

TRANSMISSION MAINTENANCE

OVERALL 1 KHZ LOSS MEASUREMENTS ON MESSAGE TRUNKS

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1. GENERAL

1.01 This section covers the maintenance requirements for overall 1 kHz loss measurements on message trunks. These tests are made at periodic intervals to determine the extent of departure of actual measured loss (AML) from the expected measured loss (EML) and to indicate the need for corrective action. The tests provide a check only of the 1 kHz loss of the trunks and do not take into account other factors such as noise and frequency characteristics.

1.02 This section is reissued for the following reasons:

- (a) To indicate that test loss is part of the expected measured loss.

- (b) To include reference to the centralized automatic reporting on trunks (CAROT) optimized testing schedules.

- (c) To make additional references to test jack locations.

1.03 This is a major revision of this section. The use of arrows to denote changes has been omitted for that reason.

1.04 The procedures and requirements contained herein apply to **all** message trunks used in the direct distance dialing, extended area and local dialing telephone networks. These include the following (as defined in Section 781-030-100, Notes on Distance Dialing, Part 7):

- (a) Intertoll
- (b) Secondary intertoll
- (c) Toll connecting
- (d) Intertandem
- (e) Tandem
- (f) Local interoffice
- (g) Miscellaneous, such as information and intercept.

1.05 Some of the above trunks are often referred to by the following designations:

- (a) Intrabuilding
- (b) Intermachine
- (c) Recording and completing
- (d) CLR

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- (e) CAMA (centralized automatic message accounting)
- (f) AMA (automatic message accounting)
- (g) Operator service
- (h) Operator junctors
- (i) Operator tandem
- (j) Operator office
- (k) TSPS (Traffic Service Position System)
- (l) RTA (remote trunking arrangement)
- (m) PSS2 (position subsystem No. 2)
- (n) CDO
- (o) Tributary
- (p) Toll tandem
- (q) 121
- (r) 131
- (s) Leave word.

1.06 The procedures discussed herein relate to overall loss of trunks measured in accordance with the following definition:

- (a) The overall loss of a trunk consists of all the losses between the outgoing switch appearance of the trunk at the outgoing end and the outgoing switch at the incoming end to which the trunk is connected. The overall loss thus includes the loss of the switching path or cord circuit at the incoming end.

1.07 The term "outgoing switch" is a general term and include appearances on the following:

- (a) Secondary outgoing link frame in No. 4-type crossbar offices.
- (b) Office link frame in crossbar tandem and No. 1 crossbar offices.
- (c) Trunk link frame in No. 5 crossbar offices.

- (d) Outgoing selector bank in step-by-step offices.
- (e) Office or district selector frame in panel offices.
- (f) Outgoing trunk multiple in manual switchboards.
- (g) Trunk switch frame in electronic switching system (ESS) offices.
- (h) Time slot interchange (TSI) frame in No. 4 ESS offices.

1.08 The "outgoing switches" to which incoming trunks in class 5 offices are connected through the office for purposes of transmission measurements are as follows:

- (a) Connector bank in step-by-step offices.
- (b) Line link frames in No. 1 and No. 5 crossbar offices.
- (c) Final selector frame in panel offices.
- (d) Line switch frame in ESS offices.

1.09 The EML is the calculated loss of a trunk shown on the circuit or trunk layout card and includes the losses of test pads at either or both ends when specified. It is the loss expected to be measured when a transmission measurement is made between the prescribed appearances discussed above, and includes the test pad losses.

1.10 Some trunks are arranged to be accessed or to be terminated in more than one mode. For instance, in No. 5 crossbar offices, a particular trunk can be accessed directly from a subscriber line or from another trunk. Two-way trunks can be accessed from either end. Different wiring paths are involved in the different modes and in some cases additional equipment will be included, such as repeating coils, battery supply circuits, pads, etc. Hence the EML may be different. For indexing purposes, the trunk is measured in only one mode of operation and the EML for this purpose is computed accordingly. The mode selected for indexing purposes is (1) the mode which has the more severe transmission requirements or (2) the

mode which is more frequently used, as applicable. For example:

- (a) The machine access is used where the trunk can be accessed by the switching machine as well as via a manual switchboard.
- (b) When a trunk can be accessed by or terminated in a subscriber line or another trunk, the mode is used in which the trunk is accessed by or terminated in another trunk.
- (c) When a given trunk can be used in any of several categories, the mode to be used is that which is nearest the top of the following list:

Intertoll

Toll Connecting

Tandem.

Two-way trunks are considered outgoing trunks at the control office for indexing purposes

1.11 Trunks having more than one mode of operation should be measured in all other possible modes.

1.12 The AML is the actual loss measured at any time between the same appearance and under the same conditions for which the EML was calculated, and includes test pads when specified. The AML is compared with the EML to determine the condition of the trunk with respect to transmission loss and to indicate possible need for corrective action.

1.13 Test access points have been designed to be the equivalent of the EML. Where necessary, adjustments may be made in the access test path so that the need for manual correction in the measured results is not required. Test pads such as TP2, where specified, are included in the measuring paths of the test facilities used for transmission measurements.

1.14 Transmission measurements made in accordance with this section are performed at secondary testboards, manual test frames, manual switchboards and by automatic transmission measuring equipment. Automatic transmission measuring equipment is provided, where applicable, to permit increased

frequency of testing and hence, to obtain better performance of trunks. With the advent of the Automatic Transmission Measuring System (ATMS) associated with automatic test frames, trunks are being measured more frequently. These measurements are accumulated and summarized to provide the trunk transmission maintenance index (TTMI). Any service outage of 104-, 105-type test lines, associated responders, and remote office test lines (ROTLs) reduces trunk testing capabilities of automatic transmission test and control circuits, ATMSs and CAROTs. This has a detrimental effect on the TTMI of all offices with trunks to the office with the defective test line. Consequently, it is imperative that central office forces expedite the repair of test lines, responders, and ROTLs.

1.15 At the incoming end, use is made of test lines such as the following:

(a) A new 100-type which transmits 5 to 6 seconds of 1 kHz tone and then provides a quiet termination.

(b) 101-type, or its equivalent, which appears at the secondary testboard or maintenance center, and is used when manual assistance is required in making the measurement.

(c) 102-type, which transmits 1 kHz-test-signal at the required level and is used when a far-to-near one-way measurement is sufficient.

(d) 104-type, which is an automatic test line for measuring loss in both directions in connection with either automatic transmission measuring equipment or manual means at the near end.

(e) 105-type, which is associated with the ATMS responder for measuring loss in both directions and noise at both ends when an ATMS director and associated test frame or CAROT controller and ROTL or Trunk and Facility Maintenance System (TFMS) are used at the near end.

1.16 Methods of making transmission measurements from the various types of testing facilities and with the various types of test lines at the distant offices are covered in the practices listed in Section 660-450-301.

1.17 For maintenance purposes, trunks which do not terminate at both ends in the same or

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adjacent buildings consist of three basic parts or segments. These are discussed in Section 660-450-300 and its related sections as follows:

(a) **Originating Segment:** Includes the equipment and wiring between the trunk appearance at the outgoing switch and the main distributing frame (MDF) or other facility connecting frame, repeater bay, voice-frequency patching bay, or carrier channel unit.

(b) **Facility:** The transmission facility between the originating and terminating segments of a trunk may consist of a cable pair, open-wire pair, or a carrier channel. Cable and open-wire pairs are terminated at the MDF or other facility connecting frame - or when equipped with V-type repeaters - at a repeater bay. E-type (negative impedance) repeaters and impedance compensators, when provided, are considered part of the facility. Carrier channels are terminated at the voice frequency patching bay (VF bay) or have equivalent 4-wire jacks on the channel unit.

Note: In case there is more than one facility connected in tandem between voice-frequency patching bays or repeaters bays, each individual facility is treated as a segment.

(c) **Terminating Segment:** Includes the equipment and wiring between the MDF or other facility connecting frame, repeater bay, voice frequency patching bay, or carrier channel unit, and the outgoing switch appearance to which the trunk is connected.

1.18 Test jacks and matching network circuits where applicable are provided at T carrier terminals for use in making measurements and adjustments of the carrier channels and of the originating and terminating segments of the trunk.

1.19 Each individual segment described above is aligned separately to meet its own requirements. When an overall measurement indicates the need for corrective action, the segments are checked individually and corrected.

- **No change in any of the segments is made on the basis of an overall measurement nor is any segment changed to compensate for departure from requirements in any other segment.**

Note: An exception is made in the case of repeatered trunks where it is permissible to adjust the gain of the repeaters up to ± 1.0 dB to meet the overall trunk loss requirement.

1.20 Definitions of other terms used in this section are the same as those contained in Section 660-450-300.

1.21 In sectionalization tests when locating causes of trouble, it is important that the testing signal be applied at the correct level specified for the particular segment under test. This is to assure compatibility of the results of sectionalized test with measurements of the overall trunk. However, when it is necessary to apply the testing signal for appreciable periods of time to a trunk or any segment thereof, it should be applied at a level 10 dB or 16 dB below the specified level for the test point. This is necessary to avoid interference to other channels of the same carrier or radio system.

2. GENERAL PRINCIPLES

2.01 Losses of trunks must be kept to their assigned value (EML) to provide the transmission performance needed for good service. Since operators are not involved in most connections, it becomes the responsibilities of the plant forces to insure that excessive losses and other undesirable effect are reduced to the minimum. In addition, many trunks are composed of complex electronic and other equipment with a multitude of test points and adjustments. Even trunks without gain devices are subject to rearrangements and have locations where wiring errors can be made.

2.02 To provide the type of service required, it is necessary to measure the loss of all trunks as frequently as practicable. The longer the interval between tests, the longer a deviation in transmission loss or other trouble goes undetected. Where automatic test equipment is provided, it should be used to the maximum extent possible.

2.03 It is important that all test equipment and test power sources be maintained to a high degree of accuracy at all times. **Frequent checks of the milliwatt distributing system (includes all test lines) and periodic calibration of all test equipment are a requirement.** A wrong measurement is often worse than no measurement at all, since resulting adjustments

can have far reaching effects which are difficult to eliminate.

2.04 Automatic transmission measuring equipment and 104- and 105-type test lines should be checked daily to assure that they are in proper working order and that they will provide the required accuracy. Test equipment which is found to be in error should be corrected before any further measurements are made. **It is particularly important that all 102-, 104-, and 105-type test lines whose accuracy does not meet requirements are removed from service until they can be corrected.** Otherwise, other offices will obtain erroneous results and have no easy way of knowing the cause.

2.05 Where provision has been made in secondary testboards and similar testing facilities for adjustable test pads, as discussed earlier, it is important that they be adjusted accurately and checked annually. The necessary procedures for doing this are covered in the appropriate testboard and other applicable sections of practices. **Change in the testboard multiple or positions, or additions and rearrangements of switching frames can change the requirements for these pads.** They should, therefore, be checked as soon as possible after each occurrence.

2.06 In earlier testboards where adjustable pads have not been provided, appropriate corrections should be determined and should be applied to all measurements. The correction applying to measurements of outgoing trunks will generally be different from that applying to measurements of incoming trunks. Also, these corrections may change with the rearrangements discussed earlier and should be redetermined after each such occurrence. To avoid the possibility that the corrections will be inadvertently omitted from the results of any measurements, it will be desirable to post both of them in conspicuous places at the testboard positions.

Note: These corrections due to access losses should never be included as part of the EML of the trunks.

2.07 Automatic transmission measuring equipment and 104- and 105-type test line equipment are all provided with adjustments to assure that the measurements are made accurately. It should

be assured that these adjustments have been made accurately and that they are checked annually and after any changes in the arrangements of the switching equipment or test equipment. A check should be made to ensure that proper designations have been provided at all milliwatt outlets associated with any of this equipment.

2.08 Portable measuring equipment and the transmission and noise measuring equipment permanently associated with testboards, test frames, and test bays should be calibrated before each use. Any errors should be corrected before the equipment is used.

3. MAINTENANCE GUIDES

3.01 From a maintenance standpoint, the transmission performance of trunks is evaluated by the Trunk Transmission Maintenance Index. Control of trunk loss deviations is discussed in Section 660-430-010 and related sections listed therein. In the present index, trunks are divided into two groups:

- (1) Those containing E-type repeaters, metallic facilities terminal (MFT) equipment, and those using outside plant but without gain devices.
- (2) Those containing carrier and repeaters other than E-type.

3.02 In both groups, the index takes into account the percentage of measurements in which the deviation from EML exceeds ± 0.7 dB. In the second group, an additional requirement is placed on the percentage of measurements where the deviation exceeded ± 1.7 dB. As the deviation from EML approaches zero the index value is increased, and the performance is improved. Although the index plan permits a small percentage of the trunks to have significant deviations, it is desirable that deviations for all trunks be kept to the lowest practicable values consistent with controlled maintenance objectives.

3.03 In a particular control office, the present index plan applies to all trunks controlled by that office. However, the objective for good transmission can be defeated if the results from a certain group, composed of trunks which are relatively simple to maintain, are allowed to mask the actual performance of groups whose trunks are more complex. It is therefore desirable to review

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the results in each office to assure that all the various trunk groups individually meet the index objectives.

3.04 Over and above the index requirements, an immediate action limit of 3.7 dB has been established for all trunks to insure that no trunk is left in service when its deviation from EML is so large that it could, by itself, cause a transmission difficulty. This limit is contained in a footnote to Table B. Any trunk whose loss deviation is found to exceed 3.7 dB should receive immediate attention and should be removed from service until the necessary corrective action has been completed.

3.05 To meet the objectives of the index plan, it is desirable to take corrective action first on those trunks whose deviations are the largest. The particular limit to be used for indicating trunks on which action should be taken is largely a matter of judgment and will be based on available work force and the number of large deviations being experienced. Where significant improvement in the index is required to meet the objective it will be necessary to program the work in the most effective manner. Therefore it would be desirable to initially establish a limit which can be handled by the working force and to gradually reduce the limit as the number of large deviations experienced is reduced.

3.06 CAROT and TFMS both have registers for TTMI purposes which score counts for loss deviations above 0.7, 1.7, and 3.7 dBs. In addition, both systems have a maintenance limit which can be adjusted. The maintenance limit controls the printouts of deviations which are sent to the individual offices. Only those trunks with deviations above the maintenance limit will be included in the printouts for each office. By adjusting the maintenance limit, the number of deviations reported to each office can be reduced and limited to those trunks with the largest deviations.

3.07 The minimum limit value which can be handled effectively depends on the type of trunk and its complexity. Some trunks are inherently more variable than others and hence, it would not be profitable in these cases to attempt the correction of small deviations. Table B contains a set of guides which can be considered the smallest deviation that it will be profitable to correct.

3.08 The more complex trunks obviously should be allowed to have larger deviation values. Although these guides have been established as a result of experience over a long period of time and covering a substantial amount of plant, it is possible that individual offices may find by their own experiences that they can handle smaller deviations in individual cases. In such instances, the maintenance forces should feel free to establish any lower limit which they can handle. It should be pointed out, however, that the values in Table B are intended as guides only and are to be used as an indication that the trunk involved may be in trouble and that corrective action most likely will be profitable. They are not to be considered as performance limits. Performance, as mentioned earlier, is indicated by the Trunk Transmission Maintenance Index.

4. TEST INTERVALS

4.01 The trunk test intervals are established with the purpose of minimizing the number of defective trunks which a customer can access when establishing a connection. Ideally all trunk faults should be identified and corrected immediately after they happen. Two sets of testing frequencies are provided which are designed to minimize the detection of trunk trouble in either a CAROT or non-CAROT environment.

NON-CAROT ENVIRONMENT

4.02 The trunk test frequencies for a non-CAROT environment are based on the type of trunk facilities used. The basis for the testing frequencies shown in Table A is the relative complexity and stability of the circuits. When automatic test frames such as ADOIT, TFMS, or ATMS are used, the trunks should be tested as often as possible at essentially the same rate. That is, use the test frames as much as possible, but at least to meet the minimum TTMI requirements.

4.03 As discussed earlier, the more often a trunk is tested, the shorter the time that excessive transmission deviations or other troubles will go undetected. To the extent practical, the objective should be to give all customers good service all of the time. At present, with the more complex carrier type trunks, daily measurements are necessary if the objective is to be met. Other trunks, of course, do not need to be measured as often because of inherently better stability and because the

number of points where maladjustments can be made is not as large.

4.04 Table A lists the recommended frequency of tests for various types of trunks which, based on experience, are required to give good service. The Trunk Transmission Maintenance Index plan permits test intervals which are much longer than those shown in Table A. TTMI intervals are established primarily for the purpose of assuring that every trunk is measured at least once in a given period and are based on practical considerations of work force requirements where automatic equipment is not provided. For measurements made using automated test frames, the TTMI interval are essentially those in Table A, allowing for possible test frame or associated equipment failures. However, the more often a trunk is measured, the greater are the chances that deviations will be detected before they become large enough to affect service, and degrade the index. Consequently, more frequent measurements than those required for the index will result in a better index rating, assuming that deviations are corrected as they are detected.

CAROT ENVIRONMENT

4.05 For offices tested by CAROT, the trunk testing schedule has been optimized not on an individual office basis, but for all the offices tested by a given CAROT center. The objective of the optimized schedule is to minimize the detection time of trunk faults. In arriving at this optimized testing schedule, the capabilities of trunk fault detection of the various types of switching machines have been considered. In addition, the effect on service to a customer of a particular fault has been taken into account.

4.06 The new scheduling procedure tailors the CAROT test schedule to the specific network which each CAROT system is testing. This is done in such a way as to minimize the network ineffective attempt rate due to trunk faults, provide an adequate amount of transmission testing (at least one transmission test per trunk per month), and give a means for protecting service on small trunk groups where the effect of a short holding time (killer) trunk fault can be severe. This last feature helps reduce the number of trunk groups giving inferior service at any instant in time.

4.07 The overall steps involved in applying the procedure are:

(a) Obtain network structure information.

Categorize each near-end office (ie, with a ROTL) into one of the "machine types" defined in the procedure. "Machine type" here denotes the basic structure (SXS, ESS, 5XB, XBT, 1XB), the built in trunk fault detection systems and the utilization of these systems. This results in a few distinct "machine types" for a network. Next, for each near-end office, extract from the CAROT data base the size and type (high usage or final) of each of its trunk groups. Pool together the trunk group information of all offices belonging to the same "machine type." Finally, obtain the testing capacity (overall tests per month) of the CAROT installation.

(b) Apply the manual optimization procedure.

For each machine type, the pooled trunk group information is entered into a supplied form and summarized. Next, following the procedure's instructions outlined in Section 190-102-308, three candidate optimal solutions are calculated, the "nominal" solutions, "small service protection" solution, and "large service protection" solution which, respectively, provide an increasing measure of service protection to certain smaller sized groups. Then the best of the three solutions is chosen and its optimal test rates are simplified down to a few distinct ones.

(c) Implement the optimal test rates. The test codes of the trunks in the data base are changed in order to reflect the new test rates. Finally the trunks are scheduled for testing according to the new test rates.

The overall procedure is straightforward to carry out and, it can be done by one person in a few days' time.

4.08 The main benefits obtained from optimal CAROT testing are:

- (1) Minimizes the overall network ineffective rate due to faulty trunks
- (2) Tends to equalize the ineffective rates of different machine types
- (3) Provides a measure of service protection to certain smaller sized trunk groups.

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4.09 The estimated relative improvement in the network ineffective rate due to faulty trunks obtained via optimal testing depends on the initial allocation of testing (ie, the facility mix). Some initial allocations may be quite good in comparison to the optimal while others may be poor. However, the optimization procedure provides a systematic way of finding the testing allocation which minimizes the network ineffective rate while satisfying the various service and capacity constraints.

4.10 A second benefit of optimal testing is that it tends to equalize the ineffective rates, due to faulty trunks, for different machine types. This arises from the nature of optimal testing, in which additional testing is given to machines with little or no automatic testing and less is given to machines with a high degree of automatic testing.

4.11 When a killer is present, a small group has a more severe effect on customer service than a large group, arising from the fact that a call arrival has a greater chance of selecting the killer in a small group. The only way to minimize the effects of killers in small groups is to detect them sooner by way of more frequent testing.

A. One kHz Loss Measurements

4.12 Two-way 1 kHz loss measurements are required on all 4-wire repeatered voice-frequency trunks, trunks on carrier channels, 2-way voice-frequency trunks equipped with hybrid-type repeaters, trunks equipped with MFT equipment, and all trunks terminated at one or both ends in 4-wire switching systems. Two-way measurements are required on all trunks assigned to these facilities, because each direction of transmission is essentially independent of the other and may not necessarily have the same losses and gains.

4.13 Two-way manual measurements are made with a tester at each end of the trunk, using 101-type test lines - at the incoming end - which appear at distant testboards or at switching system maintenance centers.

B. Schedule of Tests

4.14 Where tests must be made manually with assistance at the distant office, a testing schedule is necessary to secure proper coordination. The schedule should be prepared for all such tests by the office controlling the trunks. In many

situations, where a 104-type test line is not available at the distant office, 2-way tests on 2-way trunks can be made by having each office test to a 102-type or combined 100-type test line at the distant office. Where this is done, the control office should check to assure that all such trunks will be scheduled for tests in each direction of transmission during the same period, and that the results of the tests made by the noncontrol offices are transmitted to the control office for inclusion in the records and reports of the control office. Section 660-402-010 outlines forms for use in scheduling transmission measurements.

4.15 Schedules should be arranged so that each trunk is tested at least once (in each direction for 4-wire type trunks) during the required periodic interval.

4.16 Where automatic transmission tests are made, it will be desirable to schedule the tests so that a minimum number of busy trunks is encountered. In many cases, it will be found that measurements can be made most effectively during the night, weekends, or other light load periods.

5. TESTING ARRANGEMENTS

5.01 Periodic tests should be made with automatic transmission measuring equipment, where provided, assuming that far-end equipment is available at the distant offices. In all other cases, the tests should be manually made from the secondary testboard, where provided, following the procedures outlined in sections of practices applying to the particular testboard in question. Trunks which do not appear at testboards are measured as described in the sections of practices applying to the particular offices involved.

6. USE OF RESULTS OF MEASUREMENTS

6.01 *Measurement of the loss of trunks is valueless unless corrective action is taken when required.* Where measurements indicate the need for action, it should be taken promptly. The results of measurements on trunks using carrier facilities in common should be analyzed, using mechanized methods where available, to determine whether the trouble is individual to a particular trunk, or common to the carrier system, channel group, supergroup or other grouping. Where ATMS is available it will be desirable to group

trunks for testing by facilities so that troubles common to a facility will be evident from a visual inspection of the printout. In this way, much time will be saved in locating the source of trouble, and any remedial action taken will be more effective. No adjustment should be made in any segment except on the basis of a measurement of the segment itself. No carrier should be readjusted unless it has been determined that the carrier system components and associated pilots are within specified limits. Adjustments which tend to compensate for a maladjustment in some other part of the trunk only leads to further trouble. Such a procedure will not only degrade service, but it is wasteful of labor. Whenever a trunk is taken out of service to correct a transmission trouble, it should be brought as close to the EML as possible and should not be returned to service unless it meets the requirements of Section 660-450-301.

6.02 The results of measurements should be analyzed to identify groups of trunks where

deviations are consistently positive or negative, and the necessary action taken to reduce the deviations. Section 010-300-010 (controlled maintenance plan for transmission and signaling equipment serving all trunks and special services) outlines procedures for the analysis of trunk loss deviations and other trunk troubles.

6.03 Trunks which deviate repeatedly after normal corrective action is taken should be investigated critically for possible troubles, wiring and installation errors, etc. Section 660-430-012 discusses methods which can be used to detect unstable trunks which are measured automatically and Section 660-402-010 discusses methods which can be used to detect unstable trunks which are measured manually. If efforts along these lines fail, the difficulty should be reported to higher supervision through channels of organization.

TABLE A
RECOMMENDED FREQUENCY OF OVERALL 1 KHz
LOSS MEASUREMENTS ON MESSAGE TRUNKS

NON-CAROT TESTED

Trunks containing carrier channels of the following types only:

L, R with supergroup and group regulation, N2, N3 or T	Weekly
Trunks containing carrier channels of all other types	Daily
Trunks containing only VF repeaters	Semimonthly
Nonrepeated voice-frequency trunks	Monthly

CAROT TESTED TRUNKS

Follow procedures outline in Section 190-102-308 to establish the recommended optimal frequency of testing.

TABLE B
MAINTENANCE GUIDES

Deviation From Expected Measured Loss (EML)
Notes 1, 2, and 3

TYPES OF FACILITIES	LENGTH IN MILES		
	UNDER 100	100-500	OVER 500
Nonrepeated voice frequency	1.0	—	—
Repeated Voice Frequency (Note 4)			
(1) E1, E2 repeaters	1.0	—	—
(2) E6 repeaters	1.0	—	—
(3) E13, E23 repeaters	1.0	—	—
(4) V-type repeaters	1.0	1.5	1.5
(5) MFT Equipment	1.0	1.0	1.0
Intrabuilding trunks	0.6	—	—
T carrier	1.0	1.0	—
C, H, J, K, N, ON, O, or similar systems, single link	1.0	1.0	1.5
L, R single or multiple link with group and supergroup regulation	1.0	1.0	1.0
L, R single link without group or supergroup regulation	1.0	1.0	1.0
L, R single or multiple link with supergroup regulation only	1.0	1.0	1.0
L, R multiple link without group or supergroup regulation	1.5	1.5	2.0
All other multiple link carrier	1.5	1.5	2.0
Multifacility trunks	1.5	1.5	2.0

Notes:

1. The deviations shown in this table are to be used only as guides to indicate when corrective action will be profitable.
2. Any trunk with deviation exceeding 3.7 dB should be removed from service immediately.
3. Trunks with 1A companders — increase limits by 1.0 dB.
4. Repeated voice frequency trunks using aerial cable without regulation — increase limits by 0.5 dB.