



**EKRAD, INC.**

MANUFACTURERS AND SALES OF HIGH EFFICIENCY ANTENNAS

P.O. BOX 57

VALPARAISO, FLORIDA 32580

## TEKRAD MARK V ANTENNA SYSTEM

The Tekrad Mark V Antenna System is a high efficiency radiator, designed for operation in the frequency spectrum of 3.5 through 30 MHz. Operation on 160 meters is possible by connecting the system as a "T" antenna working against ground.

The antenna system was developed from the classical bi-conical antenna employed as a broadband radiator in VHF and UHF services. The wide tapered radiating element technique is used, employing two elements to form a balanced system. Such elements present a much higher feedpoint impedance than the conventional "thin" wire antenna used by most amateurs. The current and voltage distribution is also quite different than found on the conventional dipoles. Voltage measured at the ends of the system is lower because of the very low Q of the system; current at the feedpoint is also lower due to the higher impedance of the antenna. This means, in practical terms, a much greater power handling capability with given insulation, and excellent wet weather characteristics. Aperture or area of collection is another measure of antenna performance. The aperture of the Tekrad Mark V Antenna System is much larger than that of the conventional antenna and increases with frequency. This characteristic is exhibited by a vast increase in received signal strengths and weak signal reception. On the three high bands of 10 - 15 and 20 meters scatter communication is possible and has been proven.

The feedpoint impedance is a nominal 450 ohms balanced and is fed by a 450 ohm balanced transmission line. A matching device is required to translate the 50 ohm unbalanced output and input circuits of the conventional amateur band transmitter-receiver combination to 450 ohms balanced. The standard Matchbox or home constructed device is satisfactory. Baluns, if available in the 9:1 ratio as required, are not suitable because they do not attenuate harmonics.

When installed in accordance with the instruction supplied with each antenna system, one can expect the following results:

- a. Extremely high radiation efficiency.
- b. Essentially omnidirectional (slight indentation of the radiation pattern at the ends of the radiators).
- c. Five band operation, 3.5 - 30 MHz.
- d. Large aperture.
- e. Very low VSWR presented to the transceiver or transmitter.
- f. Very wide angle of radiation.
- g. Capability of back scatter communications on 10-15-20 meters.
- h. Horizontal polarization.
- i. Very low wind resistance.

The clear area required for installation of the System is from 90' x 30' to 125' x 60'. The larger area is recommended.

The Tekrad Mark V Antenna System is completely assembled with high strength nylon cord attached. The system is packaged on five reels ready to be rolled out for easy, tangleless installation. Transmission line stand-off insulators are supplied; no need to raid the junk box or buy anything. Seventy feet of transmission is permanently attached.

Price: \$42.50 delivered

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# INSTRUCTIONS

(Read before installing!!!)

## Tekrad Mark V Antenna System

### Siting

The Mark V Antenna System is a balanced system. It should be installed in a clear area. Avoid installing over low trees, metal roofs and the like. Should unbalance exist (unequal distance of the ends to ground) will be exhibited by the inability to achieve a low standing ratio on one or more bands, 80 through 10 meters.

Like all high frequency antenna systems suspended near the earth the Tekrad Mark V Antenna System depends on good ground conductivity to achieve high radiation efficiency and wide angle of radiation inherent in the system. Earth conductivity varies greatly geographically. As a means of achieving good stable earth conductivity at radio frequencies, radials are highly recommended. Their use produces a stable conductive reflecting surface especially in sandy regions. Start the radial system under the center of the antenna using 70' pieces of wire. Use as many radials as possible, the ideal number is one per degree. The wires should be bonded together around the antenna center mast or tower. Bury the radials a few inches (grass roots) under the surface. It should be mentioned that vertical grounds such as wells, pipes and rods are not good radio frequency grounds when compared with radials for maximum reflection. The radiated waves from the antenna must penetrate the earth and be reflected from the vertical section and relatively small surrounding earth surface, a long path through a very lossy medium. In addition little coupling is offered between the horizontal antenna and the vertical ground conductor and a relatively small area around the ground rod. Vertical grounds are excellent at DC and commercial AC power frequencies. Reference good BC station practice.

### Installation

The recommended height of the center of the antenna system is 50'-60'. A 50' TV mast is an ideal center support. Guy the mast with a non-conducting material. Plastic rayon-filled clothes line or nylon cordage is excellent for guying. A rectangular lay-out of 110' x 50' is the optimum linear span and element spread. The center support is located at the center of the rectangle. Other configurations are practical with the minimum dimensions fixed at approximately 90' x 30'. Each of the two open ends of the system may be spread to 65' with little change in overall operating characteristics. The system may be mounted parallel with the earth, as indicated by the 110' x 50' area, or in a shallow inverted V. An included angle of the inverted V of not less than 100 degrees is recommended. Lesser angles will have a major effect on the radiation pattern, angle of radiation and introduces some vertical polarization. The Mark V Antenna System is capable of producing an essentially omni-directional horizontally polarized radiation pattern having a very wide angle of radiation if care is taken in the installation of the system.

The Tekrad Mark V Antenna is completely assembled, including the supporting nylon lines. Remove the reel assembly from the box. The reels are labeled with instructions, follow them. The package is designed to be used again, should you desire to move the system to a remote location. A 100' nylon cord is attached to the center insulator for raising the system via the halyard-pulley method. Five (5) transmission line stand-off insulators are included. Attached to each end insulator is a 50' nylon cord serving as tie-off lines. These are contained inside each of the four antenna element reels. The fifth reel contains the transmission line. Carefully unroll the antenna elements, placing them in line with the four tie-off points. Raise the antenna and secure. Secure the transmission line in the stand-off insulators. Tie-off the ends of the antenna and the job is completed. Use standard precautions in installing the transmission line, avoid sharp bends and keep it away from conducting objects. Either will introduce a discontinuity in the transmission line.

### Matching

The feedpoint impedance of the system is a nominal 450 ohms balanced. A method of transferring 50 ohms unbalanced to 450 ohms balanced is required. The first thought is to use a balun with a ratio of 9:1. This is impractical for two reasons: (1) Lack of harmonic attenuation (2) 9:1 baluns in high power types present resonant problems near low frequency cut-off, none are available. The well-known Matchbox is suitable. Amateur handbooks describe homebrew units that are also suitable.

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