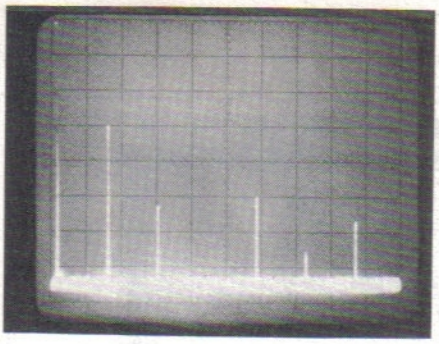
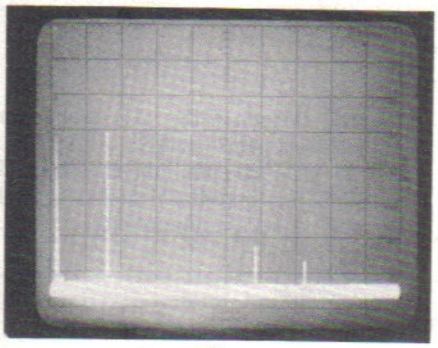


(A)



(B)

Fig. 108 — Spectral photograph of the 8930 2-meter amplifier is given at A. Power output is 340 W. Horizontal divisions are each 100 MHz; vertical divisions are each 10 dB. A shorted ¼-wavelength stub (Fig. 109) is necessary to make the amplifier meet current FCC spectral-purity requirements. The spectral photograph at B, taken with the stub installed, shows that all spurious and harmonic emissions are at least 60 dB down. In both photos, the fundamental has been reduced in amplitude by 30 dB by means of notch filters to prevent analyzer overload.

or minus a few volts. This may change some as the Zeners heat up to their operating temperature. The bias voltage should be about −200 V. Close the TR relay, K1. Bias voltage should change to somewhere around −50 V. If everything checks out, unkey K1 and turn the power off.

Connect the filament voltage to the feedthrough capacitor on the input box. Turn on the blower and check for airflow. Turn on T1 (remember, no voltages other than filament are applied to the tube). Use an accurate voltmeter to check the voltage at the socket filament pins. Adjust R11 until the filament voltage is exactly 6.0 volts. Turn off the filament voltage and blower, and connect the screen and bias supplies to the appropriate feedthrough capacitors. Put the cover on the input compartment.

Connect the high-voltage supply to the RF deck. Connect a dummy load to J2 through an accurate VHF wattmeter, such as a Bird Model 43. Connect a 2-meter rig capable of supplying about 10 W to J1 through another VHF wattmeter. If only one wattmeter is available, connect it to the input first for initial adjustments and connect the output directly to a dummy load.

Start the blower and check for airflow. Turn on T1, again preferably through a variable autotransformer in case of trouble. The exhaust air should be slightly warm from the filament. The screen current meter should read 0 (10 mA upscale from the current drawn by R7). The plate and grid current meters should not move.

After a minute or so, gradually apply plate voltage. Bring the voltage up to 1000 V or so. Listen and watch for any signs of high-voltage arcing. If everything seems okay, key the amplifier at J6. Adjust the idling plate current to approximately 90 mA using R9. Screen and grid current should stay at zero.

Apply a few watts of drive and adjust C2 for minimum reflected power on the SWR meter connected to the input. If the SWR is not better than 1.2 or 1.3, shut off the amplifier. Disconnect the high voltage, open up the input compartment and adjust the position of the link. It may take several tries, but it is important that the input match be as good as possible for best IMD characteristics. If moving the link does not bring the input SWR close to 1.2, try adjusting the spacing of L2 slightly.

When the input is matched, turn on the amplifier and bring the plate voltage up to 2000 V. If no arcing is noticed, apply a small amount of drive and tune C9 and C10 for maximum output. Increase drive slowly, and readjust C9 and C10 for maximum output. Watch the screen and plate current, and do not exceed the manufacturer's ratings. Table 6 lists the normal operating parameters for this amplifier. Six watts of drive should produce about 340-W output. If the efficiency is very much different from that shown in the table, try adjusting the position of the link with respect to the plate line.

This amplifier is extremely stable. With operating voltages applied (and no drive), the controls were tuned through their ranges with no hint of instability. This amplifier is not neutralized, so maximum output may not occur with the plate dip. The grid, tuning and loading controls work smoothly. Their adjustment is not critical — in fact, tuning is smoother than on some commercially manufactured HF amplifiers.

Spectral photographs are shown in Figs. 108 and 110. In Fig. 108A the second and fourth harmonics are about 50 dB below the amplitude of the fundamental. The sixth is 58 dB down. By increasing the value of C10 and reducing the size of L4, it is possible to raise the link Q to the point where the amplifier meets FCC spectral-purity requirements (all spurious and harmonic emissions at least 60 dB down); however, the high-Q link makes retuning necessary for small excursions in the 2-meter band.

Addition of a simple shorted stub cut to an electrical quarter wavelength at 144 MHz (Fig. 109) results in the spectral photograph shown in Fig. 108B. At the transmitter end, the stub looks like an open circuit for RF at 144 MHz, but it looks like an RF short circuit at the even harmonics. The only visible harmonic energy is at the fourth, and this is just out of the analyzer noise floor at −62 dB.

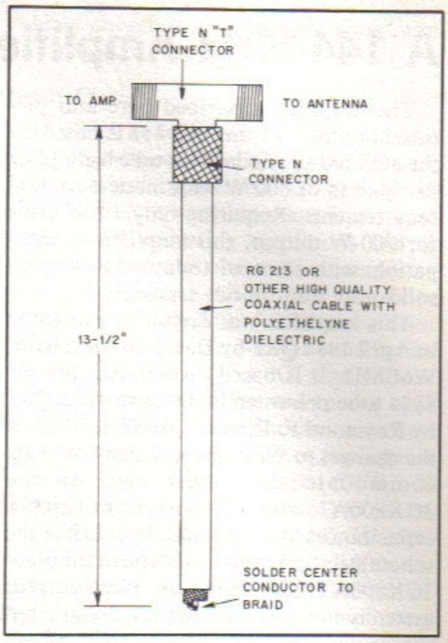


Fig. 109 — Details of the ¼-wavelength stub.

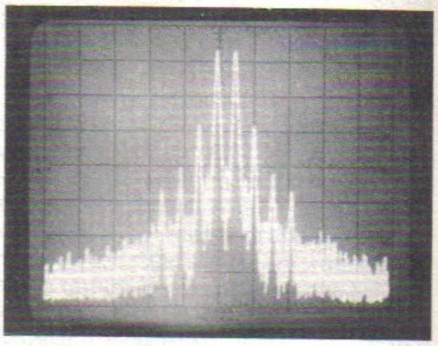


Fig. 110 — Two-tone spectral photograph of the 8930 2-meter amplifier. Power output is 340 W PEP.

The shorted stub serves a second purpose as well. In the unlikely event that the link detaches from its mounting and falls on the top of the plate line, placing high voltage on the output connector, the stub will short the dc to ground and blow the power supply fuse.

A two-tone test of this amplifier is shown in Fig. 110. The test setup consisted of two RF tones, one at 144.200 MHz and the other at 144.201 MHz fed into a combiner and then into the amplifier input. Except for the third-order products, which are down 28 dB from PEP, all IMD products generated within the amplifier are lower in amplitude than those found in most 10-W, solid-state, 2-m transceivers.