TRUNK TRANSMISSION MAINTENANCE INDEX
BALANCE COMPONENT
MANUAL SUMMARY PROCEDURES

1. GENERAL

1.01 This section describes the procedures for summarizing results to obtain the balance component of the trunk transmission maintenence index (TTMI). The sources of data are sampling surveys completed as described in Section 301-133-500. ▶This section is reissued to clarify procedures to be followed once the results of index survey are available. Marginal arrows are used to denote changes.◀

1.02 Surveys are scheduled in accordance with the instructions of Part 2. Summary requirements are detailed in Part 3. Summary procedures are described in Parts 4 and 5.

1.03 Companies using the TTMI mechanized Summary Procedure will not be required to manually summarize balance data above the area level. Instead, this will be accomplished by a computer. The mechanized process is covered in Sections 301-124-100, 301-124-110, and 660-403-011.

2. SURVEY SCHEDULE

2.01 When offices have been balanced and meet all requirements, each one should be scheduled for survey within two years after the time it was certified as balanced. This certification that an office is balanced is the responsibility of the transmission engineer.

2.02 If an office has never met balance requirements and is not certified as balanced, it will not be scheduled for survey.

2.03 ▶If an office has been surveyed and the sample shows that both echo return loss (ERL) and singing point or singing return loss (SP/SRL) performance are satisfactory, it will be scheduled for survey again in two years or less from the latest survey date. If the sample indicates that either ERL or SP/SRL performance or both are poor or questionable, the Transmission Engineer must make a determination as to whether or not the office is still balanced. This requires that the office balance records be reviewed as discussed in Section 301-133-100, Part 4. If as a result of this review the office is determined to be balanced, results of the record verification are entered into the index plan replacing the survey results and the office is scheduled for another survey in two years or less from the last survey. If the office is found to be deficient and does not meet initial balance certification requirements, a one-year period from the date of the survey is allowed for taking corrective action before the office must be decertified. Again during this interval, record verification results should be used to compute the index until the one-year period has elapsed. If corrective action is completed within this interval, index results may be adjusted to reflect this effort and the office can be scheduled for another survey two years or less from the date of the last survey. However, if the corrective action has not been completed by the cutoff date, the office shall be considered decertified and must meet minimum requirements for entering measurements into the plan (as discussed in Section 301-123-100) before credit can be taken for any rebalancing effort. If it does not meet these minimum requirements, then all trunks shall be considered to be below minimum requirements for both ERL and SP/SRL for index purposes.◀

2.04 An office should also be scheduled for survey within one year, if, during that year, it is substantially rearranged or is expanded by recentering trunks from some other office.

2.05 A survey schedule should be prepared jointly by plant and the transmission engineer and published to the organizations and offices concerned. It can be based on the dates maintained in Column C of the summary Form E-5688 as shown in Fig. 1.

3. SUMMARY REQUIREMENTS

3.01 The summary Form E-5688 should be maintained on a continuing basis. The results should be computed quarterly in accordance with Part 4.

3.02 ▶New data may be entered into the summary when a sampling survey has been completed, when additional trunks in offices not certified as balanced (but meeting the requirements for entering measurements as discussed in Section 301-123-100) have been measured, or when record verification results are obtained as a result of an investigation following a poor or questionable survey.◀ The summary form shall also be updated at the time any new toll office is completed, whether it is balanced at the time of cutover or not, or at the time any toll office is downgraded to local status and all trunks requiring balance have been recentered on some other office.

3.03 For reporting purposes, the summary is computed at the end of each quarter.

4. SUMMARY PROCEDURES

4.01 Summaries should be prepared using Form E-5688, Balance Maintenance Component Computation, as shown in Fig. 1. The form may be prepared on a division basis if division organizations exist. Otherwise it is prepared on an area and company basis. Figure 1 illustrates how office results are combined for a division or area. Figure 2 shows how to combine summaries to obtain a company report.

4.02 ***Column A—Source.*** Enter the identification of every office requiring balance, if preparing a division summary. For area and company summaries, enter the identification of the office, division, or area, as appropriate. When a divided responsibility exists, such as a testboard under one first line supervisor and the switching machine under another first line supervisor, separate surveys may be scheduled, each covering the trunks within each area of responsibility.

4.03 ***Column B—Balance Certification.*** This column is to be used when Column A contains individual office entities. Enter the date the office was certified as balanced. If it is not certified as balanced, omit this entry.

4.04 ***Column C—Office Survey.*** This column is to be used when Column A contains individual office entities. Enter the date when the office was last surveyed. If the office is not certified as balanced, omit this entry.

4.05 ***Column D—Number of Offices Requiring Balance.*** This column is to be used when Column A contains divisions or areas. Enter the number of offices in the division or area requiring balance.

4.06 ***Column E—Number of Offices Certified as Balanced.*** This column is to be used when Column A contains divisions or areas. Enter the number of offices in the division or area that have been certified as balanced.

4.07 ***Column F—Total Trunks Requiring Balance.*** If the office has been surveyed, enter the total trunks requiring balance as obtained for the survey on Form E-5530, Office Balance Sample Selection Data, per Section 301-133-500. If the office has never been surveyed, the total trunks requiring balance must be obtained from the office records or from centralized trunk records.

4.08 ***Columns D, E, F***—Add the items in each column and enter the total for each column on line 16.

4.09 ***Column G—Total Trunks Below Minimum Requirement (ERL and SP/SRL)—Engineering Assistance Requested—Pending Through This Quarter***—This column is provided to serve as measure of the extent that engineering is responsible for the failure of trunks to meet minimum balance requirements. Information should be entered in this column quarterly to reflect the current status of this problem in each office. The necessary information is obtained from Form E-5688A, line 5. Instructions for filling out this form are provided in Part 5.

4.10 ***Columns H, J, K, L—Actual Percentages.*** When Column A contains offices, enter in Columns H, J, K, and L results obtained from Form E-5588, Office Balance Survey Data, if the office has been surveyed in accordance with Section 301-133-500. Except for a new office, or an office that is less than two years old, initial office balance data pending completion of the first survey is not acceptable for computing the balance component. Those offices that have been certified as balanced

but have not been surveyed within two years must report 100 percent of their trunks below minimum and 0 percent greater than or equal to median for both ERL and SP/SRL.

The actual measurements summarized on Form E-5588 must be converted into percentages, rounded to the nearest tenth. Make the entries as follows:

COLUMN H—Enter the percent of total ERL measurements meeting median requirements. If an office has not been certified as balanced, but has met the necessary requirements for entering balance measurements as outlined in Section 301-123-100, Paragraph 2.02, enter the measured percent greater than or equal to median requirements, eg:

$$\frac{\text{No. of Trks} \geq \text{Median (ERL)}}{\text{Total Trks Requiring Balance}} \times 100$$

If an office is not balanced and has not met the requirements of Section 301-123-100, Paragraph 2.02, enter 0 percent.

COLUMN J—Enter the percent of total ERL measurements which are less than the minimum requirement. If an office has not been certified as balanced, but has met the necessary requirements for entering balance measurements as outlined in Section 301-123-100, Paragraph 2.02, enter the percent less than minimum requirements, eg:

$$\frac{\text{No. of Trks} < \text{Min (ERL)} + \text{Unmeasured Trks}}{\text{Total Trks Requiring Balance}} \times 100$$

If an office is not balanced and has not met the requirements of Section 301-123-100, Paragraph 2.02, enter 100 percent.

COLUMN K—Enter the percent of total SP/SRL measurements meeting median requirements. If an office has not been certified as balanced but has met the necessary requirements for entering balance measurements as outlined in Section 301-123-100, Paragraph 2.02, enter the measured percent greater than or equal to median requirements, eg:

$$\frac{\text{No. of Trks} \geq \text{Median (SP/SRL)}}{\text{Total Trks Requiring Balance}} \times 100$$

If an office is not balanced and has not met the requirements of Section 301-123-100, Paragraph 2.02, enter 0 percent.

COLUMN L—Enter the percent of total SP/SRL measurements which are less than the minimum requirement. If an office has not been certified as balanced, but has met the necessary requirements for entering balance measurements as outlined in Section 301-123-100, Paragraph 2.02, enter the percent less than minimum requirements, eg:

$$\frac{\text{No. of Trks} < \text{Min (SP/SRL)} + \text{Unmeasured Trks}}{\text{Total Trks Requiring Balance}} \times 100$$

If an office is not balanced and has not met the requirements of Section 301-123-100, Paragraph 2.02, enter 100 percent.

When Column A contains divisions or areas, enter in Columns H, J, K, and L results obtained from Form E-5688, Balance Maintenance Component Computation, as follows:

COLUMN H—Enter the percent of total ERL measurements meeting median requirements from Column 16M.

COLUMN J—Enter the percent of total ERL measurements which are less than the minimum requirement from Column 16N.

COLUMN K—Enter the percent of total SP/SRL measurements meeting median requirements from Column 16P.

COLUMN L—Enter the percent of total SP/SRL measurements which are less than the minimum requirement from Column 16Q.

4.11 ***Columns M, N, P, Q—Weighted Percentages.*** Perform the following computations on lines 1 through 15 (rounded to the nearest tenth):

COLUMN M—Multiply the number in Column H by the number in Column F and divide by the number in 16F.

COLUMN N—Multiply the number in Column J by the number in Column F and divide by the number in 16F.

COLUMN P—Multiply the number in Column K by the number in Column F and divide by the number in 16F.

COLUMN Q—Multiply the number in Column L by the number in Column F and divide by the number in 16F.

COLUMNS M, N, P, Q—Add the items in each column and enter the total for each column on line 16.

4.12 Compute the percent trunks balanced subcomponent points of the balance maintenance index as follows:

COLUMN M—Enter Section 301-123-300, Table I, Percent Step Column, with the item on line 16, Column M. On the same line of Table I, obtain the Component Points and enter this item on line 17, Column M.

COLUMN N—Enter Section 301-123-300, Table II, Percent Step Column, with the item on line 16, Column M. On the same line of Table II, obtain the Component Points and enter this item on line 17, Column N.

COLUMN P—Enter Section 301-123-300, Table I, Percent Step Column, with the item on line 16, Column P. On the same line of Table I, obtain the Component Points and enter this item on line 17, Column P.

COLUMN Q—Enter Section 301-123-300, Table II, Percent Step Column, with the item on line 16, Column Q. On the same line of Table II, obtain the Component Points and enter this item on line 17, Column Q.

COLUMN Q—Add the items on line 17 in Columns M, N, P, and Q and put the sum on line 18, Column Q. This is the subcomponent

index for percent trunks balanced.

4.13 ***Column 19Q***—Compute the percent offices balanced subcomponent of the balance maintenance index as follows:

(a) When Column A contains offices, multiply 20 times the number of dates in Column B and divide by the number of offices in Column A. Round to the nearest tenth.

(b) When Column A contains divisions or areas, multiply 20 times the number in 16E and divide this result by the number in 16D. Round to the nearest tenth.

4.14 ***Column 20Q***—BALANCE COMPONENT INDEX—Add Columns 18Q and 19Q to obtain the Balance Component Index.

5. FORM E-5688A

5.01 The engineering status form, Form E-5688A, Fig. 3, should be maintained on a quarterly basis by the area plant staff organization. Guidelines for entering data on this form are provided in the following paragraphs.

5.02 The following guidelines shall be adhered to when entering data on Form E-5688A:

(1) In an uncertified office not meeting the minimum requirements for entering measurements in the plan as defined in Section 301-123-100, all trunks in the office shall be shown as referred to engineering until the conditions that have required the assignment of an office "B" factor have been corrected and engineering requests that plant make measurements for the purpose of determining the office NBO value.

(2) In an office that has met the minimum requirements for entering measurements, only those trunks that are found to be below minimum after measurement and require engineering assistance will be shown as referred to engineering.

(3) In an office that has been certified as balanced, only those trunks that are below minimum and require engineering assistance will be shown as referred to engineering.

(4) A trunk shall be considered corrected and entered as such on Form E-5688A when engineering issues a new circuit order providing the necessary facilities, equipment, etc, that will enable balance measurements to exceed minimum requirements.

(5) A trunk referred to engineering shall be considered not to be an engineering responsibility if the transmission engineer determines that no new facilities, equipment, or rearrangements are necessary for the trunk to exceed minimum balance requirements when measured, and informs the area plant staff organization of his findings.

5.03 Form E-5688A should be updated quarterly for each office having trunks requiring balance by the area plant staff organization, so that the data may be entered on Form E-5688. The following instructions describe the procedure to be followed when filling out the form:

Line 1, Column C—Enter the total trunks requiring balance below minimum requirements that have been referred to engineering and are still pending as of the current quarter. This information is obtained from line 5 of the previous quarter's Form E-5688A.

Line 2, Column C—Enter the total trunks requiring balance that are below minimum requirements and have been referred to engineering this quarter. Obtain this information from local records.

Line 3, Column C—Total trunks requiring balance below minimum referred to engineering at the end of the quarter. Line 1C plus line 2C.

Line 4, Column C—Enter the total trunks requiring balance that were below minimum requirements and have been corrected by engineering during the quarter plus the total trunks that have been determined not to be an engineering responsibility during the quarter. Guidelines to be used in this determination are discussed in 5.02.

Line 5, Column C—Total trunks requiring balance below minimum requiring engineering assistance at the end of the quarter. Line 3C minus line 4C.

5.04 An example of Form E-5688A is shown in Fig. 3.

6. ANALYSIS OF RESULTS

6.01 The results are strongly influenced by offices which are not balanced, even though they may qualify for entering measurements in the plan as discussed in Section 301-123-100. In the case of offices not meeting the requirements for entering the measurements, all trunks are assumed to fail to meet minimum requirements. In the case of office meeting the requirements for entering measurements, all trunks that have not been measured are assumed to fail to meet minimum requirements. Improvement in results can only be accomplished by insuring that all noncertified offices meet the requirements for entering measurements, measuring all trunks in those offices, and concentrating efforts on meeting requirements for balance certification in those offices. In the ultimate, as work progresses the results will become more sensitive to the percentage of offices that have been certified as balanced.

6.02 The results can also be affected when events affect an office to the extent that corrective action is required. In these cases, the effect on the component index is to lower it but not nearly as sharply as if the office were never balanced. When these situations exist, surveys or complete verification tests are scheduled again after corrective action has been taken to verify that the corrective action was effective.

6.03 Component indexes should not be developed for individual offices. Each survey is based on measurements of either 20 or 40 trunks. The probability that an office is balanced can be determined accurately enough for practical purposes, but the statistical accuracy of a single survey will not be good enough for index purposes. When investigating individual offices, analysis should include the basis data and other available information such as results of circuit or trunk order tests, additions of trunk circuits and terminating sets, regrading for traffic purposes, etc.

7. REPORTS REQUIREMENTS

7.01 Balance results are reported along with other transmission maintenance data on a standard format form to be used by all companies using the manual TTMI summary procedures. This form is designed to aid AT&TCo in combining results from manual and mechanized reporting companies. The report form is presented and explained in Section 301-120-500. It is required to be delivered to:

Plant Operations Manager—
Forecasting Analysis—Mechanization
American Telephone and Telegraph Company
Room 722B
195 Broadway
New York, New York 10007

not later than the 25th of the month following the end of each quarter.

7.02 When there has been no activity to change balance results, the previous quarter's results are reissued.

7.03 Companies using the TTMI mechanized summary procedures are required to submit balance data input 09 as explained in Section 660-403-011. Form E-5688 is required as the source of information for filling out this input.

8. ORDERING INFORMATION FOR FORMS

8.01 Forms E-5688 and E-5688A can be obtained from Western Electric Company in pads of 50, two pads per package. They may be requisitioned in multiples of 100 forms on orders worded as follows:

(Quantity) Form E-5688 (9-71)

(Quantity) Form E-5688A (9-71)

BALANCE MAINTENANCE COMPONENT COMPUTATION

FORM E-5688 (3-73)
BSP 301-123-500

Source	Use Columns B and C When Column A Contains Individual Offices: Date: Balance Certification	Use Columns B and C When Column A Contains Individual Offices: Date: Office Survey	Use Columns D and E When Column A Contains Divisions or Areas: No. of Offices Requiring Balance	Use Columns D and E When Column A Contains Divisions or Areas: No. of Offices Certified as Balance	Total Trunks Requiring Balance	No. of Trunks Referred To Engr. E-5688A Line 5C	ACTUAL PERCENTAGES: ERL MEAS: ≥ Med.	ACTUAL PERCENTAGES: ERL MEAS: < Min.	ACTUAL PERCENTAGES: SP MEAS.: ≥ Med.	ACTUAL PERCENTAGES: SP MEAS.: < Min.	WEIGHTED PERCENTAGES: ERL MEAS.: ≥ Med. (H x F 16F)	WEIGHTED PERCENTAGES: ERL MEAS.: < Min. (J x F 16F)	WEIGHTED PERCENTAGES: SP MEAS.: ≥ Med. (K x F 16F)	WEIGHTED PERCENTAGES: SP MEAS.: < Min. (L x F 16F)
A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q
1. OFC A	10-1-65	8-26-71	—	—	3428	156	55.2	4.0	58.6	2.0	16.2	1.2	17.3	0.6
2. OFC B	11-3-63	11-1-70	—	—	1213	35	47.6	4.0	43.4	4.0	5.0	0.4	4.5	0.4
3. OFC C	3-17-69	3-2-71	—	—	2768	127	61.3	2.0	64.6	2.0	14.6	0.5	15.4	0.5
4. OFC D	4-15-68	4-6-72	—	—	516	0	70.6	0.0	69.1	0.0	3.1	0.0	3.1	0.0
5. OFC E	3-26-70	2-28-72	—	—	482	0	65.4	2.0	68.9	0.0	2.7	0.1	2.9	0.0
6. OFC F	—	—	—	—	2376	0	10.3	84.6	12.7	81.3	2.1	17.2	2.6	16.6
7. OFC G	7-21-72	—	—	—	861	27	61.3	1.8	64.7	1.4	4.5	1.3	4.8	1.0
8.														
9.														
10.														
11.														
12.														
13.														
14.														
15.														
16. TOTALS					11644	345					48.2	20.7	50.6	19.1
17. Subcomponent Points											19.3	0.0	19.4	0.0
18. Subcomponent Points – Percent Trunks Balanced (17M·17N·17P·17Q)														38.7
19. Subcomponent Points – Percent Offices Balanced (When Col. A Contains Offices: 20X No. of Dates Col. B / No. of Offices Col. A; When Col. A Contains Divisions or Areas: 20X Ln 16E / Ln 16D)														17.1
20. Balance Component Index (18Q·19Q)														56.8

COMPANY A

AREA A

DIVISION ALL

DATE 9-30-72

BY RLR

Fig. 1—Balance Maintenance Component Computation

FORM E-5688 (3-73)
BSP 301-123-500

BALANCE MAINTENANCE COMPONENT COMPUTATION

Source	Use Columns B and C When Column A Contains Individual Offices		Use Columns D and E When Column A Contains Divisions or Areas		Total Trunks Requiring Balance	No. of Trunks Referred To Engr. E-5688A Line 5C	ACTUAL PERCENTAGES				WEIGHTED PERCENTAGES			
	Date						ERL MEAS.		SP MEAS.		ERL MEAS.		SP MEAS.	
	Balance Certification	Office Survey	No. of Offices Requiring Balance	No. of Offices Certified as Balance			≥ Med.	< Min.	≥ Med.	< Min.	≥ Med. (H x F '16F)	< Min. (J x F '16F)	≥ Med. (K x F '16F)	< Min. (L x F '16F)
A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q
1. AREA A	—	—	7	6	11642	345	48.2	20.7	50.6	19.1	8.8	3.8	9.2	3.5
2. AREA B	—	—	10	10	14327	136	71.8	1.0	64.3	0.8	16.0	0.2	14.3	0.2
3. AREA C	—	—	9	9	11251	189	63.5	1.7	67.2	1.5	11.1	0.3	11.9	0.3
4. AREA D	—	—	13	12	27103	411	50.4	2.3	53.4	2.0	21.2	1.0	22.5	0.8
5.														
6.														
7.														
8.														
9.														
10.														
11.														
12.														
13.														
14.														
15.														
16. TOTALS			39	37	64323	1081					57.1	5.3	57.9	5.8

COMPANY A		17. Subcomponent Points	19.5 / 16.0 / 19.5 / 15.2
		Subcomponent Points – Percent Trunks Balanced (17M+17N+17P+17Q)	70.2
AREA ALL	DATE 9-30-72	19. Subcomponent Points – Percent Offices Balanced When Col. A Contains Offices: (20X No. of Dates Col. B / No. of Offices Col. A) When Col. A Contains Divisions or Areas: 20X Ln 16E / Ln16D	89.0
DIVISION ALL	BY RLR	20. Balance Component Index (18Q+19Q)	89.2

Fig. 2—Balance Maintenance Component Computation

Form E-5688A (3-73)
BSP 301-123-500

OFFICE BALANCE SUMMARY FORM
STATUS OF TRUNKS
REFERRED TO ENGINEERING

COMPANY A AREA A

DIVISION A DISTRICT A

OFFICE A DATE 9-30-72

	A	INSTRUCTIONS B	C
1.	Total Trunks Referred to Engineering – Pending Beginning of This Quarter	Obtain From Form E-5688A, Line 5 From the Previous Quarter	168
2.	Total Trunks Referred to Engineering – This Quarter	Obtain From Area Records	0
3.	Total Trunks Referred to Engineering – End of Quarter	Line 1C + Line 2C	168
4.	Total Trunks Corrected or Determined Not to Be Engineering Responsibility – This Quarter	Obtain From Area Records	12
5.	Total Trunks Requiring Engineering Assistance – End of Quarter	Line 3C – Line 4C	156

Fig. 3—Office Balance Summary Status of Trunks Referred to Engineering