

TRUNK TRANSMISSION MAINTENANCE INDEX

BALANCE COMPONENT

GENERAL DESCRIPTION

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and singing point or singing return loss (SP/SRL) taken on a sampling basis. The requirements and measurement methods must be as stated in Sections 660-YYY-300, 660-YYY-301, and associated sections. Local requirements and interpretations not in agreement with system instructions do not apply.

1.05 The source of information for this component is the sampling survey program conducted in accordance with Sections 301-133-100 and 301-133-500.

1. GENERAL

1.01 This section describes the balance component of the Trunk Transmission Maintenance Index (TTMI). The balance component provides a measure of the performance in maintaining a satisfactory condition of balance in entities where balance is required.

1.02 This section is reissued to include operator service entities in the balance component of the TTMI and to make reference to the Expanded Balance Survey. Since there are extensive changes in the section, change arrows have been omitted.

1.03 Section 301-123-300 furnishes the index tables which the System uses to rate balance maintenance performance. Section 301-123-500 provides the manual summary procedures for computing the balance component index. Some of these operations are performed by computer for companies using the TTMI Mechanized Summary Procedure. The mechanized procedure is covered in Section 301-124-100, 301-124-110, and 660-403-011.

1.04 The balance component is based on actual measurements of echo return loss (ERL)

2. SCOPE OF THE BALANCE COMPONENT

2.01 The balance component of the TTMI covers all Class 4 or higher class toll switching entities and all operator service entities which have ERL and SRL requirements. Operator service entities include Traffic Service Positions Systems, Remote Trunking Arrangement Concentrators, Automatic Call Distributing Systems, Automatic Intercept Systems and trunk concentrators. Although any trunk which has balance requirements may be selected as a part of the sample that is chosen for survey purposes, the selected sample must be stratified to include all classes of trunks as discussed in Sections 301-133-100 and 301-133-500.

2.02 Every certified office is surveyed at one- or two-year intervals. *If an office has never met balance requirements, and is not certified as balanced, it will not be scheduled for survey.* If an office has never been certified by the transmission engineer, but meets the following requirements, measurements may be entered in the balance component of the plan as discussed in paragraph 2.03. To enter measurements in the plan for noncertified offices, these requirements must be met:

- (a) All test results must be recorded on form E600X.

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(b) Trunks are designed according to standard design concepts as specified in the transmission sections of Bell System Practices.

(c) All trunks not meeting the conditions of (a) and (b) above must be entered in the total of trunks to be balanced and classified as not meeting minimum ERL and SRL requirements.

(d) The toll switching entity NBO value is 0.080 μ F or less and has been approved by the transmission engineer.

2.03 The procedure for computing the results from entities in the process of being balanced and meeting the requirements of paragraph 2.02 is shown by the following example:

Example: Assume that an entity has 1000 trunks requiring balance, and has made balance measurements on 100 of them, and 2 of the trunks measured are below minimum requirements for ERL and SRL. The results of these measurements can be entered on summary Form E-5688. However, since the remaining 900 trunks have not been measured they are assumed to be below minimum for ERL and SRL. Therefore, the percentages to be entered in the columns for below minimum ERL and SRL is:

$$\% < \text{Min ERL} = \frac{900+2}{1000} \times 100\% = 90.2\%$$

$$\% < \text{Min SP/SRL} = \frac{900+2}{1000} \times 100\% = 90.2\%$$

The percentage of trunks greater than or equal to median requirements is determined in the following manner:

$$\% \geq \text{Med. ERL} = \frac{\text{No. Trks} \geq \text{Med. (ERL)}}{\text{Total Trks Req Balance}} \times 100\%$$

$$\% \geq \text{Med. SP/SRL} = \frac{\text{No. Trks} \geq \text{Med. (SP/SRL)}}{\text{Total Trks Req Balance}} \times 100\%$$

As more measurements are made in subsequent quarters, results are entered as discussed above. This procedure will reflect the efforts made in attempting to balance an office through gradual improvement in the level of the division, area, and company balance index.

2.04 Provision has been made in the summary procedures to designate the number of trunks which are below minimum requirements that are involved in problems that have been referred to engineering and are an engineering responsibility. Specific guidelines for designating trunks in this category are provided in Section 301-123-500. The purpose of this provision is to obtain current information concerning the degree to which the results of the balance component of the TTMI is being influenced by the Engineering Department.

3. BALANCE CERTIFICATION REQUIREMENTS

3.01 Balance certification requirements are given in Section 852-400-010 for operator service entities and Section 853-500-110 for toll switching entities. Balance certification is the responsibility of the transmission engineer, or similar titled person responsible for message trunk, or operator service trunk engineering and/or network performance in loss, noise and echo.

3.02 When an entity is certified as balanced, there is little reason for its status to change, provided that individual circuit requirements continue to be met on additions and rearrangements. Thus, the above requirements are also maintenance requirements and form the basis of the index tables of Section 301-123-300.

3.03 When a new entity requiring balance is cutover for service, it shall be considered as not certified for balance until the requirements in paragraph 3.01 are met. This rule shall be applied to all new entities including those that replace an entity that was previously certified as balanced. After cutover, the new entity, if balance work has started but it has not yet been certified as balanced, may enter into the index plan the balance measurements it has made if the office meets the minimum requirements for entering measurements as discussed in paragraph 2.02.

4. SAMPLING SURVEYS

4.01 Sampling surveys are used to determine whether balance of an entity is maintained in a satisfactory status. Survey methods are described in Section 301-133-100.

4.02 The survey procedures involve ERL and SRL measurements on samples of trunks chosen from a stratified random sample. The results of the measurements indicate the probability that an office has remained balanced or that it requires corrective action.

4.03 The surveys take advantage of the fact that a toll office has met balance objectives in the past. Thus, surveys are only reliable if balance tests are made as part of the installation and rearrangement process and that results are added or updated to the E600X forms. With this prior information, it is possible to predict that an office is balanced (or unbalanced) with measurements on as few as 20 trunks, with a probability of 0.80 of being right.

4.04 The transmission engineer must examine the records of the trunks selected for the survey. The records must be complete and accurate. Trunks without records, or are incomplete and inaccurate, are considered below minimum for purposes of this survey.

4.05 When the probability of balance is not clear an additional 20 trunks are measured. At this point, if there is still no clear statistical indication, steps must be taken as described in 6.03 and Section 301-133-100.

5. ACCURACY OF THE COMPONENT

5.01 Area results are usually based on a fairly large volume of measurements and have a good degree of reliability. Division results, where computed, should be used with caution. Indexes at the district or office level should not be used, and instead, attention should be given to the basic data.

5.02 When office results are based on a complete set of verification tests, they are as good as the accuracy of the testing methods and equipment used. When an office is not balanced, there is again no question of the accuracy of results, as far as the index is concerned. When the results

for an office are based on sampling data, however, confidence limits for the results may be substantial.

5.03 When results are combined for several offices, the accuracy of the combined results depends on the weighting of sampling data with complete test information. Maximum accuracy occurs when all data is based on verification tests. Minimum accuracy occurs when all results are based on sampling tests. Under minimum accuracy conditions, results at the area level have good reliability, but results at lower organizational levels must be used with caution.

6. APPLICATION

6.01 The balance component of the TTMI is designed to be applied on an area basis. At this level, it provides a good indication of the general performance in keeping toll switching offices balanced.

6.02 The trend of the balance component index may be more important than individual entity results. Downward trends and results below the fully satisfactory range which are not improving, need further analysis. When the index appears to need further attention, entity results should be reviewed. It may be possible to identify weak spots in specific areas.

6.03 When a message toll switching entity is surveyed, and the results indicate poor or questionable balance, the transmission engineer will complete an Expanded Balance Survey Procedure as described in Section 853-500-110 within 90 days. If the Expanded Balance Survey is not completed in 90 days, or results indicate poor or questionable balance, the entity will be decertified immediately and with the loss of index points attributed to that entity. If results indicate the office is balanced, the results of the Expanded Survey will be used for index purposes. See Figure 1 for the flowchart of action that will be taken.

6.04 When an operator service entity is surveyed, and the results indicate poor or questionable balance, the transmission engineer shall take action as specified in Section 852-400-010.

6.05 If the entity described above is determined to be unbalanced and is decertified it must meet minimum requirements for entering measurements into the plan, as discussed in paragraph 2.02 before

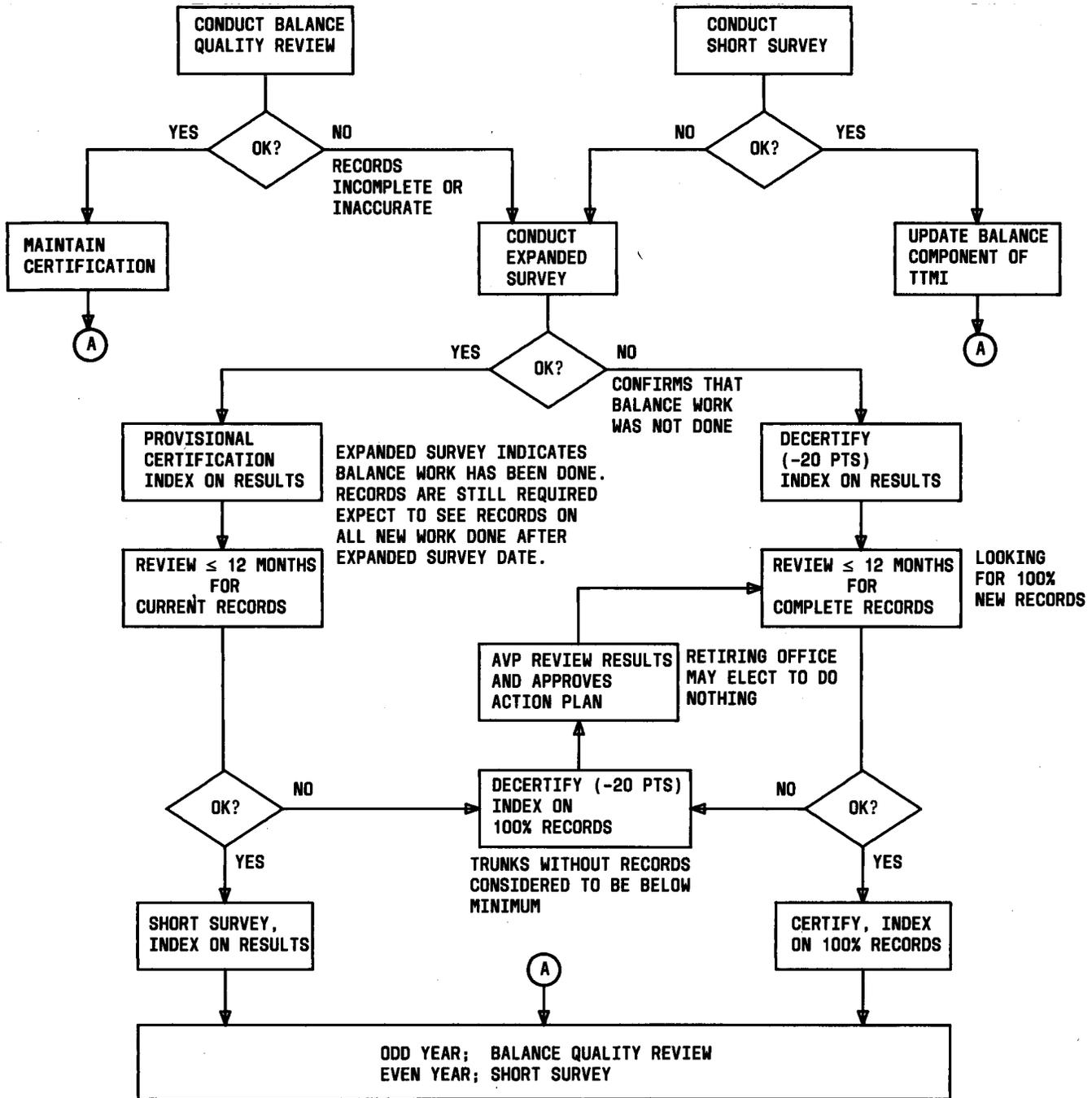


Fig. 1—Flowchart For Balance Survey and Review

credit can be taken for any rebalancing effort. After one year of being decertified all trunks shall be considered to be below minimum requirements for index purposes. Entities that have been decertified, must meet the requirements in Sections 852-400-010 and 852-500-110 to be recertified.

6.05 From the above discussion, it can be seen that the plan provides for identification of

weak spots. Since the results are based on running totals for an area, results can be improved by doing balance work in offices that meet minimum requirements for entering measurements and by taking action to eliminate weak spots in other entities. Provision is made in the plan to resurvey entities after corrective programs are completed and to insert the updated information in the summary.