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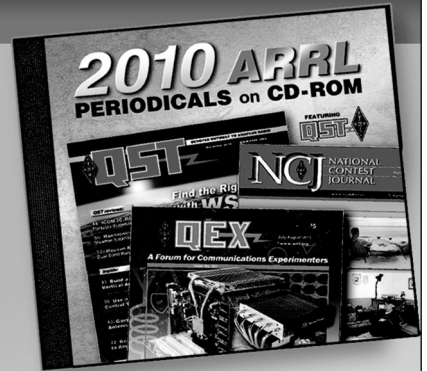
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**QST Issue:** Apr 1988

**Title:** Advanced Radio Devices HF Linear Amplifier [model 230A]

**Author:** Rus Healy, NJ2L

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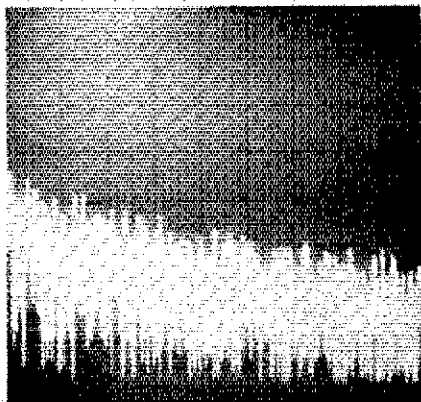


Fig D—Kenwood TS-440S (serial number 7051669) phase-noise characteristics. Measurement frequency: 3.5 MHz, power output: 104 W.

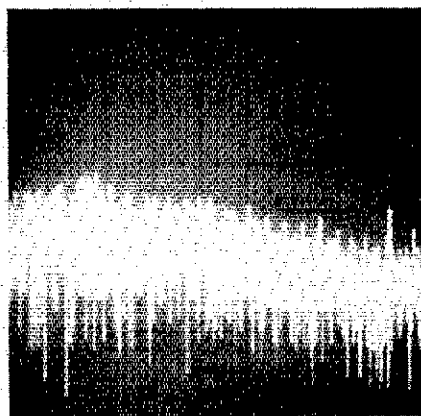


Fig E—Ten Tec Corsair II (serial number 58001721) phase-noise characteristics. Measurement frequency: 14 MHz, power output: 103 W.

their relationships to phase-noise levels in my IC-745 over this range of offset frequencies. The data obtained from the ratio of  $V_2$  to  $V_1$  indicates that the receiver was probably overloaded at offset frequencies from 5 kHz to 15 kHz. This measurement was limited to an SSB phase-noise floor of  $-154$  dBc/Hz because of the low power-output level of the oscillator. Fig 7 is based on the far-out phase noise data obtained from Table 3, as well as the close-in phase noise measured using laboratory test equipment and the same IC-745. The data obtained using the method described earlier and that obtained from the laboratory test equipment closely track each other. The phase-noise performance of this transceiver generally exceeds that indicated by the "good" curve in Fig 5 of part 1 of this article.

**Conclusion**

Close-in phase noise generally has little effect on the performance of amateur communications systems. However, far-out phase noise can significantly reduce the dynamic range of a receiver. Far-out phase-noise performance has effects just as critical as blocking dynamic range and two-tone dynamic range performance of receivers. Ideally, these measurements should be made for a range of offset frequencies. Far-out phase noise in receivers

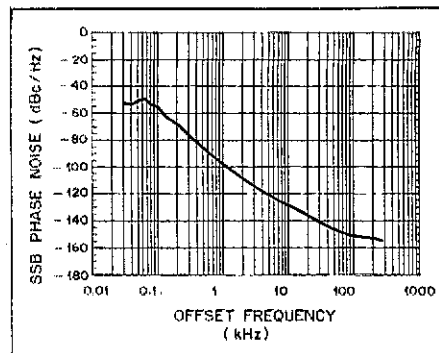


Fig 7—Measured SSB phase noise of an ICOM IC-745 transceiver (serial number 01528).

can be measured with relatively inexpensive test equipment, as long as care is taken to perform the measurements properly.

**Notes**

- <sup>1</sup>Part 1 appeared in Mar 1988 QST, p 14-20.
- <sup>2</sup>A simple oscillator circuit suitable for use in this application appears in W. Hayward and D. DeMaw, *Solid State Design for the Radio Amateur*, 2nd printing (Newington: ARRL, 1986), p 126, Fig 26.
- <sup>3</sup>M. Wilson, Ed., *The ARRL Handbook*, 1988 edition (Newington: ARRL, 1987), p 25-43.
- <sup>4</sup>Component values and construction information for fixed attenuators are given in *The ARRL Handbook*, 1988 edition, p 25-44.

removes all but a small slice of spectrum for further signal processing. If the desired filtered signal is a product of mixing an incoming signal with a noisy oscillator, signals far away from the desired one can end up in this slice. Once this slice of spectrum is obtained, however, unwanted signals cannot be reintroduced, no matter how noisy the oscillators used in further signal processing. As a result, some oscillators in receivers don't affect phase noise.

The difference between this situation and that in transmitters is that crystal filters are seldom used for reduction of phase noise in transmitting because of the high cost involved. Equipment designers have enough trouble getting smooth, click-free break-in operation in transceivers without having to worry about switching crystal filters in and out of circuits at 40-WPM keying speeds!—Zack Lau, KH6CP, ARRL Laboratory Engineer

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