

CONTROL OF TRUNK LOSS DEVIATIONS
ADMINISTRATION OF MEASUREMENTS
USE OF FORM E-3834 AND FORM E-5152

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1. GENERAL

1.01 This section describes the preparation of Form E-3834, Trunk Loss Maintenance—Stroke Sheet for Manual Measurements, and Form E-5152, Trunk Loss Maintenance—Record of Automatic Measurements. These forms should be used to summarize and develop the percentage of measurements falling into the various brackets of deviations from the Expected Measured Loss (EML). These percentages are used to compute the Loss Component of the Trunk Transmission Maintenance Index on Form E-4277C.

1.02 This section is reissued to revise Form E-5152, to make minor changes in Form E-3834, and to make changes in the text as indicated by marginal arrows. These changes provide: (1) rules that will eliminate the need to keep records of the trunks not measured by the ATTC because of busy conditions; (2) a requirement for two loss readings on 2-wire trunks with hybrids; and (3) a requirement for a minimum of six measurements per quarter on a trunk scheduled to be measured automatically on a weekly or daily basis.

1.03 Related sections concerning Trunk Transmission Maintenance are:

- (1) 660-430-010—Control of Trunk Loss Deviations—General Considerations

- (2) 660-430-012—Control of Trunk Loss Deviations—Improvement Procedures
- (3) 660-430-013—Control of Trunk Loss Deviations—Stability Recordings and Histories
- (4) 301-121-100—Trunk Transmission Maintenance Index—Loss Component—General Description
- (5) 301-121-300—Trunk Transmission Maintenance Index—Loss Component—Index Tables
- (6) 301-121-500—Trunk Transmission Maintenance Index—Loss Component Manual—Summary Procedures
- (7) 660-402-300—Transmission Maintenance—1000 Cycle—Transmission Loss Measurements on Message Trunks

1.04 Types of loss measurements covered are:

- (1) Automatic measurements, using the ATTC or ATMS equipment
- (2) Manual measurements made from testboards, OGT test frames, or other locations

1.05 Measurements should be made on message trunks which have gain devices or make use of outside plant facilities. Measurements will be grouped by type of facility:

- (1) Group 1—Trunks making use of carrier channels or equipped with repeaters other than E type.
- (2) Group 2—Trunks equipped with E-type repeaters or without gain devices.

1.06 To minimize the number of trunks not measured automatically by ATTC equipment

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because of busy conditions the following procedures should be used:

- (a) Operate the test frame regularly during light load periods.
- (b) The test frame should be started at a different point in the sequence on successive runs.
- (c) Be certain that the total number of measurements in a quarter equates to an average of 6 sets of measurements per quarter (12 measurements on a trunk requiring 2-way measurements).

If these rules are followed it can be assumed that all of the trunks connected to the ATTC were measured unless the test lines were out of service. ♦

1.07 ♦ Anytime a test line is found in trouble, this fact should be recorded and the trouble referred to the responsible office. Trunks which were not measured automatically during the report period because of test line troubles should be measured manually and reported with the other manual measurements made. ♦

2. COMPUTING DEVIATIONS FROM EML

2.01 Deviations from EML or Reference Loss should be stroked on Form E-3834 by deviation groups for manual measurements. Deviation register meter readings should be recorded on Form E-5152 for automatic measurements. Forms E-3834 and E-5152 are illustrated in Figures 1 and 2, respectively.

2.02 The computed loss shown on the circuit layout record, exchange trunk order, or equivalent is called the Expected Measured Loss or EML. The EML should include any test pads used while measuring. Deviations on trunks, except those equipped with E1 and E2 repeaters, should be computed from the EML. The deviations are the differences between the EML and the Actual Measured Loss (AML). (The measured loss should not be corrected for temperature variations.) When the AML is less than the EML, the deviation is recorded as a negative or minus deviation (not enough loss).

2.03 A deviation on a trunk with E1 or E2 repeaters is the difference between the measured loss and the *Reference Loss*. However,

an office that can meet objectives using the EML (instead of Reference Loss) to compute deviations may elect to use the EML.

2.04 *Reference Loss*: When an E1 or E2 repeater is placed in service, the Effective Gain is obtained by averaging the gains measured at several frequencies or by using a noise generator as the source of test power. Then, the 1000 cycle gain is measured and recorded as the Reference Gain. It is used as a reference to determine whether the gain has changed from the initial lineup. The Reference Loss of the trunk is obtained as follows:

- (a) Compute the difference between the Reference Gain and the Effective Gain of the repeater. (Obtain data from repeater office.)
- (b) If the Reference Gain is larger than the Effective Gain, subtract the difference from the EML. This is necessary because the repeater has more gain at 1000 cycles than the average of the speech band.
- (c) If the Reference Gain is smaller than the Effective Gain, add the difference to the EML. This is necessary because the repeater has less gain at 1000 cycles than the average of the speech band.
- (d) Retain the EML shown on the trunk or circuit record card and show the Reference Loss for future reference.

3. HOW TO PREPARE FORM E-3834

A. Form Headings

3.01 This form is to be used for manual measurements only. Figure 1 is an example of the form. Automatic measurements are reported on Form E-5152. Those trunks which can be measured by the automatic frames, but have not been measured because of test line troubles, should be measured manually and reported as manual measurements on Form E-3834.

3.02 *Type of Facility*—A separate form is prepared for each type of trunk being measured. (Exceptions: If trunks with carrier and trunks with other than E-type repeaters are measured at the same intervals, both can be included on the same form. Likewise, if trunks with E repeaters and trunks with no gain devices

are measured at the same intervals, both can be included on the same form.) The type of trunks measured and recorded on the form is indicated by placing an (X) in the appropriate box.

Note: Trunks made up of a combination of types of facilities are considered in the following progressions:

If the trunks contain carrier—Mark the Carrier box

No carrier, but other Voice Rep—Mark the Other Rep box

E Rep only—Mark the E Rep box

No electronic gain device, but has outside plant—Mark the Non-Gain box

◆ For non-gain and E Repeatered trunks, also mark the Hybrid or No Hybrid box. ◆

3.03 Interval of Measurements—A separate form is prepared for each interval of measurement for each type of facility as discussed above. Monthly measured trunks are recorded on separate forms for each month. Monthly results are averaged when preparing the quarterly report. This is accomplished by averaging column totals on this form. The interval of measurements is indicated by placing an (X) in the appropriate box.

B. Stroking

3.04 Columns are provided for three broad deviation categories:

- (1) Not Enough Loss
- (2) Within ± 0.7 of zero
- (3) To Much Loss

3.05 The column for Not Enough Loss is further subdivided into deviation columns:

- (1) -3.8 and more
- (2) -1.8 thru -3.7
- (3) -0.8 thru -1.7

3.06 The column for Too Much Loss is subdivided by the same deviation increments shown in 3.05, but on the plus (+) side.

3.07 Deviations from EML are stroked in the appropriate columns. Each line should have five strokes per loss group before the following line is used. A total of 150 strokes can be recorded per loss group on each form.

C. Computations

3.08 Column Totals—The total of each column is entered in these blocks.

3.09 $T = \text{Line Total}$ —The total number of measurements is the sum of the column totals.

3.10 % of Total—The percent of total for each column is calculated by dividing the Line Total (T) into the particular Column Total and then multiplying the answer by 100. The column percentages added together must equal to 100%.

3.11 Accumulation—This line is calculated as shown in each of the blocks; eg, block H is the sum of A + B, etc.

3.12 % Deviations Exceeding ± 0.7 dB—This block, labeled (M), is the sum of blocks J and K.

3.13 % Deviations Exceeding ± 1.7 dB—This block, labeled (N), is the sum of blocks H and L.

3.14 % Deviations Exceeding ± 3.7 dB—This block, labeled (P), is the sum of blocks A and G.

3.15 ◆ No. Trks. Cont.—This Type—The number of trunks of the type covered by the form, controlled by the office or entity making the report, should be recorded; eg, an office which controls 60 E-repeater trunks would report 60, although only 30 of these trunks may have been scheduled for measurement. ◆

3.16 $U = \text{Prev. Meas.}^*$ —This block requires different information depending upon the interval of measurement used for the type of trunks

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covered by the report. Directions are shown in a note on the form as follows:

***Previous measurements:**

- (1) For annual measurements, show the total measurements for the last three quarters.
- (2) For 6-month measurements, show the total measurements for the previous quarter.
- (3) For 3-month and monthly measurements, show 0 in Block U.

3.17 Measurements Made—Enter the sum of T + U.

3.18 % Required Meas. Made—For carrier and other repeater trunks and 2-wire trunks that terminate in a 4-wire switching system (with Hybrid), calculate the percent of required measurements made by dividing 2 times the trunks controlled (X) into the number of measurements made (Y) and multiply by 100, ie, $100(Y \div 2X)$.

For E-repeated trunks with non-gain trunks without a Hybrid, divide the number of controlled trunks (X) into the number of measurements (Y). The factor of 2 is not required in this case because only one measurement per trunk is required on these trunks. ♦

4. HOW TO PREPARE FORM E-5152

A. Form Heading

4.01 Period Covered—Record the inclusive dates covered by the form being prepared.

4.02 Frame No.—Record the number of the frame in a multiframe office. If two test frames are measuring the same trunks, the register readings can be combined. However, if one measures trunks that the other does not measure, separate Forms E-5152 should be used for recording the register readings. Also the results should be summarized on a separate line of Form E-4277C. For example, the results for an ATMS measuring certain trunks to 105 test lines should be summarized separately from the results of an ATTC measurement on other trunks to 104 test lines. ♦

4.03 Location—Enter the name of the office where the test frame is located.

4.04 Type of Facility—A separate form is prepared for each type of trunk being measured automatically. (Exception: When trunks with carrier and trunks with other than E repeaters are measured at the same intervals, they can be included on the same form. Likewise, when trunks with E repeaters and trunks with outside plant and no gain devices are measured at the same intervals, they can be included on the same form.) The type of trunks measured and recorded on the form is indicated by placing an (X) in the appropriate box; eg, Carrier, Non-Gain, E Rep, Other Rep, ♦ Hybrid and No Hybrid. ♦

4.05 Interval of Measurement—A separate form is prepared for each interval of measurement for each type of facility as discussed above. The interval of measurement is indicated by placing an (X) in the appropriate box. If trunks are measured weekly or more often and if all the trunks are measured at the same frequency, then all the readings can be submitted. However, if some trunks are measured weekly and others more often, then only one set of measurements per week should be submitted for index purposes. ♦

B. Column Completion

4.06 This form is to be used for recording and summarizing all deviation register readings of the automatic transmission measuring equipment. **All routine measurements** should be recorded on this form and become a part of the office index. An example of the form is shown in Fig. 2. Each form may be used to record seven days of measurements. It may be desirable to calculate results at the conclusion of a week of measurements for local evaluation. Another Form E-5152 may be used to summarize the weekly forms on a monthly or a quarterly basis.

4.07 Column B—Deviation Register Readings—For each date record the readings of the loss deviation registers. The designation of each of the registers is shown in Column A.

4.08 Total (Line 34)—The total of each column is recorded for each day of measurements.

4.09 N's (Line 35)—The total number of noise indications recorded by ATTC frames is recorded in these blocks on a daily basis. On days that the ATTC is not conditioned to measure noise a dash (—) is shown. On days that the ATTC is

conditioned for noise measurements and no N's are recorded a zero (0) is entered. This line is not used when ATMS registers are being recorded.

4.10 Column C—Line Totals—Enter the total readings for each register for the number of days covered by the form. Each form can be used for recording register readings for seven days.

4.11 Block T—is the sum of the total measurements for the days covered by the report (total of Line 34). This furthermore is the total of Column C.

4.12 Block N—is the total number of N's recorded for the period covered by the report (total of Line 35).

4.13 Column D—Summations—This column must be completed on the form used for summarizing the report period and may be used locally to determine progress during the report period. Blocks in this column are for summarizing the line totals as shown on the form. For example, line totals for Lines 1 through 9 are summarized to Line 9 in Column D, etc.

Note: Line totals for Lines 16, 17, and 18 are not to be summarized.

4.14 Block TN—is for recording the total measurements made that included a noise check. This is the sum of the totals in Line 34 for those days that Line 35 contains a number or 0. Measurements on Line 34 on the dates when Line 35 contains a dash (—) should not be included in this total. (See Paragraph 4.09.)

4.15 Column E—Percent of Total—For each total shown in Column D the percentage of total (T) is calculated and recorded in this column. The formula is always the number in Column D divided by T times 100.

C. Completion of the Lower Part of the Form

4.16 % Noisy—This block is to record the % of measurements found to exceed the noise limit of the ATTC test frame. The formula is N (total N's) divided by TN (total measurements for Noise) times 100. This block is not used when the form is used for ATMS loss results.

4.17 Block F—% Deviations Exceeding ±0.7 dB—The total of the percentage in Column E should be recorded in this block. This percentage will usually be less than 100%.

4.18 Block G—% Deviations Exceeding ±1.7 dB—The total of the percentages shown in Column E, Lines 9, 13, 24, and 33 should be recorded in this block.

4.19 Block H—% Deviations Exceeding ±3.7 dB—The total of the percentages shown in Column E, Lines 9 and 33 should be recorded in this block.

4.20 Block J—Number of Controlled Trunks—Record the number of controlled trunks being measured automatically. Exclude those that could not be measured because of test line troubles.

4.21 Block K—Base for Computing % Measured—Compute and record the Base for Computing % Measured. This base is computed as follows:

FREQ. OF MEAS.	NO. OF EQUIV. TRUNKS
DAILY	6 X N
WEEKLY	6 X N
SEMI-MONTHLY	6 X N
MONTHLY	3 X N
QUARTERLY	1 X N

Where N = 1 for a 2-wire trunk without a hybrid and N = 2 for any 4-wire trunk, and for 2-wire trunks with hybrids (terminated in a 4-wire switching system).

4.22 Block L—Percent of Measurements Made—Compute

$$\frac{\text{Block T}}{\text{Block K}} \times 100 \text{ and record } -$$

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If this computation is greater than 100.0, show 100.0. ♦

5. ORDERING INFORMATION FOR FORMS

5.01 Forms E-3834 and E-5152 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-3834 (9/70)

(Quantity) Form E-5152 (9/70) ♦

**TRUNK LOSS MAINTENANCE
STROKE SHEET FOR MANUAL MEASUREMENTS**

DATE _____

TYPE OF FACILITY					INTERVAL OF MEASUREMENTS			
CARRIER <input type="checkbox"/>	NON-GAIN <input type="checkbox"/>	NO HYBRID <input type="checkbox"/>		WEEKLY <input type="checkbox"/>	MONTHLY <input type="checkbox"/>	6 MONTHS <input type="checkbox"/>		
OTHER REP <input type="checkbox"/>	EREP <input type="checkbox"/>	HYBRID <input type="checkbox"/>		2 X MONTH <input type="checkbox"/>	3 MONTHS <input type="checkbox"/>	ANNUAL <input type="checkbox"/>		
NO. OF STROKES	NOT ENOUGH LOSS			0 ± .7	TOO MUCH LOSS			
	-3.8 & MORE	-1.8 THRU -3.7	-.8 THRU -1.7		+8 THRU +1.7	+1.8 THRU +3.7	+3.8 & MORE	
5								
10								
15								
20								
25								
30								
35								
40								
45								
50								
55								
60								
65								
70								
75								
80								
85								
90								
95								
100								
105								
110								
115								
120								
125								
130								
135								
140								
145								
150								
COLUMN TOTALS								T = LINE TOTAL
% OF TOTAL	A	B	C	D	E	F	G	% LINE TOTAL
ACCUMULATION		H = (A + B)	J = (A+B+C)		K = (E + F + G)	L = (F + G)		100% U = PREV. MEAS.*
% DEVIATIONS EXCEEDING ± 0.7 db				M = (J + K)	NO TRKS. CONT.—THIS TYPE		X	
% DEVIATIONS EXCEEDING ± 1.7 db				N = (H + L)	MEASUREMENTS MADE		Y = T + U	
% DEVIATIONS EXCEEDING ± 3.7 db				P = (A + G)	% REQUIRED MEAS. MADE		Z = SEE NOTE 1	

OFFICE _____ PERIOD COVERED _____

- * PREVIOUS MEASUREMENTS: (1) FOR ANNUAL MEASUREMENTS, SHOW LAST 3 QUARTER'S MEAS.
- (2) FOR 6 MONTHS MEASUREMENTS, SHOW LAST QUARTER'S MEAS.
- (3) FOR 3 MONTHS & MONTHLY MEASUREMENTS, SHOW 0 IN BLOCK U.

NOTE 1: UNDER TYPE OF FACILITY, WHEN CARRIER OR OTHER REPEATER IS CHECKED, FORMULA FOR Z = (Y + 2X) x 100.
WHEN E REP OR NON-GAIN, AND NO HYBRID, FORMULA FOR Z = (Y ÷ X) X 100.

Fig. 1—Trunk Loss Maintenance Stroke Sheet for Manual Measurements

**TRUNK LOSS MAINTENANCE
RECORD OF AUTOMATIC MEASUREMENTS**

PERIOD COVERED _____ FRAME NO. _____ LOCATION _____

TYPE OF FACILITY _____ INTERVAL OF MEASUREMENTS _____

CARRIER NON-GAIN NO HYBRID DAILY WEEKLY 3 MONTHS
 OTHER REP EREP HYBRID 2-X MONTH MONTHLY

LINE NO.	A	B						C	D	E
	DATE →	DEVIATION REGISTER READINGS						LINE TOTALS	SUMMATIONS	PERCENT OF TOTAL
1	+8.0									
2	+7.5									
3	+7.0									
4	+6.5									
5	+6.0									
6	+5.5									
7	+5.0									
8	+4.5							LINES 1-9	(D9 ÷ T) x 100	
9	+4.0									
10	+3.5									
11	+3.0							LINES 10-13	(D13 ÷ T) x 100	
12	+2.5									
13	+2.0									
14	+1.5							LINES 14-15	(D15 ÷ T) x 100	
15	+1.0									
16	+0.5							DO NOT SUMMARIZE THESE LINES		
17	0.0									
18	-0.5									
19	-1.0								LINES 19-20	(D20 ÷ T) x 100
20	-1.5									
21	-2.0									
22	-2.5							LINES 21-24	(D24 ÷ T) x 100	
23	-3.0									
24	-3.5									
25	-4.0									
26	-4.5									
27	-5.0									
28	-5.5									
29	-6.0									
30	-6.5									
31	-7.0									
32	-7.5							LINES 25-33	(D33 ÷ T) x 100	
33	-8.0									
34	TOTAL						T		% Noisy $\frac{N}{TN} \times 100$	
35	N's						N	TN		
% DEVIATIONS EXCEEDING ± 0.7 db (SUM OF COL. E)		F	NO. OF CONTROLLED TRUNKS BEING MEASURED				J			
% DEVIATIONS EXCEEDING ± 1.7 db (SUM OF COL. E, LINES 9, 13, 24 & 33)		G	BASE FOR COMPUTING * % MEASURED				K			
% DEVIATIONS EXCEEDING ± 3.7 db (SUM OF COL. E, LINES 9 & 33)		H	% OF MEASUREMENTS MADE (T/K x 100)				L			

* SEE TEXT PARAGRAPH 4-21

Fig. 2—Trunk Loss Maintenance Record of Automatic Measurements