LOAD BALANCE INDEX

PHILOSOPHY, RULES, AND DEFINITIONS

NETWORK SWITCHED SERVICES

CONTENTS PAGE

1. GENERAL

1.01 This section provides the network administrator with the philosophy, rules, and definitions that relate to load balance and the Load Balance Index (LBI) Plan. This information is general in nature and is applicable to all switching machines.

1.02 This section is being reissued to accomplish the following:

(a) Delete references to the manual preparation of LBIs. This includes deletion of Forms E-6402, E-6403, and, E-6404.

(b) Detailed procedures for developing the LBIs for the various switch types have been deleted. These procedures will be included in reissues of the switch specific sections.

(c) Delete the Raw Load Balance Index, Hot Spot Threshold, and Index Correction. These tables will be included in the appropriate switch specific sections.

(d) The procedure for reporting of the LBI to the American Telephone and Telegraph Company (AT&T) has been canceled.

(e) Section 780-200-104 has been canceled. The information previously contained in that section is included here. This includes the definitions of common terms and references to the Load Balance System (LBS), both of which are expanded.

1.03 In addition to these specific changes, this section has been completely reorganized and is considered a general revision. As a result, revision arrows are not used.

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

1.05 Terms and phrases pertinent to load balancing and the LBI are defined in Part 6 of this section.

2. LOAD BALANCE PRINCIPLES

2.01 Perfect load balance would exist if customer usage were distributed so that each load unit would carry its exact proportional share of the total load. Since a customer's usage may vary from day to day and week to week, perfect balance is impossible to obtain. These chance variations in usage can impact the reliability of load studies and their relation to the state of balance. If the variations in measured loads do not exceed reasonable estimates, it can be assumed that a good load balance exists.

2.02 Monitoring of the load units within a loading division is necessary if good load balance is to be obtained and maintained. It is possible for a load unit to be significantly above the average load one week and below the average the next week although no assignment changes or corrective action has taken place. The trend of a load unit within a loading division is more important than its relative position for a given study.

2.03 Poor balance, even in underloaded offices, can have a detrimental effect on customer service. The first step in maintaining good balance in any office is class-of-service spread. A class-of-service mix will not prevent load fluctuations, but it will spread them across all load units. Balance of usage is another criteria to be used for developing good balance. This can be best accomplished by directing line assignments within a unit. ***The use of line equipment transfers (LETs) as a method of improving balance should only be used as a last resort.*** The LETs are expensive and usually have limited effectiveness.

3. LOAD BALANCE INDEX

PHILOSOPHY

3.01 The LBI Plan provides a method of developing trends and courses of corrective action for the loading of end office line equipment. The LBI provides for variances in office loading by introducing quality control limits (QCLs) into the equation for developing the index. The QCLs allow for greater fluctuations between line groups in offices that are lightly loaded. The QCLs also allow for differences in holding times between offices (ie, offices with unusually short or long holding times have no advantage nor are they penalized). Detailed information regarding QCLs is contained later in this part. The LBI Plan uses a comparative index that is capable of evaluating the effectiveness of the administration of load balancing in both electromechanical and electronic switching machines.

3.02 The LBI Plan places emphasis on alleviating conditions in heavily overloaded groups where service is likely to be adversely affected rather than lightly or moderately overloaded groups where service is not likely to be affected.

SCOPE

3.03 Traffic units covered by this plan include those units equipped with electromechanical or electronic line equipment as follows:

- Step-by-Step (line finder groups only)
- No. 1 and No. 5 Crossbar (horizontal groups only)
- No. 1 and No. 1A ESS* switches (both single and mixed concentrator offices)
- No. 2 and No. 2B ESS switches (B-link groups—full and fractional line and trunk networks [LTNs]).

These offices may use either manual or mechanized assignment procedures, with or without service-observing facilities. ***There must be more than three load units in service.*** All offices will be indexed unless specifically exempted by the rules as shown in the following paragraphs.

3.04 A loading division is indexed by this plan when the average usage of its measured load units equals or exceeds 30 percent of their engineered capacity. Traffic units are indexed by the plan when one or more loading divisions within the unit satisfies the 30 percent rule.

3.05 In order to be indexed by the LBI Plan, traffic units must also meet the following requirements:

- Serve any or all classes of service (centrex customers included).
- Be equipped with a permanently-installed device that provides automatic collection of usage measurements.

* Trademark.

REPORTING

3.06 Results for traffic units that are indexed should be reported to the Network Switching Performance Measurement Plan (NSPMP). The procedures for reporting of the LBI to the NSPMP are contained in the following sections:

SECTION	TITLE
216-020-005	Network Switching Performance Measurement Plan — No. 1 Crossbar
218-020-005	Network Switching Performance Measurement Plan — No. 5 Crossbar
226-020-005	Network Switching Performance Measurement Plan — Step-by-Step
231-001-005	Network Switching Performance Measurement Plan — Network Switched Services
232-001-005	Network Switching Performance Measurement Plan — No. 2/2B ESS Switch

LOAD UNIT ADDITIONS, REMOVALS, OR REARRANGEMENTS

3.07 When load units are added to a loading division, the new units may be added to the existing loading division; or, the addition may be indexed as a separate loading division for a period of up to 6 months. It is recommended that the addition be incorporated into the existing loading division as soon as possible. However, if the loading division is added too soon (ie, the percentage of capacity is still low), there may be negative effect on the index.

3.08 If part of an existing loading division is planned for removal or rearrangement, that portion of the loading division may be indexed as a separate loading division. Indexing as a separate loading division can begin when the new assignment policy is begun for the involved load units.

REMOVAL OF TRAFFIC UNITS

3.09 An entire traffic unit may be removed from service in a dial-to-dial replacement. Planning may include an embargo on all new connect service orders for the unit being replaced, if there are other traffic units in the wire center. Load balance studies and LBI calculations should be continued until the traffic unit fails to meet the 30 percent rule previously stated in paragraph 3.04.

DATA REQUIREMENTS

3.10 The data requirements for LBI studies begin with identification of the busy hour. Busy hour studies are taken periodically to determine busy hours for engineering and administrative purposes. The number of hours required for load balance studies is 10 hours per week. To obtain the required 10 hours, the side hours adjoining the busy hour must be reviewed. These hours will normally be close to the busy hour in usage and will have the same traffic characteristics. To be included for study purposes, the side hour(s) must be at least 90 percent of the busy hour load during the busy season. Out of the busy season, the side hour(s) must have at least 80 percent of the busy hour load.

3.11 The 10 hours of data required for study purposes may be obtained by using the busy hour plus the half hours immediately preceding and following the busy hour. Alternatively, the entire preceding hour ***or*** following hour may be used. For any given study, a ***minimum of 7 hours*** of data is required.

3.12 Out of each week, 5 days will be scheduled for each study (ie, 2 hours per day). In most cases, this will be Monday through Friday. Where Saturday and/or Sunday usage is greater than any other day(s), then the weekend day(s) may be substituted. In any case, the study days must be consistent from week to week and the usage characteristics must be the same.

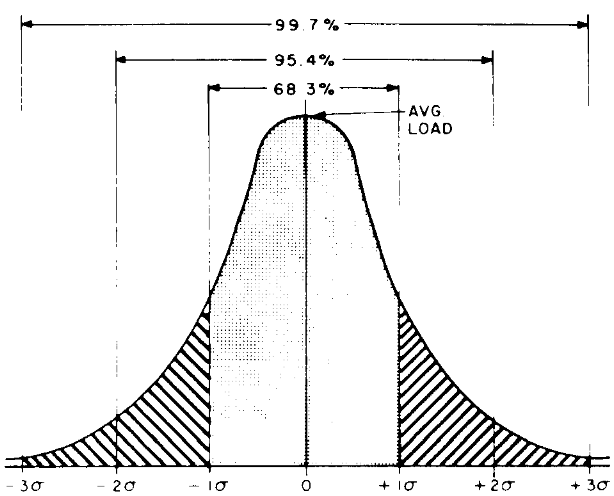
3.13 Only one load balance study per month is required for indexing purposes. Additional studies may be scheduled by the administrator during any other week(s) of the month. The week recommended for LBI purposes is normally the first or second week of the month. A week is defined as being in the month in which its Sunday start date appears. For example, if a service month ends on the twenty-second of a month, a week beginning on the twentieth would be in that month; whereas, a week beginning on the twenty-third would be in the next service month.

3.14 Normally, the last valid study week will be used for which a study was requested for index purposes. If the study week for a given month is not available, the administrator should substitute another week. If it is necessary to substitute a week, it must be at least 2 weeks from the last study made for index purposes. This 2-week rule should not be broken except in extreme cases when data are unavailable. Further information regarding data requirements for the LBI is provided in Part 4 of this section.

CALCULATIONS

3.15 The LBI calculations begin by establishing a QCL. The QCL provides a statistical method of eliminating the possibility of chance fluctuations in customer-calling having an effect on the LBI. The QCL is developed as described in the following paragraphs.

3.16 Load unit variations due to chance follow a normal distribution pattern. The normal distribution is described by establishing an average value and the measure of dispersion of load units about that value. The distribution pattern takes a symmetrical bell shape about the previously-established average (mean) value. The measure of dispersion, adjusted for the number of hours of data, is commonly called the standard deviation (SD). Trends are not a factor since each load unit is related to the average of all load units. An area representing ± one SD (± one sigma ([σ]) from the average in a normal distribution may be expected to include 68.3 percent of all the measurements. Plus/minus two SDs or ± two sigma will include 95.4 percent of all measurements and ± three sigma will include 99.7 percent of all measurements. This is illustrated in the following distribution curve:



3.17 The problem of isolating and evaluating chance variations may be resolved by using the QCL method. The size of a deviation from the mean may be used to judge whether that deviation may be due to chance or is most probably due to imbalance. As a basis for this judgment, standard QCLs representing three SDs have been developed. (This approach is arbitrary and is used by many industries to indicate items not meeting manufacturing tolerances.) To see what this means, consider 1000 groups for which the measured loads are averaged together. Mathematical analysis indicates that only three (the 0.3 percent outside the 99.7 percent) of these measurements can be expected to differ by chance from the mean by more than three SDs, ie, the QCL. In effect, it is assumed that ***all*** deviations from the mean greater than the QCLs are due to imbalance. Choosing larger QCLs would increase this assurance; however, there will be a greater chance that some deviations that truly reflect imbalance would be ignored. These three SD (3 sigma) limits are utilized to compute the QCL tables.

3.18 There are two steps required in determining the appropriate QCL. The first step is to calculate the ***percentage of capacity*** for the study period. This is done by taking the actual average load and comparing it to the engineered load. This computation is made by dividing the total actual average usage (in hundred call seconds [CCS] [AL]) per load unit by the engineered load capacity (in CCS [TL]) per load unit and multiplying the result by 100. The calculation is shown in the following example:

Example:

Actual Average Usage (AL) = 84 CCS
Engineered Load (Capacity) (TL) = 116 CCS

$$\text{Percentage of Capacity} = \frac{AL}{TL} \times 100$$

$$= \frac{84}{116} \times 100 = 72.4\%$$

The 72.4 percent rounded to the nearest whole number (integer) would be 72 percent.

This percentage can then be used to determine the ***proper table for the selection of the QCL for the loading division*** for the type of equipment involved. These tables cover the percentage of loading range from 30 percent to over 96 percent. The QCL value derived from this computation makes allowance for the fact that load unit loads in a lightly-loaded traffic unit can fluctuate more than those in a comparable heavily-loaded unit.

3.19 The table representing 66 to 75 percent would be selected. These tables are contained in each switch specific section. These sections are identified in Part 5.

3.20 The second step in the use of the QCL tables provides for selection of the QCL based on average holding time (AHT) of the calls creating usage on the line equipment. Documentation of the AHT is required for each busy season. Detailed procedures to be followed for these calculations are provided in the section pertaining to the particular type of equipment involved.

3.21 After determining the QCL as described in the preceding paragraphs, it is possible to establish CCS values for the ±3 sigma points. It is also necessary to indicate load units which are approaching these limits. This is done by designating an intermediate point at ±1.5 sigma.

> ***Example:*** Assume average usage per load unit in a loading division is 200 CCS and the QCL is 44 percent:

200 CCS x .44 = 88 CCS

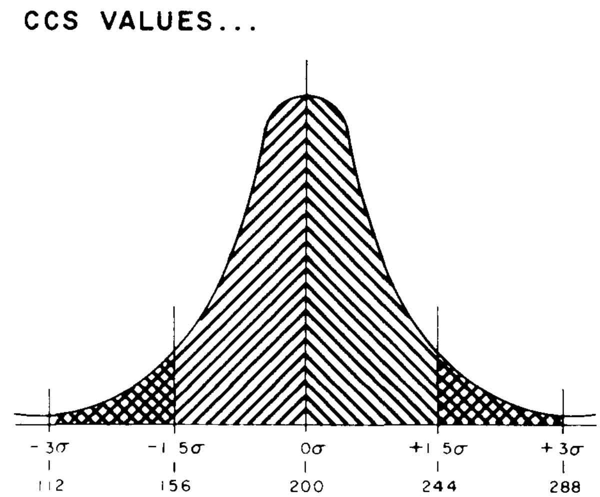
+3.0 SD = 200 CCS + 88 CCS = 288 CCS

-3.0 SD = 200 CCS - 88 CCS = 112 CCS

+1.5 SD = 200 CCS + 44 CCS = 244 CCS

-1.5 SD = 200 CCS - 44 CCS = 156 CCS

This is illustrated in the following distribution curve:



3.22 The use of CCS values at the specified 3.0 and 1.5 sigma limits works well for 1 week's data. Unfortunately, when a history is maintained to increase statistical reliability, the mathematics become too awkward to utilize on a manual basis. This burden is lightened by the use of an alternate method called the score system.

DEVELOPMENT OF SCORES

3.23 The score system was developed to simplify the mathematics required in load balance procedures. Numerical values are assigned to represent the extent to which each load unit has deviated from the average during a measurement period. In application, all load units exceeding the QCL on a weekly record are assumed to be out of balance. The remaining load units may deviate to a lesser degree above and below the average.

3.24 The procedure for deriving scores is to take the QCL percentage as determined from the preceding paragraphs and apply it as follows:

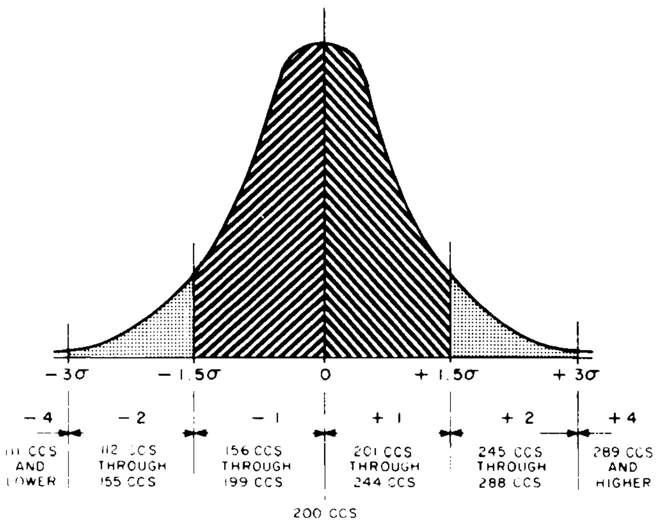
(a) Each load unit with ***exactly average*** CCS is assigned a score of 0 (zero).

(b) Each load unit deviating above or below average, up to and including 1.5 SDs (one-half the QCL), is assigned a score of +1 or -1.

(c) Each load unit deviating above or below 1.5 SDs from the average and up to and including 3.0 SDs is assigned a score of +2 or -2.

(d) Each load unit deviating greater than ±3.0 SDs from the average is assigned a score of +4 or -4. Note that 4 is used rather than 3 in order to accentuate this undesirable deviation. See the following distribution curve:

SCORE METHOD...



Example: Assume average usage per load unit in a loading division is 200 CCS and the QCL is 44 percent. A total of 3.0 SDs is 44 percent and 1.5 SDs is 22 percent. Scores are computed as follows:

LOAD UNIT CCS	SCORE
289 and higher	+4
245 through 288	+2
201 through 244	+1
200	0
156 through 199	-1
112 through 155	-2
111 and lower	-4

Penalty Points

3.25 The LBI is developed using a 3-month rolling average. The most recent results are weighed most heavily. This is done by assigning penalty points as follows:

(a) Load units are assigned three penalty points for a +4 on the current month's study.

(b) Two penalty points are applied to a +4 score on the preceding study.

(c) One penalty point is given for a +4 score on the next preceding study.

(d) Each load unit can collect a maximum of six penalty points. The following provides an example of the use of penalty points:

	NOV.	DEC.	JAN.	TOTAL
LOAD UNIT A				
Study Score	+4	+4	+4	—
Penalty Points	1	2	3	6
LOAD UNIT B				
Study Score	+4	+1	+4	—
Penalty Points	1	0	3	4
LOAD UNIT C				
Study Score	−1	+4	+2	—
Penalty Points	0	2	0	2
LOAD UNIT D				
Study Score	+4	+1	−1	—
Penalty Points	1	0	-	1
LOAD UNIT E				
Study Score	−2	+1	+4	—
Penalty Points	-	0	3	3
LOAD UNIT F				
Study Score	+1	−1	+1	—
Penalty Points	0	0	0	0
LOAD UNIT G				
Study Score	+4	+2	+2	—
Penalty Points	1	0	0	

Penalty Point Fraction

3.26 The penalty points are totaled for a loading division and a penalty point fraction (PPF) is calculated. The PPF is determined by dividing the number of penalty points by the number of load units in the loading division as follows:

Valid Load Units = 200
Penalty Points = 60
PPF $\frac{60}{200}$ = 0.3

Weighted Percentage of Capacity

3.27 The percentage of capacity that an office is working at is used for the LBI. A factor is used to emphasize the most current data in a manner similar to penalty points. The following illustrates a weighted capacity calculation:

	NOV.	DEC.	JAN.	TOTAL
Percentage of Capacity (Loading Division)	65	66	71	—
Weight	1	2	3	6
Total	65	132	213	410
Weighted Percentage of Capactiy	—	—	—	68

Raw Load Balance Index

3.28 A raw LBI is obtained by using the PPF and the weighted capacity. These values are used to enter the appropriate table (found in the switch specific section). The raw LBI is found at the intersection of the two numbers.

Hot Spots

3.29 The raw LBI measures the state of balance of a given office. However, the raw LBI does not consider excessive overload conditions. Load units with excessive usage are provided for by the introduction of hot spots. The hot spot concept establishes a threshold that equals a high probability of blocking. A load unit with usage above the threshold is considered a hot spot. Hot spot penalty points are then assigned based on the performance of the load unit.

3.30 The load unit usage measurements for the current and the previous studies are compared to the proper threshold value. Hot spot penalty points are applied to the load unit as follows:

(a) Load units are given three hot spot penalty points for a hot spot in the current months study.

(b) Two penalty points are assigned for a hot spot on the preceding study.

(c) One penalty point is applied for a hot spot on the next preceding study.

(d) If a hot spot occurs for two consecutive studies, an additional penalty point is assigned.

(e) If hot spot penalty points exist for all three studies, two additional penalty points are applied.

(f) A load unit can collect a maximum of eight hot spot penalty points.

3.31 Hot spot penalty points are accumulated for an entire loading division and a hot spot PPF is calculated. The hot spot PPF is obtained by dividing the number of hot spot penalty points by the number of measured load units in the loading division. An example of a hot spot PPF follows:

Measured Load Units = 300
Hot Spot Penalty Points = 25
Hot Spot PPF $\frac{25}{300}$ = 0.08

3.32 A hot spot correction is obtained by consulting the appropriate table. Actual tables are contained in the appropriate switch specific sections.

3.33 The hot spot correction factor is then subtracted from the raw LBI. The result is the LBI. For example:

Raw LBI = 99
Hot Spot Correction = -3
LBI = 96

4. LOAD BALANCE SYSTEM

4.01 The LBS is designed to provide flexibility for the Bell Operating Company (BOC) user. In addition to the "user friendly" capabilities such as company options, system control features, and special data base summary reports, the LBS provides the following:

- Mechanized computation of the LBI
- Generation of balance guides to assist the network administrator in the performance of the line assignment function
- Production of selected reports for nonindexed equipment.

4.02 The user is responsible for providing specific information to the program in order for the necessary calculations and reports to be made. This specific information defines the parameters and includes:

- Number of main stations
- Average holding time (if data not available for system to compute)
- Theoretical capacity by load unit
- Average office CCS/main station or lowest CCS/main station
- Service observing end-of-month data.

4.03 Once parameters and usage information has been input to the mechanized program, the following four basic reports are available in an off-line mode:

(a) ***Traffic Unit Index-Addendum (TL-720):*** This report is prepared by loading divisions and traffic units each time an LBI study is taken and includes load units installed (measured and not measured), capacity data, and balance and hot spot penalty points. Figure 1 contains an example of this report.

(b) ***Index Study-Data Summary (TL-732):*** This report provides a working report that allows manual inspection of all load unit data being used for index calculation and is generated each time a valid loading division index study is processed. A full data summary or exception is optional. Information includes average hour CCS (for the current study week), balance and hot spot penalty points for the 3 latest valid index study weeks (current plus 2 previous service-observing month study weeks), and a series of validation codes which point to a suspected problem. See Fig. 2 for an example of an Index Study — Data Summary (exception type report).

(c) ***Balance Guide Reports (TL-744, TL-745, TL-746, TL-747):*** These are line assignment guides (LAGs) to be used for line-assigning purposes. A similar removal guide is developed to identify potential line transfers from overloaded load units. For line assignment purposes, these reports should be requested at least monthly and supplemented with other reports as required. The reports in this category are used only in a manual line-assignment environment. See Fig. 3 for an example of a Line Assignment Guide (TL-744).

(d) ***Selected Reports:*** The LBS has a series of output reports that provide information on equipment such as connectors, trunk link frames, etc. Each equipment type supported has a specific report format. The LBS uses the equipment measurement code (EMC) from the Traffic Data Acquisition System (TDAS) to determine the traffic unit type, equipment item, and report format to be generated. The output reports are provided in Table A.

Manual Line Assignment

4.04 The LBS reports described in the following paragraphs are used in a manual environment only. When the Computer System for Main Frame Operations (COSMOS) or similar vehicle is used, the system performs the function.

4.05 The LBS can generate one of the following types of LAGs; (1) TL-744 decremented LAG, or (2) TL-745 condensed LAG. The decremented TL-744 is generated in a fashion that provides a ***desired order*** of assignments into load units. This is achieved in the computer program by:

(1) Selecting a load unit which needs the largest CCS addition for the next assignment

(2) Subtracting the CCS/main station (average or light) value from the total CCS correction needed for the load unit just selected

(3) Go back to Step (1).

This cycle is repeated as many times as required until the total number of load unit selections equals the LAG print volume (1 through 9999) value on the Common Update (CU) LBS master file. The administrator must specify a reasonable value on the CU inputs for the LAG print volume. Sufficient volume should be obtained to satisfy the expected inward assignment demand for the measurement interval between the generation of TL-744 reports. For example, 2 weeks between TL-744 reports, with an expected service order volume of 300 orders per week, would require a print volume of at least 600 per output. Each assignment order on the report carries the load unit identification selected in Step (1). Other information columns on a TL-744 do not, however, always carry data. The CCS TO ADD and PROJ CCS fields are used only for the first appearance of a load unit on the list. Each subsequent appearance of a load unit after the first appearance will have blank space under the preceding fields. The % CAP field entries appear in ascending order. Percentage of capacity will always appear for the first assignment order on the TL-744; however, it will only be printed subsequently when the last printed value changes. For example, the first load unit on a TL-744 shows the expected percentage of capacity (after assignment) to be 1. The percentage of capacity for the next load unit appearance (choice number 2 on the list) would not be printed unless it was greater than 1. This method allows the assigner to keep track of the percentage of capacity as it increases without printing repeating values on the TL-744.

4.06 The spare line equipment selected may be recorded in the appropriate column of the guide as it is being entered on the assignment lists. The notation ***NA*** should be made next to any load unit when spare line equipment is not available. Remaining columns are provided for administrative purposes such as listing the class of service, noting the assignment list number, entering remarks, and/or noting the main frame location of the load unit.

4.07 Knowledge of the disconnect activity within a loading division is as important as knowledge of inward movement. The disconnect activity usually counteracts the efforts to bring load units closer to the average or it may satisfy a need for spare equipment in a load unit requiring additional CCS. The TL-744 may be used to account for disconnect activity. This involves keeping track of the line equipment disconnect and incorporating the information into the guide. For example:

(a) With the understanding that every disconnect negates an assignment, a flagging system may be devised to identify load units with consistently low usage trend (the TL-732 flags these) in the line records. As disconnects occur within these flagged load units, they should be noted on the guide and entered on an assignment list.

(b) Or, shortages of spare line equipment begin to appear when the loading division is working at a high-percentage fill. When ***NA*** is noted on the TL-744, an indication should also be made in the line equipment records in order to take advantage of any disconnect activity. The presence of an ***NA*** means that there is still a requirement for additional CCS in that load unit.

4.08 The LAG cover sheet is generated by the LBS each time a regular TL-744 is generated with more than 80 appearances. The TDAS Traffic Measurement Request (TMR) Numbers 1, 2, or 5 will cause the LBS to generate balance guide outputs including this cover sheet. This report should be used to locate individual load unit appearances in the TL-744 as required for manual line assignment activities (both inward and disconnect). It shows as many as 12 appearances of each load unit in the body of the main TL-744.

4.09 ***Condensed Line Assignment Guide (TL 745):*** The condensed LAG (TL-745) (Fig. 4) is generated when studies are input with Request Numbers 1, 2, or 5 on the TDAS-TMR and the CU master file record for the assignment division or loading division print control field contains the literal ***COND.*** Condensed LAGs will ***not*** have cover sheets.

4.10 The condensed LAG will list every load unit in a loading division or assignment division ***once.*** The guide is generated in a desired order of assignments with the load unit requiring the most corrective action listed ***first*** and the load unit requiring the least amount of corrective action listed last. Each assignment order on the guide will contain information in the PROJ CCS, ADD CCS, and NBR LINES columns. The % CAP value will appear for the first assignment order and will be printed subsequently only when the last printed value changes.

4.11 The ADD CCS column will contain a minus (-) sign next to the value when the calculated CCS for a load unit is ***above*** the average for the loading division.

4.12 The LBS divides the calculated amount of usage required to bring the load unit near the loading division average by the CCS/main station value input by the user in the data base to develop an ***estimated*** number of lines to be assigned. The minus (-) sign will appear next to the value when the estimated number of lines calculated should be ***removed*** from the load units. A single asterisk (*) will appear when the projected CCS value is greater than 1.5 SDs from the expected average load unit usage of the loading division. A double asterisk (**) will appear when the projected CCS value is greater than 3.0 SDs from the expected average. These signs (minus and asterisk) will normally appear near the bottom of a nonzone condensed LAG. These signs may or may not appear in each zone on a condensed LAG with zones. If they do appear, they should normally be near the bottom of the assignment list for the zone.

4.13 The condensed LAG should be requested to more efficiently perform manual line assignments in the following instances:

(a) The traffic unit or loading division has a modular frame or conventional main frame with zoning.

(b) The traffic unit or loading division has a high percentage of line fill (load units with no spare line equipment begin appearing on the decremented LAG, TL-744).

(c) The degree of loading division balance is so poor that a relatively small number of load units constitute all the appearances on the decremented LAG (TL-744).

4.14 ***Line Equipment Transfer Guide (TL-746):*** This is the last choice method to achieve balance. See Fig. 5 for an example. The decremented TL-746 LET output is triggered when studies are input for balance guide and LET print volumes are specified on the appropriate master file record (Assignment Division or Loading Division). The TDAS-TMR Numbers 1, 2, or 5 will direct the LBS to print LETs if the master file print option has a value in effect of 1 through 9999. Zero in the master file print option will suppress this report.

4.15 The LET guides aid the user in selecting above-average load units for line transfers to lightly-loaded units. Line transfer choices on the TL-746 normally represent load units operating with above-average loads (+ scores); however, it may, at times, give choices for transfer with below-average loads. If the requested print volume is large enough, it is possible to cause the process of load unit selection to take load units with minus (-) scores as the guide is decremented.

4.16 The LET is generated in a similar fashion as the LAG, by ***desired order*** of assignments ***from*** load units. This is achieved in the computer program by:

(1) Selecting a load unit which needs the largest CCS subtraction in order to bring it close to average load.

(2) Subtracting the CCS/main station (average or light) value from the total CCS correction needed of the unit just selected in Step (1).

(3) Go back to Step (1).

This cycle is repeated as many times as required until the number of load units selected equals the LET Print Volume value on the CU master file.

4.17 Similar to the decremented TL-744 LAG, information under certain columns on the LET may or may not be present. The order of assignment of line transfers and a corresponding load unit are shown for each line on the LET. The CCS TO (RMV) values are shown only for the ***first*** appearance of a load unit on the list. The PROJ CCS values are also shown only for the first appearance of a load unit on the LET. The % CAP is shown always for the very first line of the LET but is only printed subsequently as the originally-printed values decrease.

4.18 Actual line equipment selected for transfer may be recorded in the appropriate columns of the LET at the same time as it is placed on the locally-used LET cut sheets. Space is provided to record the cut-sheet number, enter remarks, or note the main frame location of the load unit.

4.19 Like the LAG, disconnect activity within a loading division may affect the effort to bring load units closer to average. Disconnects to load units also selected for transfer may cause an overcorrection to take place in CCS reduction. Conversely, assignments into these load units may completely counteract the corrective action of a transfer.

4.20 It is suggested that load units actually selected for transfer be flagged in the line records to prevent the preceding situations from occurring. Inward assignments should not be made into these groups and disconnects worked should be noted on the TL-746 LET to prevent additional removal of load from load units.

4.21 If the ***ZONE*** option is used for the TL-744 LAG, any LETs produced for the same loading division will also be produced in zones. All load units in the loading division are combined to produce their projected CCS values and CCS correction values. However, they are separated into zones for the production of the assignment guides when this special feature is used in TDAS data collection device (DCD) assignments.

4.22 ***Condensed Line Equipment Transfer Guide (TL-747):*** The condensed LET (TL-747) (Fig. 6) is produced when studies are input for a balance guide and the LET print control volume specified on the master file record contains the literal ***COND.*** This guide will list every load unit in a loading division or assignment division ***once.*** The condensed LET (TL-747) is generated in a similar fashion as the condensed LAG (TL-745). The load units are listed in a desired order of assignments with the load unit requiring the ***most*** corrective action (remove CCS) listed first and the load unit requiring the ***least*** amount of corrective action listed last. Each assignment order on the guide will contain information in the PROJ CCS, RMV CCS, and NBR LINES columns. The % CAP value will appear for the first assignment order and will be printed subsequently only when the last printed value changes.

4.23 The RMV CCS column will contain a minus (-) sign next to the value when the calculated CCS for a load unit is ***below*** the average for the loading division.

4.24 As with the condensed LAG (TL-745), LBS divides the calculated amount of usage by the input CCS/Main Station value to develop an estimated number of lines to be removed. The single and double asterisks (* and **) will appear when the projected CCS values are 1.5 and 3.0 SDs from the expected average load. These signs will normally appear at the top of a nonzone and zoned condensed LET.

4.25 The condensed LET should be requested when the network administrator wishes to identify load units which are possible candidates for LETs.

Computer System for Main Frame Operations

4.26 The COSMOS line assignment system provides a number of parameters that are the responsibility of the network administrator. These parameters can be monitored and changed by the network administrator in order to control entity balance. To control traffic unit balance, the network switching administrator (NSA) specifies the entity status (stable or growth), the upper and lower limits of main station fill, and the traffic unit priority. The NSA also controls the party line fill ratio by designating which of 3-party service assignment procedures COSMOS is to follow. The NSA determines whether cross loading should be allowed or disallowed in each entity and sets the cross-load permit parameter accordingly.

4.27 The established procedures for determining what constitutes good class-of-service balance for electromechanical systems has not changed with COSMOS. For ESS switches, COSMOS will achieve class-of-service balance by assigning a class-of-service designation to each concentrator terminal and restricting assignments to those terminals having the required class-of-service designation.

4.28 A load factor (LF) is developed by COSMOS to establish the loading sequence for the traffic unit being measured. The LBI scores should track with the COSMOS LFs. Figure 7 provides a graphic representation of this relationship.

5. REFERENCES

5.01 The following Bell System Practices are used as references in this section:

SECTION	TITLE
780-101-270	Mechanized Aids to Management (COSMOS)
231-070-740	Load Balancing Procedures, No. 1 ESS Switches
232-070-110	Load Balancing Procedures, No. 2 ESS Switches
216-020-110	Load Balancing Procedures, No. 1 Crossbar
218-020-110	Load Balancing Procedures, No. 5 Crossbar

SECTION	TITLE
218-020-110	Load Balancing Procedures, Step-by-Step
780-200-031	Busy Hour Determination
756-370-254	Traffic Measurement Request Input Preparation
756-370-321	Load Balance System Users Guide
756-370-324	Load Balance System Output

6. DEFINITION OF TERMS

6.01 The definition of a ***traffic unit*** is the same as the definition of a ***dial entity.*** The term ***traffic unit*** is used to conform with Section 795-100-100, Common Language Location Identification. Examples of traffic units are as follows:

(a) ***Step-by-Step*** is a group of lines requiring use of the same intermediate distributing frame.

(b) ***No. 1 Crossbar*** is a group of lines using a common ***terminating marker group.***

(c) ***No. 5 Crossbar*** is a group of lines using a common marker group.

(d) ***No. 1 and No. 2 ESS switches*** are groups of lines associated with one central control system using the same logic and processor.

6.02 A ***load unit*** is defined as the component of line originating equipment arranged for usage measurements and for which individual scores are to be computed. Examples of load units are line finder groups, horizontal groups (No. 1 and No. 5 Crossbar), concentrators (No. 1 ESS switches), and B-link groups (No. 2 ESS switches).

6.03 The general definition of a ***loading division*** is a group of load units of the same type of dial equipment, designed to be loaded similarly by both usage and classes of service and not requiring telephone number changes to effect line load balance within the loading division. Where equipment features, such as TOUCH-TONE* dialing, prevent similar loading and assigning due to equipment design, the BOC has the option of establishing more loading divisions. A consistent system to justify the establishment of more loading divisions should be used within a BOC. Care should be taken that the establishment of additional loading divisions does not create undetectable imbalances in other equipment components. Creation of more than one loading division requires additional administrative effort to achieve proper loading.

*Registered service mark.

6.04 Loading divisions of the same class of service, possessing approximately the same capacities and percentage of loading, may conveniently be combined in order to assign customer lines. Combinations of this type are called ***assignment divisions.***

6.05 A ***study*** is a scheduled time period used to accumulate usage data to calculate load balance by quality control techniques.

6.06 The ***class busy hour (CBH)*** is the time-consistent hour during which a loading division has the highest average CCS usage measured for 5 days during the same week. The hour may start and end on the clock hour or half-hour.

6.07 A ***side hour*** is an amount of time equal to 1 hour that is time consistent and adjacent to the CBH. It may be on one side or both sides of the CBH in order to provide the highest possible CCS for the side hour but must not be divided into time periods of less than one-half of an hour. For example, if the CBH is 9:00 to 10:00 am, the side hour could be 8:00 to 9:00 am, 10:00 to 11:00 am, or 8:30 to 9:00 am and 10:00 to 10:30 am.

6.08 ***Session busy hours (SBHs)*** are comprised of the CBH and the side hour.

6.09 ***Completion date*** of added or changed load units is the date that they are available for service.

(a) When ***advance completion*** of one or more load units on a single addition or change is necessary, the completion date will be the date that the ***last*** unit is available for service.

(b) When ***segmental (partial) completion*** is scheduled, each segment will be treated as a separate addition or change.

Note: Segmental completion may only be applicable in certain companies.

6.10 ***Theoretical capacity*** is the line usage capacity of the line link frame, line trunk network, line link network, or line finder group as specified in the appropriate traffic engineering sections. These values will be used to calculate the percentages of theoretical capacity.

6.11 A ***wire center*** is a location, owned or leased by the BOC within a well-defined geographical area (wire center area) which has ***all*** of the following characteristics, all of which describe the way in which the location is administered within the BOC:

(a) All customers within the wire center area gain network access for all network services via that location. (In other words, the wire center is a hub for all subscriber facilities.)

(b) A main distributing frame (understood to represent a flexible interconnection point at which service order activity is performed, rather than any specific type of equipment) is used to terminate all customer pairs (or the connecting links to subscriber concentrators or remote switch units) arriving at the location.

(c) The location has its own set of cable records to support both the engineering and assignment functions.

(d) The location has its own general planning forecasts.

(e) The location and the area it serves is a basic unit for various performance measurement plans.

6.12 An ***end office*** is a trunking entity where subscriber lines are terminated for purposes of interconnection to each other and to the network and is designated as a Class 5 office.

6.13 An end office must be ***located at a wire center*** and must have stand-alone capability; namely, the ability to complete intraoffice calls (possibly with reduced grade-of-service, loss of billing, and vertical services capability) in the event that the link between the end office and other switching systems is severed. It is possible for two or more end offices to be located at the same wire center. This definition allows remote switch units which have stand-alone capability but which rely on a host office for many centralized functions to be end offices.

6.14 An ***exchange area*** is a geographic area defined by the tariff for the purposes of establishing rates for classes of service for subscribers within the area.

6.15 An exchange area may consist of two or more wire center areas, a single wire center area, or a portion of a wire center area. In the latter case, the exchange area is sometimes called a "theoretical exchange" since it is not served by its own dedicated end office and wire center. With a theoretical exchange, the end office whose serving area includes that exchange must distinguish between customers in that exchange area and customers in other exchange areas on the basis of the NXX (or NXX-X number group) dialing prefix, and the administrative procedures used to assign numbers must ensure that customers located within the theoretical exchange (and only those customers) are assigned the appropriate NXX (or NXX-X).

6.16 A ***pair gain system*** is any of a number of different systems including (but not limited to) subscriber carrier and/or concentrator systems and remote switching systems, deployed in such a way that the remote terminal is located between the end office and the customer premises (or in some cases ***at*** the customer premises), and is an integral part of the feeder route design. A pair gain system typically also has a central office terminal, which is located at the wire center which serves the area in which the remote terminal is located. Local digital switching brings the possibility of an integrated pair gain system which does not have a distinct central office terminal.

6.17 Because a pair gain system is an integral part of the feeder route, it is not recommended that the feeder and distribution plant beyond the remote terminal be regauged to take advantage of the signaling/supervision range of the remote terminal. Standard administrative procedures require that the ability for plant beyond the remote terminal to be cross-connected either to the pair gain system or to metallic pairs, with no perceptible degradation in performance, be maintained.

6.18 Some pair gain systems are deployed in ways which do not fully conform to feeder route design principles. Such applications may, for example, have a main frame adjacent to the remote terminal or may have regauged plant beyond the remote terminal. It is planned that guidelines for engineering and administering such installations will be developed, but none exist at the present time. Economic studies of such installations should properly account for the administrative benefits and penalties involved.

TABLE A

LOAD BALANCE SYSTEM OUTPUT REPORTS

REPORT	OFFICE TYPE	LOAD UNIT
TL-760	Step-by-Step	Connectors
TL-762	No. 1 Crossbar	Incoming Link Frame—Horizontal Groups
TL-763	No. 1 Crossbar	Office Link Frame—Horizontal Groups
TL-764	No. 5 Crossbar	Trunk Line Frame—Horizontal Groups
TL-766	No. 1 ESS Switches	Trunk Link Network—Grid
TL-768	Crossbar Tandem	Office Link Frame—Horizontal Group
TL-769	Crossbar Tandem	Trunk Link Frame—Horizontal Group

COMPANY________
AREA________

TNDS
LOAD BALANCE
TRAFFIC UNIT INDEX - LISTING

PROCESS DATE__________
BISP LISTING TL 720
RESP CODE__________

SERVICE OBSERVING MO/YR:

JOHN DOE
OFC TYPE:

ID	LOADING DIVISION DESCRIPTION	LATEST VALID STUDY	INDEX RAW LBI	INDEX LOAD BAL INDEX	PERFORMANCE BALANCE PENALTY PTS	PERFORMANCE BALANCE PENALTY FRAC	PERFORMANCE HOT SPOT PENALTY PTS	PERFORMANCE HOT SPOT PENALTY FRAC	LOAD UNITS QUAN INST	LOAD UNITS QUAN VALID	LOAD UNITS % VALID	LOAD & CAPACITY LINE CCS LOAD	LOAD & CAPACITY ACT CCS LOAD	LOAD & CAPACITY % CAP	WTD % CAP	SERVICE RESULTS DTS	SERVICE RESULTS IML
C1	FRLF TT	08 15	96	96	6	.22	0	.00	27	27	100.0	11772	8664	74	74		
D1	FRLF DP	08 15	96	96	14	.23	0	.00	60	60	100.0	22800	14736	65	65		
E1	2MRLF DP	08 15	NI	NI					1	1	100.0	270	43	16			
K1	2MRLF DP	08 15	NI	NI					12	12	100.0	1464	412	28			
N1	COIN DP	08 15	100	100	0	.00	0	.00	2	2	100.0	872	330	38	41		
P1	COIN TT	08 15	100	100	0	.00	0	.00	1	1	100.0	436	144	33	35		
TOTALS-			98	98	20	.22	0	.00	90	90	100.0	35880	23874	67	67		

Fig. 1—Traffic Input Index—Addendum (TL-720) Example (4.03)

COMPANY________
AREA________
DIV________
DIST________

TNDS
LOAD BALANCE
INDEX STUDY--DATA SUMMARY

PROCESS DATE__________
BISP LISTING_TL 732___
RESP CODE__________

OFC TYPE:

LOADING DIVISION	STUDY WK DATE	END HOUR

HG	TRUE HR	AVG HR CCS	% ENG CAP	STUDY 3	MONTH 2	SCORE 1	PENALTY POINTS- BAL	HS	REMARKS
FRM 00									
3	10.0	159	110	-1	+2	+4	3		1 3
5		119	83	+4	+1	+1	1		
FRM 01									
2		163	113	+2	-1	+4	3		3
FRM 02									
0		119	83	+4	+1	+1	1		
FRM 03									
3		159	110	+1	-1	+4	3		3
8		79	55	+4	-1	-2	1		2
FRM 04									
7		111	77	+4	-1	-1	1		2
9		159	110	+2	-1	+4	3		3
FRM 05									
7		139	97	+4	+2	+2	1		
FRM 06									
5		103	72	+2	+4	-1	2		
FRM 07									
1		127	88	+4	+2	+1	1		
FRM 09									
1		199	138	+4	+4	+4	6		3 6
FRM 10									
0		99	69	-1	+4	-1	2		
7		71	49	+1	-1	-4			2 4
FRM 11									
4		147	102	+2	+2	+2			3
5		131	91	+1	+4	+2	2		

HG	TRUE HR	AVG HR CCS	% ENG CAP	STUDY 3	MONTH 2	SCORE 1	PENALTY POINTS- BAL	HS	REMARKS
FRM 12									
8	10.0	147	102	-1	-1	+2			3
FRM 13									
4		151	105	+1	+2	+4	3		3
FRM 14									
2		135	94	+4	+1	+2	1		
FRM 16									
2		151	105	-1	-1	+4	3		1 3
FRM 17									
0		147	102	+1	+1	+2			3
2		147	102	+1	+1	+2			3
FRM 18									
8		67	47	+1	-1	-4			2 4
FRM 19									
7		71	49	-1	-1	-4			4
FRM 22									
7		147	102	-1	+4	+2	2		3
FRM 24									
0		167	116	-4	+1	+4	3		1 3

REMARK CODES

1 ASCENDING TREND	4 CHECK LOW CCS	7 HOT SPOT	* = HOT SPOT
2 DESCENDING TREND	5 SECOND +4	8 FIRST SEQUENT HOT SPOT	
3 CHECK HIGH CCS	6 THIRD +4	9 SECOND SEQUENT HOT SPOT	

Fig. 2—Index Study-Data Summary (TL-732) Example (Sheet 1 of 2) (4.03)

COMPANY________ TNDS PROCESS DATE__________
AREA________ LOAD BALANCE BISP LISTING__TL 732__
DIV________ INDEX STUDY--DATA SUMMARY RESP CODE____________
DIST________

OFC TYPE:

LOADING DIVISION	STUDY WK DATE	END HOUR

LOADING DIVISION INDEX CALCULATION

WEIGHTED LOAD DIV % OF CAP	BALANCE PENALTY PTS FRAC	HOT SPOT PENALTY PTS FRAC	% VALID HG	RAW LBI	HOT SPOT CORR	LBI
75	64 .16	0 .00	100.0	99	0	99

VALUES USED FOR CURRENT WEEK SCORE CALCULATION

AVG HOUR CCS/ HG	LD % CAP	AHT	T/S	TOTAL HG	VALID HG
112	78	166	3.97	400	400

LINE LINK FRAME STATISTICS

LLF	AVG HR CCS	BALANCE PENALTY	HOT SPOT PENALTY	LLF % CAP	LLF % OF GRP AVG
0	121	4	0	84	108
1	109	3	0	75	97
2	120	1	0	83	107
3	112	4	0	77	100
4	116	4	0	80	104
5	108	1	0	74	96
6	114	2	0	79	102
7	110	1	0	76	98
8	104	0	0	72	93
9	112	6	0	77	100
10	107	2	0	74	96
11	122	2	0	64	109
12	115	0	0	79	103
13	112	3	0	77	100
14	110	1	0	76	98
15	110	0	0	76	98
16	111	3	0	77	99
17	123	0	0	85	110
18	106	0	0	73	95
19	103	0	0	71	92

Fig. 2—Index Study-Data Summary (TL-732) Example (Sheet 2 of 2) (4.03)

```
COMPANY________
  AREA________
  DIV________
DIST________
                                                        PROCESS DATE__________
                                      TNDS              BISP LISTING TL 744
                                  LOAD BALANCE          RESP CODE_____________
                                      L A G
                                   COVER SHEET
          STUDY WEEK DATE:                         CCS/MAIN STATION:

          LOAD  DIVISION:

 OFC TYPE:

 LOAD UNIT  --------------------FIRST 12 APPEARANCES-------------------

 ---------  ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ----
    072     125, 129, 133, 137, 141, 145, 149, 153, 157, 161, 165, 169
    073     199
    080      34,  36,  38,  40,  42,  44,  46,  48,  50,  52,  54,  56
    183      84,  87,  90,  93,  96,  99, 102, 105, 108, 111, 114, 117
    184       1,   2,   3,   4,   5,   6,   7,   8,   9,  10,  11,  12
```

Fig. 3—Line Assignment Guide (TL-744) Example (Sheet 1 of 2) (4.03)

COMPANY________
AREA________
DIV________
DIST________

TNDS
LOAD BALANCE
L A G

PROCESS DATE____________
BISP LISTING TL 744
RESP CODE____________

STUDY WEEK DATE:

CCS/MAIN STATION:

LOAD DIVISION:

OFC TYPE:

ASGM ORDER	CCS TO ADD	PROJ CCS	% CAP	MDF LOC	LOAD UNIT LFG	ASSIGNMENTS LT	ASSIGNMENTS C/S	DISCONNECTS LT	DISCONNECTS C/S
1	320	3	01		184				
2					184				
3			02		184				
4					184				
5			03		184				
6			04		184				
7					184				
8			05		184				
9					184				
10			06		184				
11			07		184				
12					184				
13			08		184				
14					184				
15			09		184				
16			10		184				
17					184				
18			11		184				
19					184				
20			12		184				
21			13		184				
22					184				
23			14		184				
24					184				
25			15		184				
26			16		184				
27					184				
28			17		184				
29					184				
30			18		184				
31					184				
32			19		184				
33			20		184				
34	236	3			080				
35					184				
36					080				
37			21		184				
38					080				
39					184				
40					080				

Fig. 3—Line Assignment Guide (TL-744) Example (Sheet 2 of 2) (4.03)

COMPANY________
AREA________
DIV________
DIST________

TNDS
LOAD BALANCE
CONDENSED
L A G

PROCESS DATE____________
BISP LISTING TL 745
RESP CODE____________

STUDY WEEK DATE:

CCS/MAIN STATIONS: L 2.0
M 4.0
H 6.0

OFC TYPE: LOAD DIVISION:

ZONE ID	MDF LOC	LOAD LLF	UNIT HG	PROJ CCS	% CAP	ADD CCS	NBR LINES	ASGM MADE	REMARKS
02		10	0	80	68	35	18	----	
02		10	9	80		35	18	----	
02		9	2	84	72	32	16	----	
02		10	6	88	75	28	14	----	
02		10	7	92	79	24	12	----	
02		10	3	92		24	12	----	
02		9	3	96	82	20	10	----	
02		9	1	100	86	17	9	----	
02		10	8	104	89	13	7	----	
02		10	4	108	93	9	5	----	
02		10	5	108		9	5	----	
02		10	1	120	103	- 2	- 1	----	
02		10	2	120		- 2	- 1	----	
02		9	9	120		- 2	- 1	----	
02		9	0	136	117	- 17	- 9	----	
02		9	7	140	120	- 20	- 10	----	
02		9	5	156	134	- 35	- 18	----	
02		9	6	156		- 35	- 18	----	
02		9	4	156		- 35	- 18	----	
02		9	8	160	137	- 38	- 19	----	
04		11	0	20	17	84	42	----	
04		11	5	21	18	84	42	----	
04		12	1	26	22	79	40	----	
04		12	8	49	42	57	29	----	
04		12	9	61	52	46	23	----	
04		11	4	100	86	17	9	----	
04		11	2	104	89	13	7	----	
04		12	0	108	93	9	5	----	
04		11	1	120	103	- 2	- 1	----	
04		12	2	124	106	- 6	- 3	----	
04		12	3	128	110	- 9	- 5	----	
04		12	4	132	113	- 13	- 7	----	
04		11	3	136	117	- 17	- 9	----	
04		11	6	140	120	- 20	- 10	----	
04		11	7	144	124	- 24	- 12	----	
04		12	5	148	127	- 28	- 14	----	
04		11	8	152	131	- 32	- 16	----	
04		11	9	156	134	- 35	- 18	----	
04		12	7	160	137	- 38	- 19	----	
04		12	6	160		- 38	- 19	----	

ZONE TRAFFIC UNIT EXAMPLE

Fig. 4—Condensed Line Assignment Guide (TL-745) Example (Sheet 1 of 2) (4.09)

COMPANY________	TNDS	PROCESS DATE________
AREA________	LOAD BALANCE	BISP LISTING TL 745
DIV________	CONDENSED	RESP CODE________
DIST________	L A G	

MPLS MN 24 72C   STUDY WEEK DATE: CCS/MAIN STATIONS: L 2.0

OFC TYPE: LOAD   DIVISION: M 4.0

H 6.0

ZONE ID	MDF LOC	LOAD LLF	UNIT HG	PROJ CCS	% CAP	ADD CCS	NBR LINES	ASGM MADE	REMARKS
		12	7	80	68	35	18	----	
		14	3	80		35	18	----	
		15	2	84	72	32	16	----	
		14	7	84		32	16	----	
		13	7	88	75	28	14	----	
		13	3	92	79	24	12	----	
		11	7	92		24	12	----	
		12	3	96	82	20	10	----	
		11	3	96		20	10	----	
		10	4	100	86	17	9	----	
		17	3	104	89	13	7	----	
		13	6	104		13	7	----	
		01	1	108	93	9	5	----	
		10	1	108		9	5	----	
		16	3	112		6	3	----	
		10	6	112		6	3	----	
		17	4	116	100	2	1	----	
		15	8	116		2	1	----	
		12	6	120	103	- 2	- 1	----	
		16	7	120		- 2	- 1	----	
		13	2	124	106	- 6	- 3	----	
		13	8	128	110	- 9	- 5	----	
		17	6	132	113	- 13	- 7	----	
		12	4	132		- 13	- 7	----	
		14	1	136	117	- 17	- 9	----	
		11	4	140	120	- 20	- 10	----	
		13	0	144	124	- 24	- 12	----	
		15	9	144		- 24	- 12	----	
		15	0	148	127	- 28	- 14	----	
		10	9	148		- 28	- 14	----	
		17	7	148		- 28	- 14	----	
		12	2	152	131	- 32	- 16	----	
		16	6	152		- 32	- 16	----	
		17	2	152		- 32	- 16	----	
		$00	0	156	134	- 35	- 18	----	
		$07	5	156		- 35	- 18	----	
		$04	6	160	137	- 38	- 19	----	

NON-ZONE TRAFFIC UNIT EXAMPLE

Fig. 4—Condensed Line Assignment Guide (TL-745) Example (Sheet 2 of 2) (4.09)

COMPANY________ TNDS PROCESS DATE__________
AREA________ LOAD BALANCE BISP LISTING TL 746
DIV________ L E T RESP CODE____________
DIST________

MPLS MN 01 34E STUDY WEEK DATE: CCS/MAIN STATION:

LOAD DIVISION: CG01-PARENT

OFC TYPE: ZONE

ASGM ORDER	CCS TO RMV	PROJ CCS	% CAP	MDF LOC	LOAD LLN	UNIT CONC	SELECTED SW	LVL	C/S		DISCONNECTS SW	LVL	C/S	
1	35	128	77		03	505								
2			74		03	505								
3			72		03	505								
4			69		03	505								
5	18	105	63		03	504								
6					03	505								
7			60		03	504								
8					03	505								
9			58		03	504								
10					03	505								
11			55		03	504								
12					03	505								
13			53		03	504								
14					03	505								
15			50		03	504								
16					03	505								
17	- 7	13	44		01	416								
18	- 7	13			05	512								
19					03	504								
20					03	505								

Fig. 5—Line Equipment Transfer Guide (TL-746) Example (4.14)

COMPANY________ TNDS PROCESS DATE__________
AREA________ LOAD BALANCE BISP LISTING TL 747
DIV________ CONDENSED RESP CODE__________
DIST________ L E T

MPLS MN 24 72C STUDY WEEK DATE: CCS/MAIN STATIONS: L 2.0

OFC TYPE: 5XB LOAD DIVISION: C1 M 4.0
H 6.0

ZONE ID	MDF LOC	LOAD LLF	UNIT HG	PROJ CCS	% CAP	RMV CCS	NBR LINES	ASGM MADE	REMARKS
02		$ 9	8	160	137	38	19**	----	
02		$ 9	4	156	134	38	19**	----	
02		$ 9	6	156		35	18**	----	
02		$ 9	5	156		35	18**	----	
02		$ 9	7	140	120	20	10*	----	
02		$ 9	0	136	117	17	9	----	
02		$ 9	9	120	103	2	1	----	
02		10	2	120		2	1	----	
02		10	1	120		2	1	----	
02		10	5	108	93	- 9	- 5	----	
02		10	4	108		- 9	- 5	----	
02		10	8	104	89	- 13	- 7	----	
02		&$ 9	1	100	86	- 17	- 9	----	
02		&$ 9	3	96	82	- 20	- 10	----	
02		10	3	92	79	- 24	- 12	----	
02		10	7	92		- 24	- 12	----	
02		10	6	88	75	- 28	- 14	----	
02		&$ 9	3	84	72	- 32	- 16	----	
02		10	9	80	68	- 35	- 18	----	
02		10	0	80		- 35	- 18	----	
04		12	6	160	137	38	19**	----	
04		12	7	160		38	19**	----	
04		11	9	156	134	35	18**	----	
04		11	8	152	131	32	16*	----	
04		12	5	148	127	28	14*	----	
04		11	7	144	124	24	12*	----	
04		11	6	140	120	20	10*	----	
04		11	3	136	117	17	9	----	
04		12	4	132	113	13	7	----	
04		12	3	128	110	9	5	----	
04		12	2	124	106	6	3	----	
04		11	1	120	103	2	1	----	
04		12	0	108	93	- 9	- 5	----	
04		11	2	104	89	- 13	- 7	----	
04		11	4	100	86	- 17	- 9	----	
04		12	9	61	52	- 46	- 23	----	
04		12	8	49	42	- 57	- 29	----	
04		12	1	26	22	- 79	- 40	----	
04		11	5	21	18	- 84	- 42	----	
04		11	0	20	17	- 84	- 42	----	

ZONE TRAFFIC UNIT EXAMPLE

Fig. 6—Condensed Line Equipment Transfer Guide (TL-747) Example (4.22)

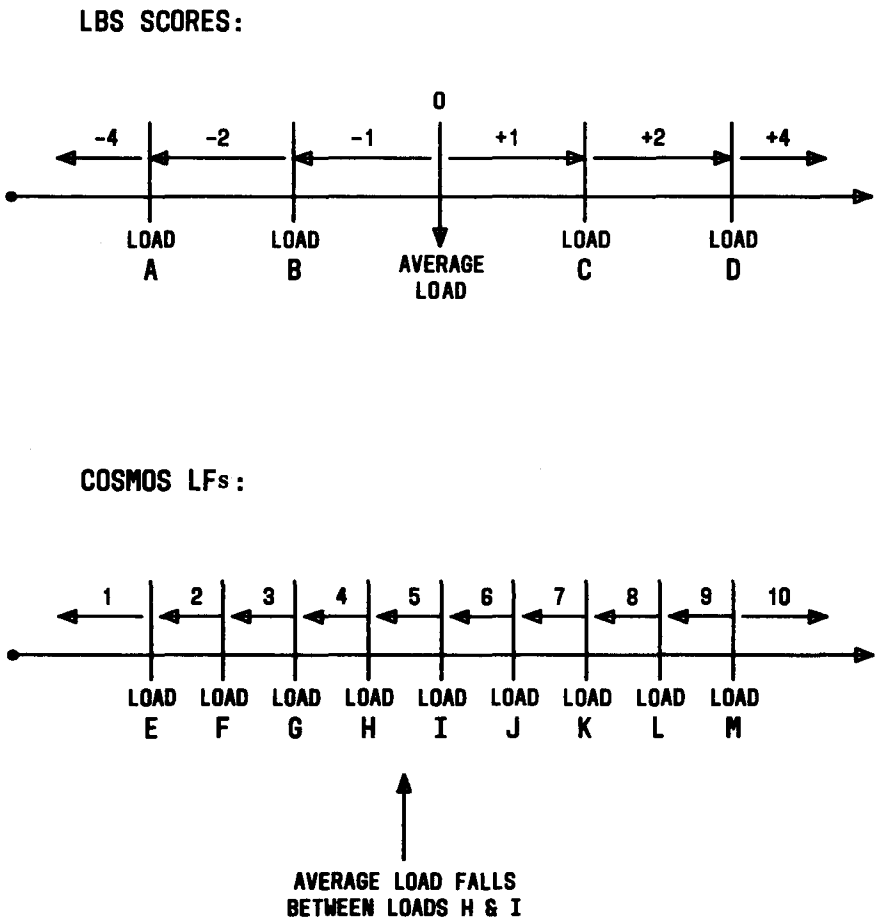


Fig. 7—Load Balance System Score Versus COSMOS Load Factor (4.28)