Off-Center-End-Fed Dipole on a "DX Fishing Pole"

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The chances of successful QRP QSOs increase dramatically when you can choose the operating bands and operating modes. Here, I describe an Off-Center-End-Fed (OCEF) dipole of my own design which can hang from a collapsible fiberglass tent pole "DX Fishing Pole" extending off a balcony. The system can provide you with 80m through 6m coverage with the aid of an antenna tuner unit. You can casually hang the antenna in almost any convenient way.

I assembled a "DX-go-bag" station that includes a Yaesu FT-817 transceiver, an Elecraft T1 antenna tuning unit (ATU), and the OCEF because I like to have HF ham radio available during my business travels. The go-bag takes up less than one-third of a cubic foot, and easily fits inside a small carry-on roller bag for commercial airline travel. I also carry a small computer and a Signalink-USB interface, so that I have QRP capability on multiple operating modes as well as multiple bands. A choice of modes lets you take advantage of the 17 dB and 12 dB that CW and RTTY provide over SSB respectively, or the 9 dB and 24 dB that PSK31 and JT65 respectively provide over CW. Figure 1 shows the station set up for operation. A Dell Mini 1010 computer runs PSK31 or RTTY (both shown on the screen) or JT65 software. You can see my CW keyer on top of the radio. The Signalink-USB interfaces with the computer via a single USB port, and to the FT-817 via the radio 6-pin data connector.

I constructed my homebrew OCEF dipole antenna using about 13 feet of RG-174 miniature coaxial cable, plus about 30 feet of #22 stranded Teflon covered hookup wire, and two split bead ferrites (Palomar Engineering FSB-1/4, 43 mix). Why those wire and coax lengths? Because that is what I had on hand. There is nothing too critical bout the lengths, provided that neither dipole leg is a multiple of a half-wavelength. The lengths of the dipole legs should be in a ratio of between about 2:1 and 3:1 to provide tunable impedances for the ATU. The lower portion of Figure 2 shows a detail of the dipole extended to its full length. I attached a porcelain egg insulator to the far end of the dipole (left end of the detail drawing) as a possible support point. One dipole element comprises the length of hookup wire that extends from the egg insulator to the center conductor of the RG-174 coaxial cable. The second leg of the dipole comprises the outer shield of the coax up to the split-bead ferrite current chokes. I wound two turns of coax around each of the two split bead ferrites separated by two inches to form a current choke. The 41.5 foot radiating portion of the dipole includes the 30 feet of wire between the egg insulator and the coax feed point, plus 11.5 feet of coax shield up to the ferrite beads. The OCEF coax portion can be neatly coiled, and the dipole wire can be wound in figure-8 fashion (to prevent twisting) around a small piece of cardboard for easy and compact storage in a quart-size Zip-loc bag inside the "DX-go-bag."

In the upper part of Figure 2 you can see this antenna (picture was enhanced for clarity) drooping from a 20 foot long fiberglass tent pole which is attached to a building balcony by bungee cords (not shown). The egg insulator acts as a weight for the outer portion of the wire length in this ad hoc "DX-fishing-pole" installation. There is nothing especially critical about the manner in which the dipole was hung. This is simply how everything fits! The dipole dimensions are not critical—but try to avoid half wave long dipole leg lengths. The ATU, aided by the off-center impedances, does the heavy lifting in matching the OCEF dipole. I recorded close to 1:1 VSWR on all ham bands from 40m through 6m, and about 2:1 on 80m. You can construct single band versions of this antenna which do not need an ATU, by locating the feed point at the center of a half wavelength self-resonant dipole.

Preferably, the dipole should be extended to the full length, and hung by some thin non-conducting cord attached to the egg insulator at the dipole far end. However, any "best effort" method,

Figure 1-The FT-817 based QRP station set up for CW and digital modes.

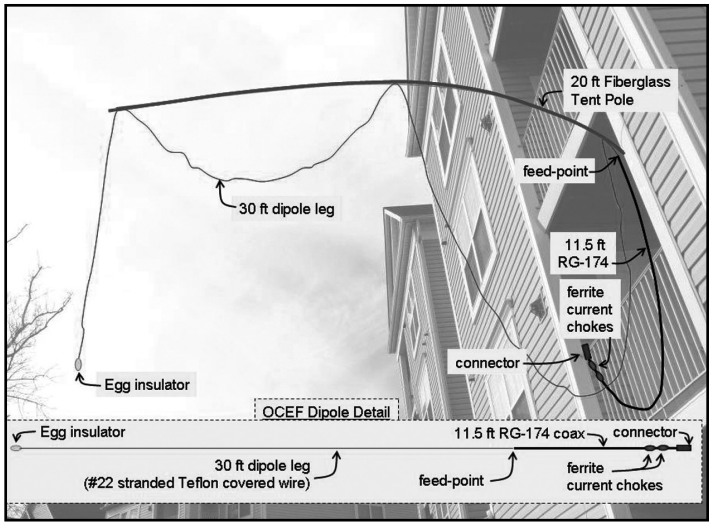

Figure 2-OCEF dipole shown drooping from a 20 foot long collapsible fiberglass tent pole; the detail shows the OCEF dipole construction and dimensions.

including the "droop" method pictured here, will provide you with a good measure of HF QRP fun. With the pictured installation I worked Cuba, Sweden, France, Czechoslovakia, Bonaire, and all across the USA in a few hours using CW, PSK31 and JT65 modes from a recent portable operation in Annapolis MD.

Don't leave your HF fun at home! Pack a "DX-go-bag" and include an OCEF dipole to hang from your own "DX-fishing-pole."

About the Author

Kazimierz (Kai) Siwiak, Ph.D., KE4PT, is an Extra Class amateur radio operator and QRP member (#2194). He is a consultant with Timederivative, Inc., specializing in intellectual property and in antennas and radiowave propagation. Kai is a prolific inventor and author of many professional papers and several textbooks. His articles appear in many ham publications. Kai is a life member of AMSAT and a member of ARRL where he serves on the RF Safety Committee and is a Technical Advisor. Kai is an avid DXer and earned DXCC, WAS-TPA, WAC on 8 bands while operating his 100 watt station with a 160-6m band indoor attic antenna. As former team member of SAREX (Space Amateur Radio Experiment) he facilitated many SAREX operations and school contacts. His other interests include flying (instrument and multi-engine commercial pilot), hiking and camping.

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A Portable Voltmeter

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I like to always have a portable pack ready to go! This has to be little enough to be carried into a ICOM LC-156.

Inside I have a ICOM IC-703, a Clansman foldable antenna, some RG174 cable, some connectors, ground wires and, most important, "The power"!

The battery I use is a small 12 V, 2.2 AH SLA battery and, as we all know, it is very important to always check the voltage to prolonge the battery's life. The best use for a SLA is never to discharge it under 11 V and never overcharge it!

Overcharging is a little complex, as it compries two charging methods. One is the so called "floating mode" and the other is "cycle charging." In "floating," the battery must be kept under 13.8 V and in "cycle" we have to monitor the charging current (under C/10 where C = capacity as rated) and to keep the charging voltage under 14.8 V.

If one will ask, I will prefer the "floating" because I can always keep the battery charged when operating! For this I use a modified laptop SMPS (Switched Mode Power Supply) but for multimeter, well, I preferred to "think out of box."

One can use the radio's voltmeter. FT817 have one, IC-703 have one. One is to hard to see it and the other needs restart to the radio to check the battery! Therefore, a dedicated voltmeter is needed. So, I decided then to make a tiny voltmeter using LED's. I first sketch a few demands:

- The voltmeter has to be precise (the SLA voltage has to be kept inside a 2-3% tolerance).
- Also has to be little enough to be fitted into the pocket of the backpack.
- The current drawn from the battery has to be less than 30 mA and better to not have a separate battery.

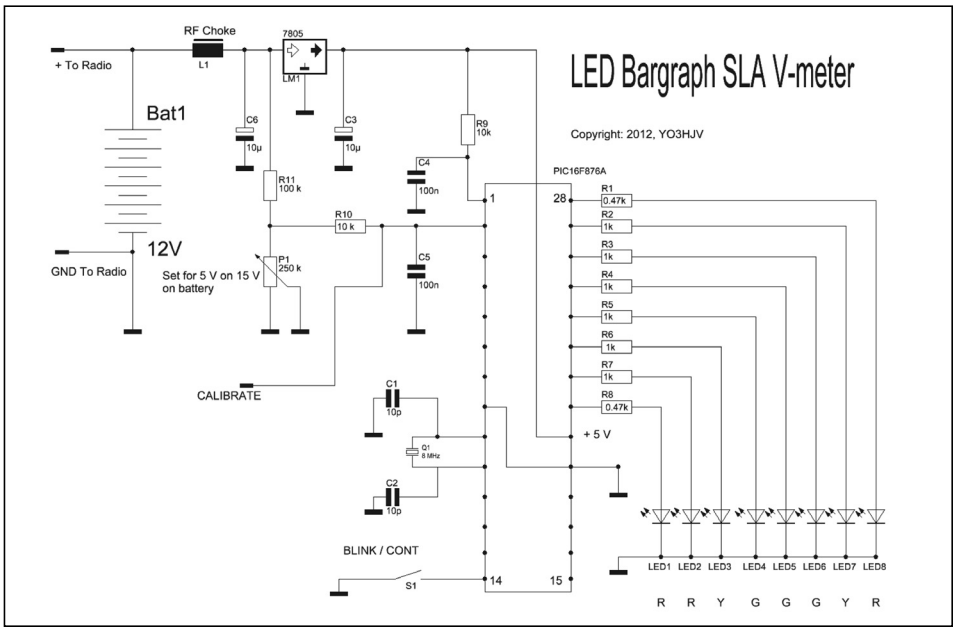

Figure 1—Version 1 diagram.

In the market there are a few possible solutions for this; one is with a dedicated circuit, LM3914 and the other is to use a PIC microcontroller with ADC (Analog to Digital Converter). The most appropriate (a length of arm) was a 16F876A microcontroller.

The schematic is very simple. We can do it in two "flavors" (see diagrams in Figs. 1 and 2). Version 1 has a limiting resistor for each LED so we can easily set the light intensity and Version 2 has the same resistor for all the LEDs. Smaller but not so versatile.

The 8 LEDs show the voltage, as per the Table 1.

Calibration procedure:

1. Put a precise regulated supply instead the SLA Battery.

2. Set the regulated supply to EXACTLY 15 V.

3. Set the P1 to measure at Pin 2 of the

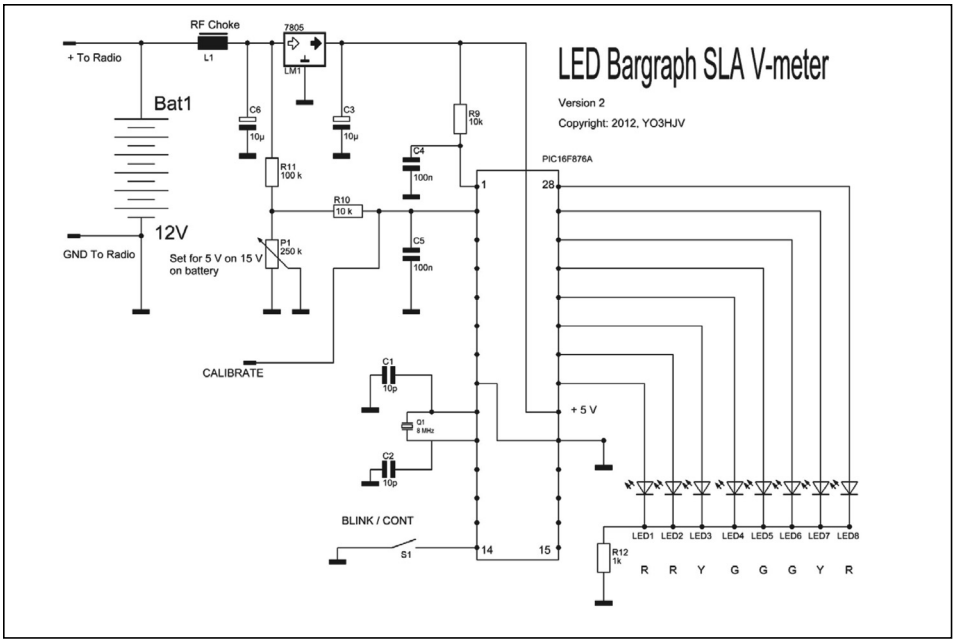

Figure 2—Version 2 diagram.

# / Message	Voltage	Colour
LED 1/ DISCONNECT-RECHARGE	< 11 V	RED Bright
LED 2/ RECHARGE	11 V - 12 V	RED Bright
LED 3/ ATTENTION	12 V - 12,4 V	GALBEN
LED 4/ OK	12,4 V - 12,6 V	VERDE
LED 5/ OK	12,6 V - 13 V	VERDE
LED 6/ OK	13 V - 13,3 V	VERDE
LED 7/ CHARGING OK	13,2 V - 13,8 V	GALBEN
LED 8/ ATTENTION OVERCHARGE	>13,8 V	ROSU Bright

Table 1—Voltages indicated by the LEDs.

IC to EXACTLY 5V.

4. Measure with a voltmeter which has under 0,5% error!

5. Ready to go!

In the archive I put the asm code and also the hex code. Please feel free to use it and, if you don't mind, give credits for my first PIC code.

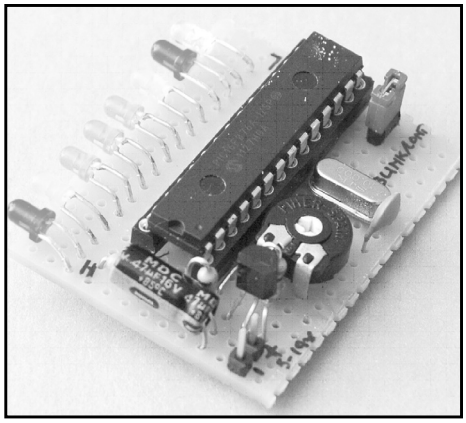

Photo of the completed voltmeter.

NOTES

The PIC is programmed with:

High Speed oscillator (HS);
No "Low voltage programming".
Brown detect OFF
Watchdog OFF

A small video shows the LED Voltmeter against a LCD cheapo Chinese (also hacked for portable) voltmeter and a certified Voltcraft voltmeter:

http://www.youtube.com/watch?v=wzSvvRhv18o&list=UUw64GKESkZfCTRPSb3KkLkA&index=2&feature=plcp

This LED voltmeter draws less than 20 mA (only when LED lights!) making it very "portable." Also, the blinking LEDs are very visible on sunlight.

Finally, the project website is:

http://yo3hjv.blogspot.com/2012/01/led-voltmeter-for-portable-qrp-ops.html

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2012 QRP ARCI CONTESTS

Hoot Owl Sprint
27 May 2012
8pm to Midnight LOCAL TIME

QRP Shootout
16 & 17 June 2012
CW: 1500Z to 2100Z on 16 June
SSB: 1500Z to 2100Z on 17 June

Summer Homebrew Sprint
8 July 2012
2000Z to 2359Z

Welcome to QRP
25 August 2012
1500Z to 1800Z

The Two Side Bands Sprint
USB (10m, 15m, 20m), and
LSB (40m, 80m)
8 & 9 September 2012
USB: 1500Z to 2100Z on 8 September, and 1500Z to 2100Z on 9 September
LSB: 2100Z on 8 September to 0300Z on 9 September, and 2100Z on 9 September to 0300Z on 10 September

Fall QSO Party
13 & 14 October 2012
1200Z on 13 October 2012 through 2400Z on 14 October 2012.

Top Band Sprint
29 November 2012
0000Z to 0600Z
Note, this is the evening of 28 November 2012 in North America

Holiday Spirits Homebrew Sprint
16 December 2012
2000Z to 2359Z