HF ADAPTER FOR NARROW-BANDWIDTH OSCILLOSCOPES

…25.33 shows the circuit of a simple …est equipment that will allow you … signals that are beyond the nor…dth of an inexpensive oscillo… circuit was built to monitor …n of a 10-m signal on a scope … 5-MHz upper-frequency limit. …n features a Mini-Circuits Labo…RA-1 mixer. Any stable oscillator …with an output of 10 dBm can be … the local oscillator (LO), which …th the HF signal to produce an IF …ndwidth of the oscilloscope. …ixer can handle RF signal levels … dBm without clipping, so this was … upper limit for the RF input. A …transformer coupler is constructed …ding a 31-turn secondary of #28-…ire on an FT-37-75 core for RG-… an FT-50-75 core for use with … larger coax such as RG-58. The … is the piece of coaxial cable … through the core center. The cou…es 30 dB of attenuation and has a …esponse from 0.5 to 100 MHz. An …nal 20-dB of attenuation was added … total of 50 dB before the mixer. One-… resistors will do fine for the attenua… The completed adapter should be built … shielded box.

…s circuit, with a 25-MHz LO fre…, is useful on frequencies in the 20 …-MHz range with transmitters of up …-W power output. By changing the …ency of the LO, any frequency in the … of the coupler can be displayed on a …MHz-bandwidth oscilloscope. The frequency displayed will be the difference between the LO and the input signal. As an example, a 28.1-MHz input and a 25-MHz LO will be seen as a 3.1-MHz signal on the oscilloscope.

More attenuation will be required for higher-power transmitters. This circuit was described by Kenneth Stringham Jr, AE1X, in the Hints and Kinks column of February 1982 *QST*.

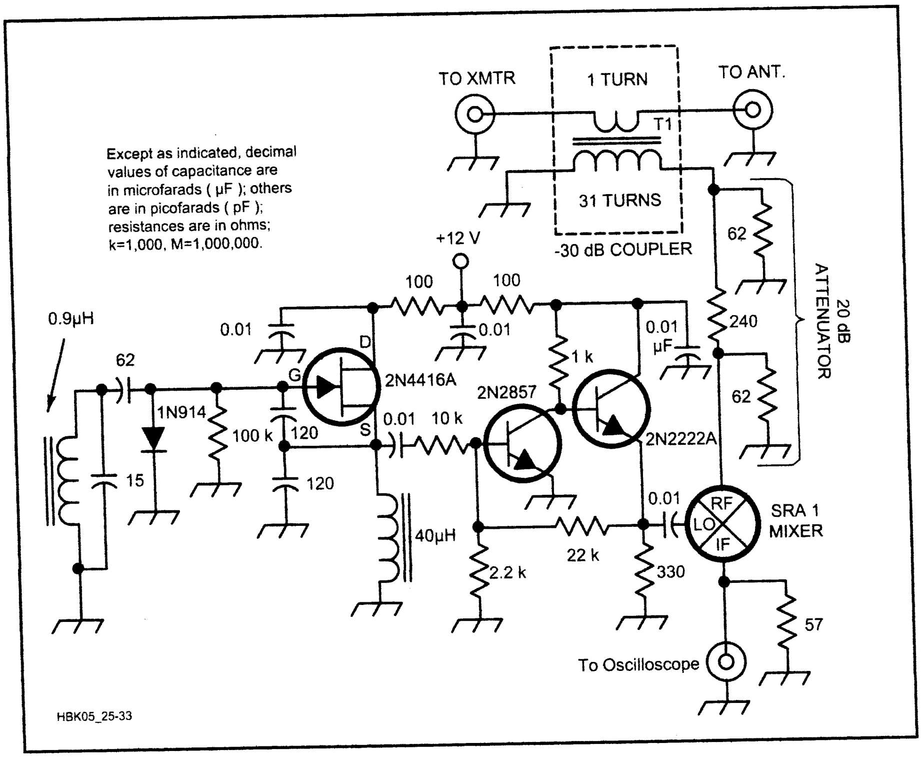

Fig 25.33 — This adapter displays HF signals on a narrow-bandwidth oscilloscope. It uses a 10-dBm 25-MHz LO, –30-dB coupler, 20-dB attenuator and diode-ring mixer. See text for further information.

A CALIBRATED NOISE SOURCE

NOISE FIGURE MEASUREMENT

One of the most important measure…ents in communications is the noise …gure of a receiving setup. Relative mea…rements are often easy, while accurate …es are more difficult and expensive. One EME (moon bounce) station checks noise and system performance by measuring the noise of the sun reflected off the moon. While the measurement source (use of the sun and moon) is not expensive, the measuring equipment on 2 m consists of 48 antennas (each over 30 ft long). This measurement equipment is not for everyone!

The rest of us use more conventional noise sources and measuring techniques. Coverage of noise figure and its measurement appear in the **Receivers and Transmitters** chapter of this *Handbook*.

Most calibrated and stable noise sources are expensive, but not this unit developed by Bill Sabin, WØIYH. It first appeared in May 1994 *QST*. When hams use a noise source, it is usually included in an RF bridge used to measure impedances and adjust antenna tuners. A somewhat different device (an *accurately calibrated and stable* noise source) is also useful. Combining a broadband RF noise source of known power output and a known output impedance with a true-RMS voltmeter, results in an excellent instrument for making interesting and revealing measurements on a variety of circuits hams commonly use. (Later on, some examples will be described.) The true-RMS voltmeter can be an RF voltmeter, a spectrum analyzer or an AF voltmeter at the output of a linear receiver.[1]

Calibrated noise generators and noise-figure meters are available at medium to astronomical prices. Here is a low-cost approach which can be used with reasonable confidence for many amateur applications where accuracy to tenths of a decibel is not needed, but where precision (repeatability) and comparative measurements are much more important. PC boards are available for this project.[2]

Semiconductor Noise Diodes

Any Zener diode can be used as a source of noise. If, however, the source is to be calibrated and used for reliable mea-