TYPE N AND ON CARRIER TELEPHONE SYSTEMS

LINE BUILD-OUT AND CROSS-CONNECTING POINT FREQUENCY CHARACTERISTIC

SPAN PAD AND EQUALIZER SELECTION

The equalization and loss compensation in a high-frequency line using N2 repeaters is normally accomplished by plug-in equalizers and span pads at the repeater mounting shelf or the N2 repeater to N1A adapter assembly. However, at locations equipped with cross-connect facilities, provision is made for equalization at the line build-out bays. The bays contain plug-in line build-out units, each of which provides sockets for two equalizers in addition to input and output span pads. A line build-out unit is required for each carrier line termination (one transmit pair and one receive pair). A terminal system requires one line build-out unit and a through system requires two. The amount of loss correction required in a particular section of the line is determined by measuring repeater gain and determining the difference, if any, from ***nominal*** repeater gain. If the difference exceeds 1 db, an appropriate input span pad should be used to bring the repeater gain within 1 db of the nominal gain. The amount and type of equalization required for a particular repeater may be determined by using the N-line deviation test set.

The information in this section is primarily intended to be used after the terminal and repeater equipment has been installed and after the line facilities are ready for tests and adjustments prior to placing the carrier system in service; however, the information in this section also applies to the operation and maintenance of the system while it is in service.

The purpose of this section is to provide procedures for determining that the correct span pad is provided at the input of a repeater and for determining the amount and type of equalization required for the particular repeater location.

APPARATUS:

1 — Type 65017 or KS-19750 (when available) N-Line Deviation Test Set

1 — KS-14510 Volt-Ohm-Milliammeter (VOM), or equivalent

1 — J94002J (2J) Repeater Test Set

1 — P14C Adapter Cord

1 — W20C Connecting Cord

STEP	PROCEDURE
	Note: Best results will be obtained if the procedures in this section are performed when the temperature is at the annual mean for the locality. If these procedures are performed at other than mean temperatures, it is recommended that the system be rechecked when the temperature is close to its annual mean.
	A. Span Pad Check
1	Ensure that the total carrier power at the output of the transmitting terminal is at the proper level.
2	Check to see that the proper span pad and equalizer(s) as specified on the circuit layout card are inserted into the correct sockets in the line build-out unit and that a line build-out unit is inserted into the line build-out bay. If only one equalizer is provided, check to see that a P46Q910 shorting plug is inserted into the other equalizer socket.
3	Allow approximately 20 minutes for the repeater to regulate if any changes in pads or equalizers are made. Measure the total output carrier power of the repeater under test in accordance with the procedures and requirements of Section 362-465-501.
	Caution: Steps 4 and 5 should be performed as quickly as possible to ensure accurate measurements. Do not ground the probes during these steps as severe damage to the equipment may result.
4	Using the VOM, measure the resistance between the 22 and RTH test points (across thermistor) on the E-W or W-E amplifier, whichever is appropriate. (Set the VOM to the X100 scale for an H-L repeater and to the X10 scale for an L-H repeater.) Note the resistance.
5	Reverse the VOM test probes in the 22 and RTH test points and note this measurement.
6	Average the resistance readings obtained in Steps 4 and 5. (Averaging is necessary because the measurements are made across a transformer with a dc drop.)
	Requirement: H-L Repeater: 1800 to 2400 ohms (2100 ohms nominal) L-H Repeater: 370 to 490 ohms (432 ohms nominal)
7	If the requirements in Step 6 are not met, refer to Fig. 1 and determine the difference from nominal gain represented by the average resistance reading. If the difference from the nominal gain is greater than 1 db and the repeater is operating properly, the repeater input span pad in the line build-out unit should be changed to bring the gain within limits. If the average resistance is less than nominal, the span pad value should be increased. If the average resistance is greater than nominal, the span pad value should be reduced.
	Note: It is important that span pads not be changed indiscriminately. Inform Transmission Engineer prior to any change.

STEP	PROCEDURE
8	If a new or different span pad was required in Step 7, repeat Steps 4 through 7 after the repeater has had time to regulate, and ensure that the repeater gain has been brought within limits.
	B. Equalization Check
1	Remove the repeater connector from either switching jack J2 or J3 on the repeater mounting shelf or N2 repeater to N1A adapter assembly.
2	Using the P14C adapter cord and W20C cord, connect the N-line deviation test set to the vacated switching jack.
3	Adjust and calibrate the N-line deviation test set in accordance with procedures described in Section 362-415-508 for KS-19750 sets or in accordance with the special section for type 65017 sets.
4	Perform slope measurements as outlined in Section 362-415-508 for KS-19750 sets or the special section for the type 65017 sets. ***Requirement:*** The measure slope should be within ±1.0 db of the output slope of the repeater as specified by the circuit layout card. ***Note:*** The Transmission Engineer should be notified if these requirements cannot be met on initial line-up. On routine measurements, the effect of temperature (or other natural causes) may prevent the requirement being met on some systems. In such cases the tests should be considered acceptable if the difference in slope variations does not exceed ±0.5 db between two successive locally powered repeater points. (Locally powered repeater points are used as a standard because any temperature contributions to slope by the repeater itself can be discounted.)
5	Repeat Step 4 for bulge, cubic, and quartic measurements. Note each measurement and inform the Transmission Engineer upon completion of the checks.

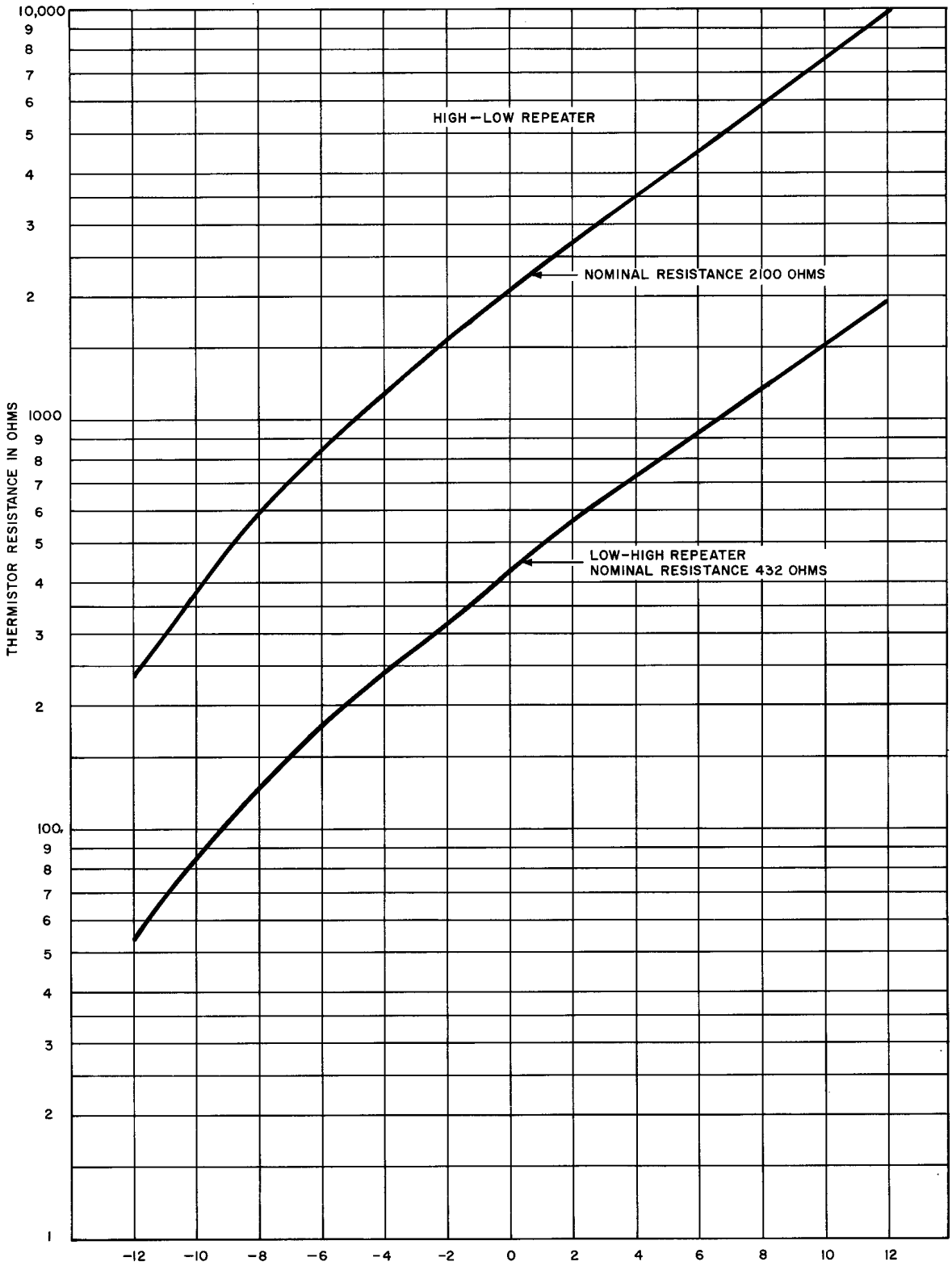

Fig. 1 — Change in N2 Repeater Gain in DB from Nominal Gain of 47 DB