E-TYPE TELEPHONE REPEATERS

EFFECTIVE GAIN MEASUREMENTS

METHOD F—MEASUREMENTS OF GAIN PEAKS AND VALLEYS—

USING 2G REPEATER TEST SET

This section describes the procedure for determining the effective gain of an E1 or E13 repeater from measurements of maximum and minimum gains at several unpredictable frequencies within the range of 300 cycles to 3000 cycles. The use of this method is restricted as stated in Section 332-200-500, 5.01 (c).

The *effective gain* is not ordinarily applied on a routine test basis but the *reference gain* derived from the effective gain may be used on a routine test basis.

The following procedure serves to determine the effective gain and the reference gain of the repeater.

When two or more repeaters are operated in tandem on a line, the effective gain must be determined for each repeater.

APPARATUS:

   Refer to Section 332-200-505.

STEP	PROCEDURE
1	Proceed in accordance with Section 332-200-505, Steps 1 to 4, appropriate Step 5 or 6, and Step 7.
2	Operate the test set CAL-MEAS key to MEAS and the REP key to IN. Set the frequency at 300 cycles. Adjust the oscillator output and the detector sensitivity to obtain a convenient reading on the detector meter. Ascertain that the repeater is not overloaded. See Section 332-200-500, 5.10.
3	Turn off the oscillator output momentarily. *Requirement:* The detector reading should drop at least 10 db. *Note:* If this requirement is not met, refer to Section 332-200-500, 5.13.
4	Reapply the 300-cycle output, and observe the detector reading for comparison with that to be obtained in Step 5.

STEP	PROCEDURE
5	Operate key REP to OUT. If the repeater under test is an E13 repeater, with a 680A tool disengage the E3 repeater from its socket on the repeater mounting shelf. See Section 332-200-500, 2.02 and 5.12. Plot the *change* in db in the detector readings obtained in going from Step 4 to Step 5. See Note 1.
6	Operate key REP to IN. If the repeater under test is an E13 repeater, restore the E3 repeater to its socket on the repeater mounting shelf. See Section 332-200-500, 2.02 and 5.12. Increase the frequency slowly while observing the direction and movement of the detector meter needle. Continue increasing the frequency until a point has been reached where the needle reverses direction or remains steady.
7	Adjust the oscillator output and detector sensitivity to obtain a convenient reading on the detector meter. Note the reading in db. Operate key REP to OUT. If the repeater under test is an E13 repeater, with a 680A tool disengage the E3 repeater from its socket on the repeater mounting shelf. See Section 332-200-500, 2.02 and 5.12. Plot the *change* in readings in db. See note 1.
8	Repeat Steps 6 and 7 until 3000 cycles have been reached. If there are no peaks between 200 and 500 cycles, repeat Steps 6 and 7 at 400 and 600 cycles to obtain a more accurate 500-cycle reading.
9	Proceed in accordance with Section 332-200-507, Steps 9 through 14.
10	When the effective gain and the variations in gain meet requirements, check the stability as follows: (1) Request or dial test terminations for *idle-line* condition (open termination). (2) Operate key REP to IN. (3) If the repeater under test is an E13 repeater, ascertain that the E3 repeater is engaged in its socket on the repeater mounting shelf.

Notes

1. At any given frequency, the gain of the repeater is determined by subtracting the detector reading obtained with the key REP in position OUT (and E3 repeater disengaged, if involved) from the detector reading obtained with the REP key in position IN (and E3 repeater engaged, if involved). Therefore, the gain may be determined by observing the *change* in detector readings in going between these two conditions.

STEP	PROCEDURE
10 (Cont)	(4) Slowly sweep the frequency from 300 cycles to 20,000 cycles to determine the frequency of the maximum gain peak. Record the value of the gain peak and the frequency at which it is attained. *Requirement*: The maximum gain peak shall not exceed 20 db. (5) Determine the insertion gain at the maximum gain peak.
11	If the effective gain or variations in gain as determined from curve analysis does not meet requirement in Step 9, refer the results to the design group.
12	When the stability requirement of Step 10 (4) is met: (a) If the network of the E1 repeater was used in Step 10, disconnect the P11A cord and restore the repeater to the in-service condition. (b) If the test set network was used for the E1 repeater in Step 10, (1) Strap the network of the E1 repeater to conform to test set patches, and terminate the line for gain test, in accordance with Section 332-200-505, Step 21 (1) through (6). (2) Measure the 1000-cycle reference gain. *Requirement*: The gain shall not deviate more than 0.5 db from the value established in Step 9.
13	If the requirement of Step 12 (b) (2) is met, record the gain and restore the repeater to in-service condition.
14	If the requirement of Step 12 (b) (2) is not met, re-examine the E1 repeater network strapping in comparison with patching on the test set network and for faulty connections. (a) Where a correction is made, repeat Step 12 (b) (2). If the requirement of Step 12 (b) (2) is not then met, refer results to the design group. (b) Where no correction is made, refer results to the design group.