

The Drake MN-4 Antenna Matching Network

Almost all of the amateur transmitters today use a pi-network tank circuit which is designed to work into a 50-ohm resistive load with an SWR of less than 2:1. This resistive load can only be achieved with a resonant antenna. For the ham who is only interested in working on one band this doesn't pose too much of a problem since he usually has space for at least one antenna. However, if he wants to work on more than one band, and preserve the 50-ohm load to his transmitter, he has to use some type of antenna tuning unit or matching network.

The new Drake MN-4 Antenna Matching Network takes care of all these problems very nicely. It will provide an optimum match with multi-band antennas, measure the feed-line SWR and reduce the SWR at the transmitter to 1:1. It will match the transmitter output to a linear amplifier which does not have a 50-ohm input impedance. In addition, it monitors transmitter power output in watts directly and continuously. Since it attenuates the second harmonic of the transmitter from 25 to 35 dB, it may eliminate the need for a low-pass TVI filter.

These are just a few of the jobs for which the MN-4 is tailor-made. It will also match the transmitter to an antenna across a complete amateur band; permit "off-the-air" transmitter tuning and antenna matching at low power using a dummy load; or, help localize antenna problems by comparing transmitter output into the antenna with the output into a dummy load. Also, it will "store" the loading adjustment for the transmitter when switching adjustment for the transmitter when switching from barefoot to linear amplifier operation because the matching network is bypassed in the direct position of the bandswitch.

The Drake MN-4 consists essentially of a wideband pi-network with a series capacitor for tuning out any reactive component of antenna impedance. The input side of the network consists of a set of fixed capacitors which are selected by the bandswitch—not unlike the pi-network in most transmitters.

The pi-network inductance has taps for each band with a special coil for ten meters. Two positions for the 3.5 MHz band—80A and 80B—insure sufficient tuning range to cover the entire band.

In addition to selecting the band in use, the bandswitch may be used for direct or alternate operation. In the direct position, as we previously noted, the matching network is bypassed. In the alternate position, the matching network is removed from the circuit and the rf is connected to the alternate coaxial socket on the back of the unit. This socket is made to order for a dummy load, and is very useful for initial transmitter tuning.

The special wattmeter which is built into the MN-4 makes tuning the unit a real snap. In most antenna tuning units, the SWR indicator is of the "monimatch" variety. One of the big disadvantages of this type of SWR pickup unit is that it is sensitive to frequency changes—being more sensitive on the high frequencies than the low. Not so with the wattmeter in the MN-4. In this wattmeter the pickup unit consists of a specially wound toroid transformer with no significant differences in sensitivity in the frequencies of interest—3.5 to 29.5 MHz. Thus you can tune the unit for minimum SWR without continuously juggling the sensitivity control.

With an SWR meter that is not frequency sensitive, it is a relatively simple matter to tune up the MN-4. All you have to do is vary the resistance tuning knob for an SWR dip, turn the reactance tuning slightly to bring the SWR upscale and tune the resistance knob for another dip. If the second dip is downscale from the first, you're tuning in the right direction and should continue to alternately tune the resistance and reactance controls until a minimum SWR indication is obtained.

If the second dip reads higher on the scale than the first dip, you're tuning the reactance knob in the wrong direction. Turn it in the opposite direction and dip with the resistance control until you obtain a minimum SWR indication on the meter. If the

Drake MN-4 Specifications

Frequency range:	3.5-4.0 MHz, 7.0-7.3 MHz, 14.0-14.35 MHz 21.0-21.45 MHz, 28.0-29.5 MHz.
Input impedance:	50 ohms resistive.
Load impedance:	50-ohm coax with SWR of 5:1 or less (any impedance angle). 75-ohm coax with lower SWR may be used.
Power capability:	200 watts continuous.*
Insertion loss:	0.5 dB or less on each band after tuning.
Built-in wattmeter:	Reads forward power in watts or SWR.
Wattmeter accuracy:	±5% of reading +2 watts.
Size:	5½x10¾x8½ inches.
Price:	\$69.95.

*Although the MN-4 is rated at 200 watts, Drake will be coming out with the MN-2000 in a couple of months. This unit will be rated for the full legal limit.

dips are so low in magnitude that it's difficult to tell whether one dip is lower than another, you can increase the meter sensitivity. With the added sensitivity it may not be possible to dip the meter to zero, but any residual reading will, in most cases, represent less than 0.1 watt.

I was surprised, and pleased, to find that you can tune up the MN-4 in less time than it takes to talk about it! With most antenna tuners it's a matter of juggling the controls *and* transmitter loading *and* SWR sensitivity. Not with the MN-4—in about 30 seconds you can tune it up from scratch. And, when you move from one end of the band to the other it's only a matter of seconds to get the SWR back down to 1:1 again.

Remember though, the matching network only matches your transmitter to the transmission line. The mismatch at the antenna still exists. Although you can get some rf into the antenna, it won't perform as well as an antenna which is resonant.

A set of tuning curves which is provided in the instruction manual show the resistance and reactance control settings versus load impedance. These curves may be used to determine the approximate load impedance of the antenna you're using. Or, if you already know the load impedance of your antenna, the curves may be used for setting up the initial control positions on the MN-4.

For the amateur who is limited to one antenna, and wants to work more than one band, the Drake MN-4 Antenna Matching Network is a natural. Not only is it simple and quick to tune, it will match a wide variety of sky wires. And, even if you have the space, the idea of only one antenna should appeal to the XYL.

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