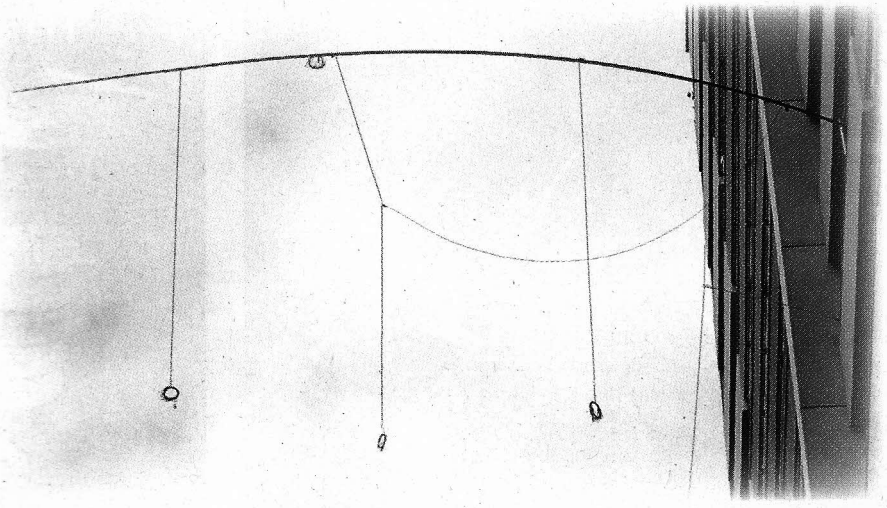
The DK7PE Jumper Beam

Just because you travel doesn't mean that you have to suffer with poor antennas.

Rudolf Klos, DK7PE



Operating out of Africa back in the eighties I very often found tall buildings to be the ideal location for efficient low band antennas using different kinds of sloping wire antennas. While on the higher bands I usually put up with a simple sloping Windom antenna even though results were not entirely satisfactory.

The Jumper Dipole

One day back in 1984 while I operated out of Burkina Faso (XT2CW), the 10 meter band was wide open. My sloping Windom favored only two directions, while others directions were attenuated to varying degrees. This effect is a result of the antenna length (40 meters) compared to the wavelength of the 10 meter band.

To serve all directions north of the building, from west to east equally, I needed a different system. Having no access to the hotel roof, the only solution I could imagine was a vertical dipole fixed on a 40 foot fiberglass pole hanging out of the balcony, about 90 feet above ground.

Comparing the signals between both antennas confirmed the great advantage of the vertical dipole compared to the Windom. It covered a 180° sector in the directions not blocked by the building, and produced a much stronger signal.

Back home in Germany I improved the system by making it operational on multiple amateur bands. A 40 meter half wave dipole was cut into smaller dipoles up to the 10 meter band. So I only had to open or close the connectors (jumpers) to get the correct length for a particular band.

The Jumper Beam

Fixing this vertical dipole in front of a big building out of concrete and steel must have an advantage in form of at least a little additional gain, as any rear energy that isn't absorbed must be reflected somewhere — even though the properties are hard to predict.

So why not put a real, perfectly cut, reflector behind the vertical dipole and a director in front? It was easily done. The result was a full size three element wire beam that covered all bands between 40 and 10 meters by only opening or closing the jumper connectors and winding up any spare antenna wires.

My 40 foot fiberglass pole was big enough to build a three element beam for any band from 30 to 10 meters. On 40 meters the ideal spacing between each element is around 30 feet, making it a bit too large for my 40 foot pole. On 40, however, I can make a two element (director and driven element) Yagi if I wish.

Construction and Deployment

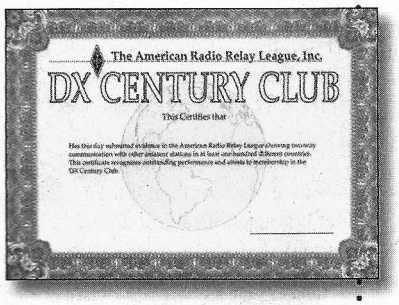
To keep this antenna as light as possible (less than 2 pounds) I use #20 AWG cop-

Hamspeak

Balun — A *bal*anced-to-*un*balanced transformer. Generally used to couple from a balanced antenna such as a dipole to an unbalanced (with respect to ground) transmission line, such as coaxial cable.

Director — One of the elements of a multielement parasitic directive antenna. The director receives energy from the driven element (attached to the feed line) and reradiates it to combine in the direction of the director. The director is usually shorter than ½ wavelength.

Driven element — Antenna element in a multielement parasitic array that is connected to the transmission line.



DXCC award — Award offered by the ARRL for demonstrated proof of legitimate amateur contact with stations in 100 countries or entities, as identified on *The ARRL DXCC List*.[1] See **www.arrl.org/awards/dxcc** for more information.

Half wave dipole — Antenna approximately half a wavelength long, usually fed by connections to each side at the center. Often used as an antenna itself, it is also a reference standard for the performance of other antennas.

Reflector — One of the elements of a multielement directive antenna. The reflector receives energy from the driven element (attached to the feed line) and reradiates it to combine in the direction away from the reflector. The reflector is usually longer than the driven element.

RG-58/U coaxial cable — Coaxial cable type with typically 50 Ω (some variants at 52 or 53 Ω) characteristic impedance and 0.195 inch outer diameter. Compatible with a PL-259 coaxial plug with the use of a sizing adapter.

Windom Antenna — A wire antenna fed with a transmission line, or single wire, at about ⅓ of the distance from one end. It is intended to operate reasonably well on even harmonic (multiples) bands of its half wave frequency. For example, a 130 foot Windom will work on 80, 40, 20 and 10 meters. See **www.smeter.net/antennas/windom2.php**.

[1] *The ARRL DXCC List*. Available from your ARRL dealer or the ARRL Bookstore, ARRL order no. 7617. Telephone 860-594-0355, or toll-free in the US 888-277-5289; **www.arrl.org/shop/**; **pubsales@arrl.org**.

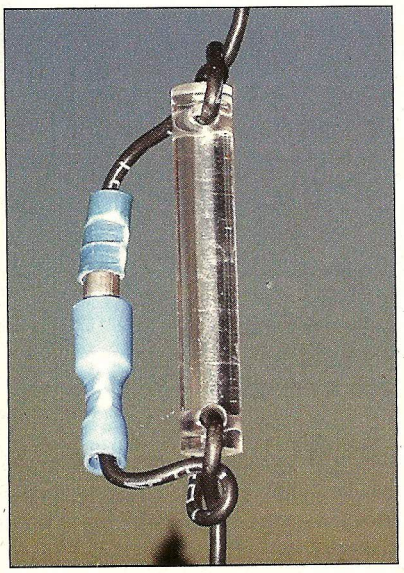


Figure 1 — Detail of the jumper connection. The connector is an automotive push-on type. The plastic insulator position is adjusted to keep the weight off the connection.

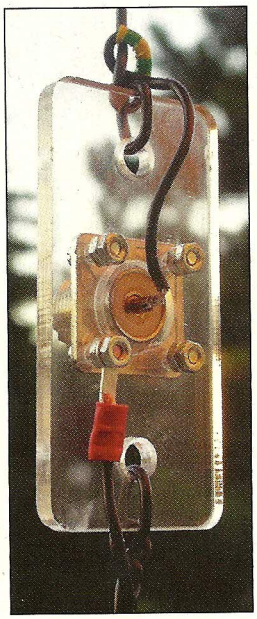


Figure 2 — Feed point details. The direct coax connection seemed to work as well as a balun and reduced the weight.

per wire that makes a perfect compromise between breaking strength and weight. The jumpers are made with connectors from the automotive industry (see Figure 1). The lengths that I found worked best are shown in Table 1.

In the first versions I used a balun to feed the balanced antenna with coax. But except for the higher weight I didn't see any difference in performance. That's why I no longer use a balun and directly feed the system with lightweight RG-58 coax cable as shown in Figure 2. I have found that the cable can easily handle up to 700 W with a matched antenna. Even attenuation on higher bands isn't an issue as the coax length seldom exceeds 50 or 60 feet between balcony and room.

Even though this antenna is a light weight antenna, the pole must always be properly secured onto the balcony railing and on the inner end with an appropriate counter weight or locking straps as shown in Figure 3. I very often found an armchair or something similar available. By moving this object I could even change the beam's direction from Japan to Europe and then to North America, depending on the building's orientation.

Usually I take tension belts to give the system the required stability. Light winds are not a problem for the antenna as the elements move with the wind. If a strong wind arrives, however, the system is taken down within a few minutes.

By the way, I never had a chance to simulate or professionally measure the antenna's gain, nor the difference in using a balun or not. I have found that the performance of this antenna is far better than from the single element. Perhaps one day some antenna specialist will have the ability and the equipment to measure this antenna professionally.

I am often asked what antenna I am using on my DXpeditions. This is one of my favorite ones!

Photos by the author.

Rudi Klos was first licensed in December 1973 as DK7PE. At age 16, he was one of the youngest radio amateurs in Germany, having been granted special permission to waive the usual age requirement of 18. He enjoyed working DX, having radio contact with other amateur radio stations more than 3000 km away. After he had worked 265 DXCC entities, he was eager to visit some of these exotic spots himself.

Egypt was the first rare DX country he operated from. In 1978, he was allowed to operate from the UN Camp in Ismailia on the Suez Canal. In almost 38 years of Amateur Radio Rudi has visited 150 and operated out of 123 different DXCC entities.

You can reach Rudi at Ulrichstrasse 26, 55128 Mainz, Germany or at **dk7pe@rooody.de.** *Check out his personal website at* **www.rooody.de.**

Table 1
Element Dimensions (feet)

Band (m)	*Director*	*Director Spacing*	*Driven Element*	*Reflector Spacing*	*Reflector*
10	15.61	3.51	16.30	7.02	17.09
12	17.61	3.97	18.37	7.90	19.25
15	20.86	4.70	21.71	9.35	22.83
17	24.27	5.44	25.29	10.89	26.54
20	31.23	7.02	32.54	14.04	34.14
30	43.85	9.74	45.23	19.48	47.46
40	62.45	14.00	65.08	N/A	Not Used

Figure 3 — Details of balcony attachment. Adjustable locking straps are used to secure both the bottom of the pole and the fulcrum on the balcony rail.