadequate
B. TLN OVERFLOW UNEQUALLY DISTRIBUTED	**D. NONTANDEM WITH TRUNK-TO-TRUNK BLOCKAGE**
1. Trunk Activity • Maintenance • Trunk rearrangements, additions 2. Load imbalance due to poor trunk group spread 3. Line-to-trunk junctor imbalance 4. Peaking incoming or outgoing calls	1. TLN load imbalance 2. T-T junctor load imbalance 3. T-T junctor capacity exceeded 4. TLN capacity exceeded **ABBREVIATIONS** TLN=Trunk link network LLN=Line link network T-T=Trunk-to-trunk