Performance of the
Terminated Folded Dipole

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Every once in awhile an antenna comes along that could be put to good use by the average amateur. The Terminated Folded Dipole (also known as the T2FD) is just such an antenna. Unfortunately, it has not been given its due publicity. This article is designed to clarify some of the points on the construction, as well as, report upon experimental results. —Editor.

INITIAL EXPERIMENTS with a terminated tilted folded dipole antenna were described by the author some two years ago.[1] This antenna has omnidirectional characteristics and a 5 or 6 to 1 frequency ratio which means that one "untuned" antenna is all that is required for operation on from three to five amateur bands.

The antenna has a definite application in connection with emergency communications in the lower frequency bands.

1. One antenna is all that needs to be erected for operation on several bands.
2. Only one elevated point (pole, tree or house gable) is required
3. Less space along the ground is needed for any given frequency as the flattop portion is shorter than the usual one-half wavelength.

Basically, the antenna is the hypotenuse of a right angle triangle, one leg of which is along the ground, as shown in *Fig. 1.* The spacing between the folded dipole wires, in feet is equal to 3,000 divided by the frequency in kilocycles, and the result multiplied by 3.28. The length of each leg in feet (from either end to the center insulator or resistor) is equal to 50,000 divided by the frequency in kilocycles, and the result multiplied by 3.28. The terminating resistor should have a wattage rating equal to 35% of the power input to the final stage, and should have a resistance equal to the impedance of the two wire feeder system—usually 600 ohms.

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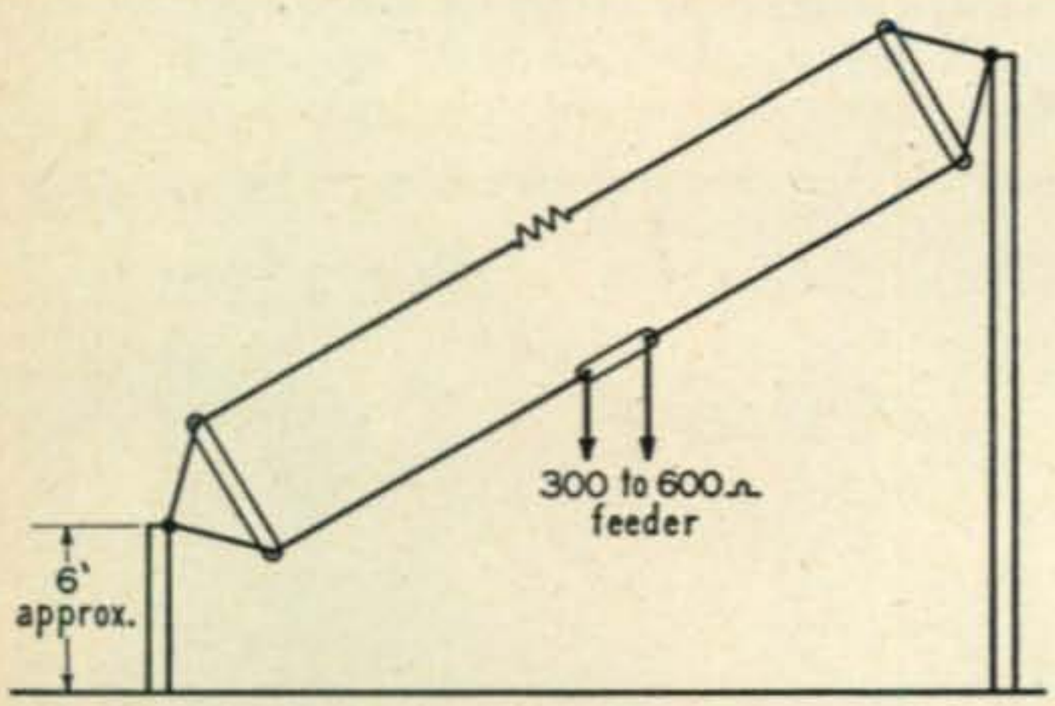
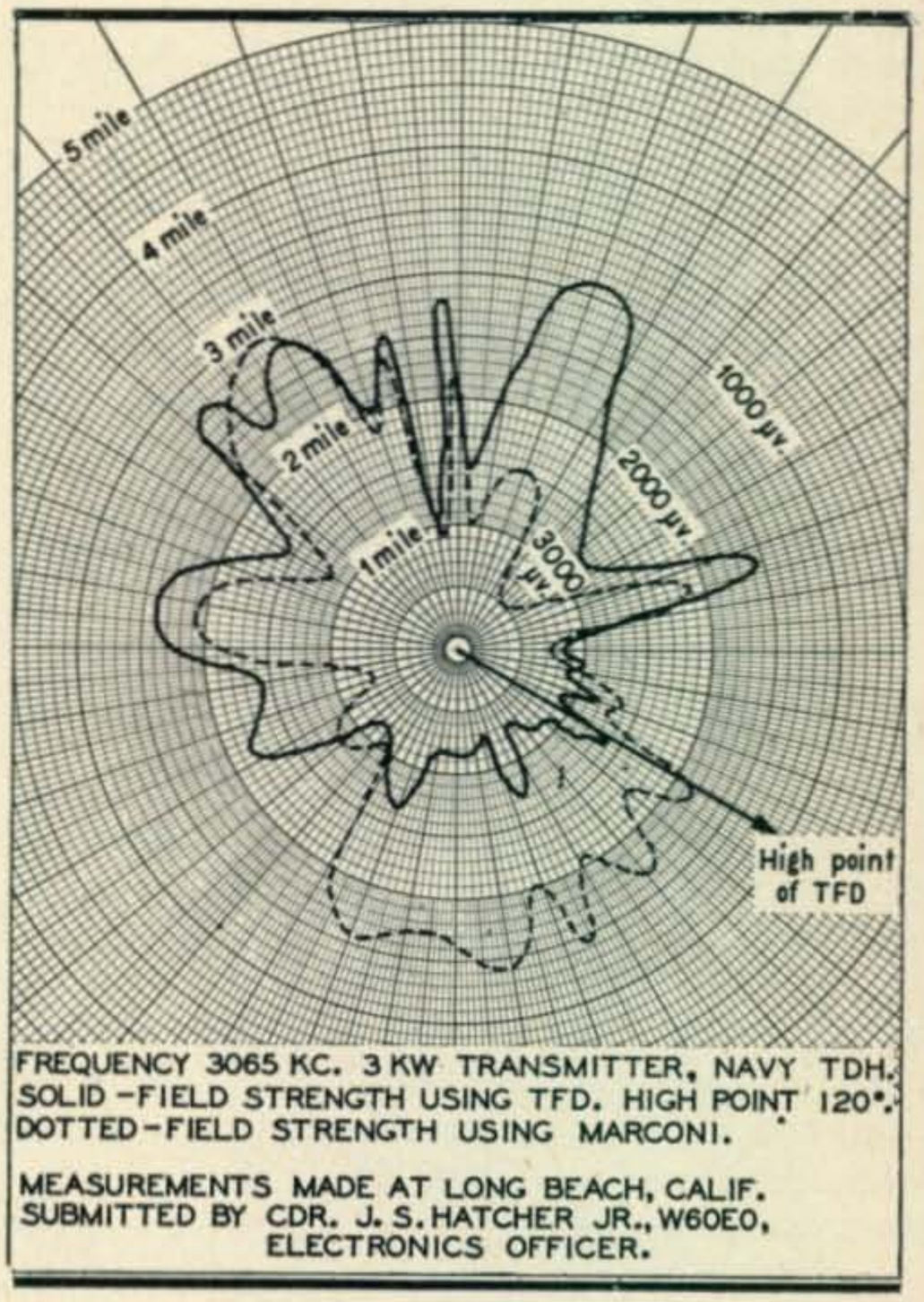


Erect so that the angle of tilt is from 20 to 40 degrees for omnidirectional operation.

Figure 1



FREQUENCY 3065 KC. 3 KW TRANSMITTER, NAVY TDH.
SOLID – FIELD STRENGTH USING TFD. HIGH POINT 120°.
DOTTED – FIELD STRENGTH USING MARCONI.

MEASUREMENTS MADE AT LONG BEACH, CALIF.
SUBMITTED BY CDR. J. S. HATCHER JR., W60EO,
ELECTRONICS OFFICER.

Figure 2

The formulas given are for the lowest frequency on which operation is desired. Applying these formulas, an antenna that will work well on the 10, 11, 15, 20 and 40 meter bands may have an overall length of forty-seven feet, with the two wires spaced about 17 inches.

During the past few months the response has indicated that there is considerable interest in, and several applications successful of the T2FD antenna. Some criticism from the theoretical gentlemen who dismiss the practicability with the statement; "It won't work," has also been received.

As far as the author is concerned, work on the antenna has progressed spasmodically, due to the

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activities on one particular band, or the like. Take it from one who knows— that is not the case. Most columnists will gladly print any news that is sent in. We all have our favorite bands, and generally we are best acquainted with what goes on close to home. So when the time comes to fill in those 12 blank sheets of paper, what could be more natural than to ad lib about the things we know best? If there is not enough appearing in print about activities in your section of the country or about your favorite phase of the hobby *you* can do more about it than anyone else. Just drop a line to the Editor! Make it a habit to send in a little news each month—send it in time to meet his deadline—usually around the 20th. We'll all enjoy reading about your experiences.

So that's it for now. Hope that we can continue the many friendships which we made while we were on this job. We'll see you on the air and whenever possible, in person. Good luck, Bill! 73.

Brownie, W2PAU

FOLDED DIPOLE

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pressure of other duties, although additional tests continue to indicate that the formulae for length and spacing are accurate. Elsewhere, experimenters have reported advantages to be gained by spacing according to formula at the antenna ends, and doubling that spacing at the center. The author has found that this apparent advantage is realized

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Comparative Signal Strength at 3 Receiving Locations

Transmitting Antenna - Hitoyoshi

Local Time	1/2 wave doublet			W3HH Antenna - 30° tilt angle		
	Kagoshima	Miyazaki	Oita	Kagoshima	Miyazaki	Oita
0800	-	-	-	-	-	-
0900	4	2	2	4	2	3
1000	2	1	2	4	2	3
1100	2	1	1	-	-	2
1200	3	1	-	2	-	-
1300	2	1	2	-	-	-
1400	2	1	-	3	1	2
1500	3	1	-	-	-	-
1600	3	2	2	3	2	3
1700	2	1	3	2	2	-
1800	3	1	3	3	3	-
1900	2	3	1	-	-	-

Reception at Kagoshima and Miyazaki was on 2530 kcs.
Reception at Oita was on 3830 kcs.
- indicates no measurement due to QRM, QRN or other reasons.
Fractions in signal strength have been reduced to nearest whole number.

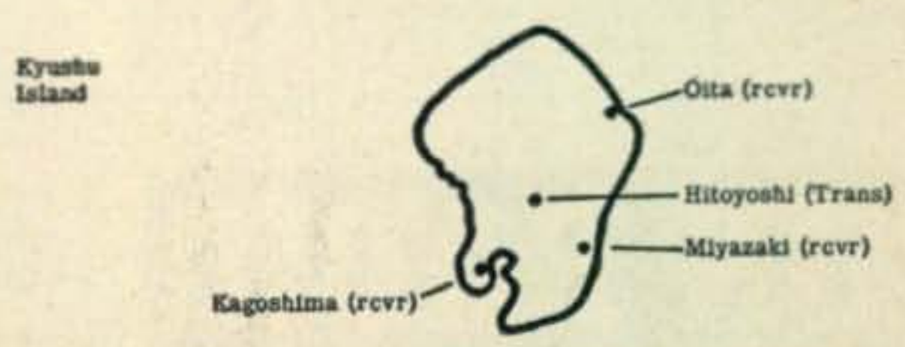

TABLE I

only because a center spacer is needed that will keep the wires fixed in their relative positions. It definitely appears that a center spacer is a good idea, but the dimension should keep the two antenna wires parallel throughout their entire length.

The only modification to the original data is that further experiments indicate the angle of tilt is not critical. Any tilt angle from about 20 degrees to about 40 degrees will radiate with omnidirectional characteristics. This greatly increases the flexibility of the system.

Performance Review

Leo Carreras, W3EC, reports that one antenna has been used on the Model TCC transmitter at NDM for over a year on all frequencies with results superior to individual antennas on the various bands. The other antennas have since been removed. The Model TCC is a Navy 1 KW transmitter of modern design, with a frequency range from 2,000 to 18,000 kc.

Captain H. O. Crisp (RAF), now retired, reports highly satisfactory results and suggested a wide center spacing. He also reports excellent results on receiving—considerably greater than could be accounted for by the antenna and transmission line presentng a better input match to the receiver

Field Intensity in db at Various Horizontal Angles

Tilt Angle of Antenna

Horizontal Angle in Degrees	44°	38°	30°	24°	18°
0	122.5	120	120	119.5	120
10	121.5	121	121.5	120.5	120
20	121.5	121.5	121.5	121.5	120.5
30	120.5	121.5	121.5	121.5	120.5
40	120.5	120.5	120.5	121.5	120.5
50	121.5	120.5	121.5	120.5	120.5
60	121	121.5	120.5	120.5	120.5
70	120.5	120.5	120.5	120.5	120.5
80	119.5	119.5	119.5	119.5	116.5
90	119.5	119.5	119.5	119.5	117

The horizontal angle is taken relative to plane of antenna. Under the same conditions, the field intensity of a conventional Zepp Antenna was 115.5 at all horizontal angles.

TABLE II

than a comparative single wire and "earth". He used an RCA AR88D in the receiving tests.

Commander H. E. Thomas, USN, W3AIU has reported that four of these antennas were erected at the Naval Station, Long Beach, California. Each T2FD was connected to a separate transmitter. They were used over the entire frequency range of the antenna with excellent results. The antennas were erected along the sides of a square with the building housing the transmitters in the center of the square. Poles were erected at each corner and each antenna ran from the top of one pole to a point near the bottom of the pole at the adjoining corner. *Figure 2* shows field strength measurements made at this station comparing the T2FD and the Marconi antenna formerly used.

Some of the most interesting observational material was from Mr. Yasuhiro Itahashi. Mr. Itahashi is a Radio Engineer for the Kyushu Electric Communication Bureau (Japan). After extensive tests Mr. Itahashi has recommended that the T2FD antenna be used for all coastal, emergency and domestic radio transmitting stations on Kyushu Island. His permission has been received to publish the results of some of their field strength checks and propagation tests.

Briefly their experiments indicated that the tilted folded dipole was superior to the "Zepp" and one-half wave doublet types previously employed. Wide band characteristics were observed and the T2FD resulted in a 4 to 8 db increase in the signal at their various receiving locations. Tables I and II are self explanatory and should be of interest to antenna minded experimenters. Table I shows that reception from the tilted folded dipole gave an equal or louder signal at three widely separated locations, as compared to conventional dipoles. Table II shows the actual field intensity in db at five different tilt angles over a 90 degree horizontal pattern. The field strength from the same transmitter using a horizontal "Zepp" antenna was 115.5 db at all points. The distance from the field strength meter to the antenna was about two miles.

The author has had excellent practical results with the antenna. One big advantage to many hams who are not fortunate enough to live in an area permitting an "antenna farm" is that only one elevated point is required. Only 80 feet along the ground is required for operation on 75 and 80 meters, and only about 45 feet is required for a 40 meter T2FD. The 80 meter antenna will function equally well on 40 and 20, while the 40 meter job will give excellent results down to and including the ten meter band.

PRIVATE LIFE

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Free Subscriptions to Amateur Radio Clubs

The policy of exchanging subscriptions of CQ for Amateur Club Newsletters, etc. is being re-established. Editors and/or secretaries of Amateur Clubs are invited to contact the Editor of CQ on exchanging their club bulletin for a CQ subscription. Such exchanges will be established on a year to year basis. The only provision in working out such an exchange is that the Amateur Club print not less than four issues of its bulletin or newsletter per year.

Staff Changes

By the time you have read this far, you will have probably noted that two changes in the personnel on the CQ masthead have been made. After capably holding down the job of VHF-UHF Department Editor for two years, E. M. Brown. W2PAU, has stepped upstairs to become Technical Editor. Although a VHF man at heart, the responsibilities of the Technical Editorship are more in keeping with Brownie's diversified knowledge of the radio game.