TYPE N2 REPEATER

REPEATERED HIGH-FREQUENCY LINE

CARRIER LINE-UP—HIGH-FREQUENCY LINE MEASUREMENTS

FREQUENCY CHARACTERISTIC

CHECK OF SPAN PAD AND SLOPE EQUALIZATION

The slope equalization and loss compensation in a high-frequency line using N2 repeaters are provided by plug-in equalizers and span pads either at the repeater mounting shelf or at the N2 repeater to N1 or N1A mounting adapter assembly. The amount of line build-out loss correction required in a particular section of the line is determined by measuring repeater gain as represented by thermistor resistance and calculating the difference, if any, from ***nominal*** repeater gain. If the difference is in excess of 2 dB, the input span pad should be changed to bring the repeater gain within 1 dB of the nominal gain. The amount of slope at a particular repeater is determined by using the N-line deviation test set or a carrier frequency voltmeter.

This section is revised to clarify the procedure for selecting the proper span pad values.

The information in this section is primarily intended to be used after the terminal and repeater equipment has been installed and the line facilities are ready for the tests and adjustments preparatory 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 span pad provided at the input of a repeater is correct and for determining the amount, if any, and type of equalization required at the particular repeater location.

APPARATUS:

1 — KS-19750 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

* If a KS-19750 test set is not available, slope measurements may be made using a carrier frequency voltmeter as outlined in Section 362-465-502.

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 temperature.
	A. Span Pad Check
1	Ensure that the total carrier power at the output of the terminal is at the proper level.
2	Check to see that the span pad and equalizer specified on the carrier layout card are inserted into the correct sockets on the mounting shelf or adapter assembly.
3	Allow approximately 20 minutes for the repeater to regulate if any changes 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.
4	Using the VOM, measure the resistance between the 22 and RTH test points (across thermistor) on the appropriate amplifier board (E-W or W-E). Since excessive time used in making this measurement will change the thermistor resistance and give erroneous readings, the following procedure is suggested to ensure accurate results. Select the proper resistance scale, X-100 for an H-L repeater or X-10 for an L-H repeater. Insert positive probe of the VOM in the 22 test point. ***Be careful not to ground other probe, as severe damage to meter and equipment may result.*** Place meter in a position where it may be readily observed and insert the negative probe of the VOM in the RTH test point. Allow meter movement to come to rest, note reading, and immediately remove probe from the RTH test point. Remove probe from the 22 test point.
5	Using the same procedures and precautions as in Step 4, reverse the VOM probes (i.e., insert negative VOM probe in 22 test point, etc.) in the 22 and RTH test points and measure the resistance.
6	Average the resistance readings obtained in Steps 4 and 5. (Averaging is necessary because the measurements are made through a transformer with a dc voltage drop.) ***Requirement:*** H-L Repeater: 1600 to 2700 ohms (2100 ohms nominal). L-H Repeater: 320 to 580 ohms (432 ohms nominal).
7	If the requirement in Step 6 is not met, refer to Fig. 1 and determine the repeater gain represented by the average resistance reading. If the repeater gain is not within 2 dB of the nominal value of 47 dB and the repeater is otherwise operating properly, the repeater input span pad should be changed to bring the gain within the limits represented by the resistance requirements. If the repeater gain is greater than 49 dB, the span pad value should be reduced; if the repeater gain is less than 45 dB, the span pad value should be increased. *Note: Inform the Transmission Engineer through appropriate channels of any changes. Obtain approval prior to any change exceeding ±2dB from the carrier layout card value.*
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.

STEP	PROCEDURE
	B. Equalization Check
9	Remove the repeater connector from either switching jack J2 or J3 on the repeater mounting shelf or adapter assembly.
10	Using the P14C adapter cord and W20C cord, connect the N-line deviation test set to the vacated switching jack.
11	Adjust and calibrate the N-line deviation test set in accordance with the instructions supplied with the set or Section 362-415-508.
12	Perform slope measurements as outlined in the instructions supplied with the test set or Section 362-415-508.
	Requirement: The measured slope should be within ±2.0 dB of the output slope of the repeater as specified by the carrier layout card. ←
13	If the requirement is met, proceed to Step 17. If the requirement cannot be met on initial line-up, notify the Transmission Engineer through appropriate channels. On routine maintenance measurements, the effect of temperature may result in the requirement not being met on some systems; if the requirement is not met during routine maintenance, perform Steps 14, 15, and 16. ↰
14	Measure the slope of other N2 repeaters at the same location operating over the same route.
15	Calculate the difference in slope between the measured values of Step 14 and those obtained on initial line-up.
	Requirement: If the variations in slope calculated in Steps 12 and 15 do not differ from each other by more than ±0.5 dB, the slope measurement shall be considered acceptable.
16	If the requirement of Step 15 is not met, notify the Transmission Engineer through appropriate channels.
17	Before disconnecting the N-line deviation test set, perform bulge, cubic, and quartic measurements and report them through appropriate channels to the Transmission Engineer for reference if engineering analysis is required. ↵

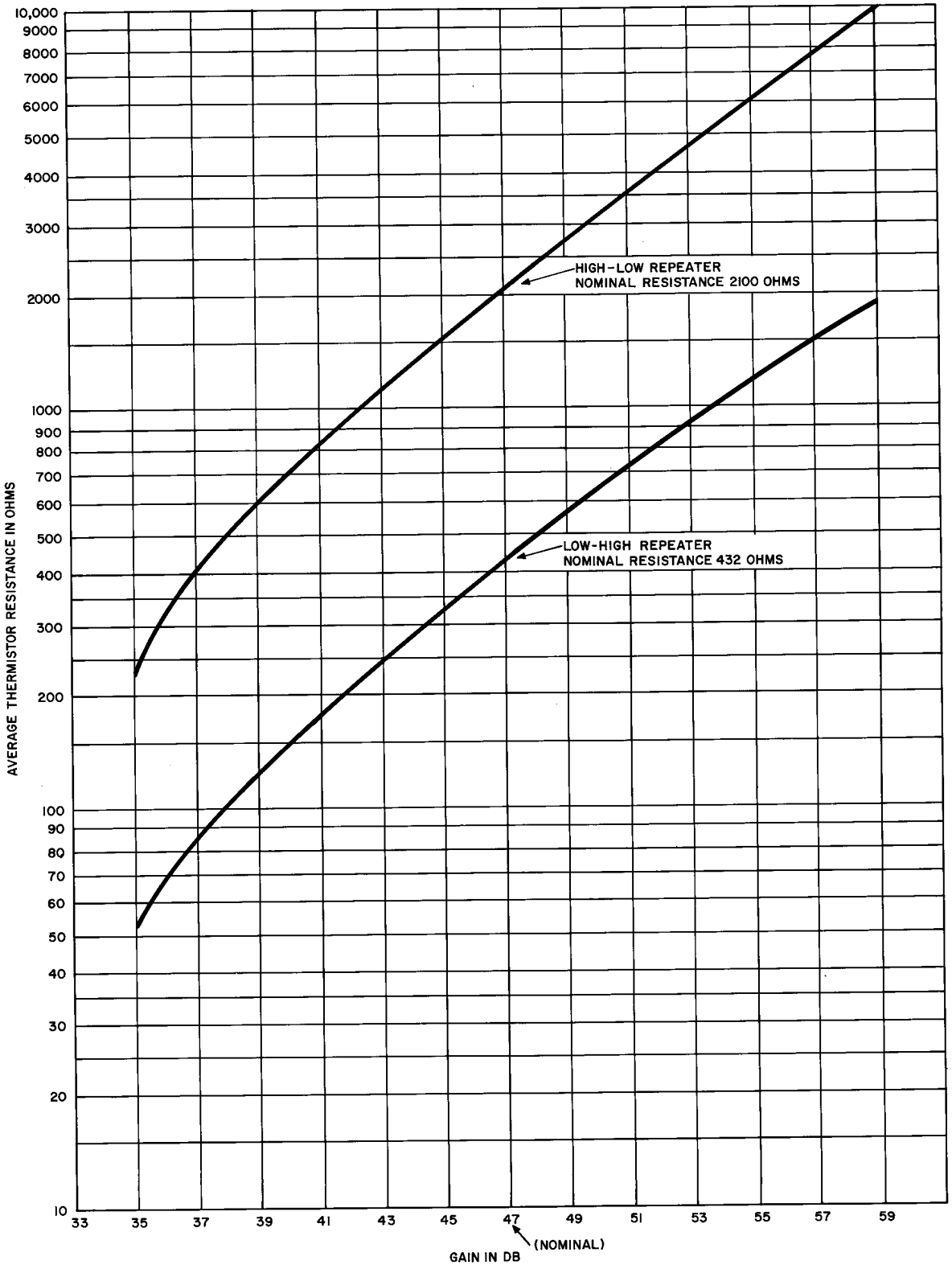

Fig. 1 — N2 Repeater Gain Versus Thermistor Resistance