laboratory test

D2T Antenna

Continuous-tuning antenna

by Rinaldo Briatta I1UW

Rinaldo Briatta (I1UW), is a profound connoisseur of antennas, he has been the author of some technical books about antennas as well as he has been writing articles in this respect on magazines for over 20 years.

Mod.D2T is a directional antenna produced by GIOVANNINI in Vicchio (Florence). It is composed of two modest- dimension elements covering all, really all, amateur waves of frequency HF from 1.8 to 30 MHz and VHF from 50 MHz up to 200 MHz.
It is an ideal antenna, the dream of very many radio-amateurs, and not only.
You happen to ask yourselves whether all this is possible, whether the result in terms of radiation yield is positive, or at least acceptable, and what may be the direct SWR ratio; in short it is evident that if the **D2T** antenna is included in the parameters indicated in the constructor’s specifications, really it is a very interesting product.
In order to verify this answer, in the meantime let us go and see how it is made and what type of antenna is.

Technical data

High-impedance non-resonant antenna composed of two dipoles folded-up fed and 180° dephased with resistive non-inductive termination and broad-band RF transformer for feeding with 50 ohms cable. It shows a bi-directional directivity just starting from 10 MHz with 10 db F/S. At 21 MHz it gains 3 dbd with 5 db F/B and 10 db F/S to reach a progressive gain of 6 dbd at 30 MHz with 5 db F/B and 20 db F/S. In VHF it presents a daisy-type irradiation lobe. The signals transmitted and received up to 15 MHz are attenuated according to what is shown on the yield graph.
Max applicable power:
1 KW PeP 1.5 – 80 MHz
500 W PeP 80 – 200 MHz
Continuous bearing, RTTY, CW, etc.:
100 W 1.5 – 2.5 MHz
200 W 2.5 - 4 MHz
400 W 4 - 10 MHz
500 W 10 - 30 MHz
250 W VHF
Connector : SO 239
Rotation radius : 3.6 m (11.8 ft)
Mast joint : 40 to 50 mm ($1_{5/8}$ to 2 in.)
Max wind speed : 150 Km/h
With 3 mm ice sleeve : 90 Km/h
Employment temperature:
1.5 – 10 MHz : -30 + 25 °C
10 – 200 MHz : -30 + 40 °C

Theory

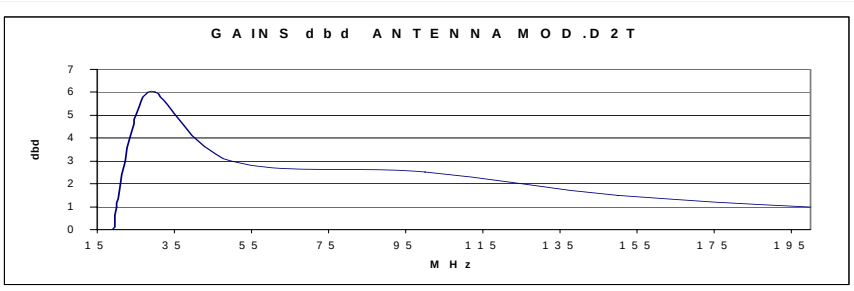
The D2T antenna is a directive system composed of two elements connected with each other by a phase line: consequently two active elements.
Each element is six meters long, thus the “mechanical” resonance is at about 25.5 MHz; but really this antenna is provided with many kinds of resonance.
Multiresonance corresponds not only to the length of the elements but to their total electrical development.
At this point it is added the presence of the resistive element placed opposite the feeding in order to close the loop by switching off the circuit and making the system directional.

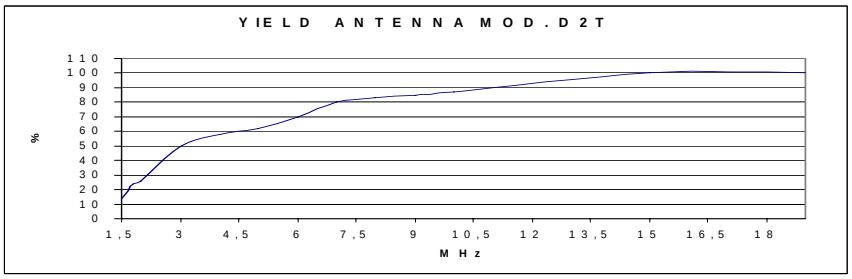
Just to be clear, we are in the presence of a mixture of antenna systems among which we recognize

the W8JK one, for its theory and development please refer to note 1, and then the monodirectional system utilized in rhombic-type antennas as well as in some long-wire Vee.Beam antennas (see note 2).

The impedance at the terminals is on an average of high value and is reckoned at values near 50 ohms by a broad-band transformer.

The SWR declared is included within 2 : 1 but we recommend to utilize a certain length, that is 60-70 meters of a good coaxial cable; the switching-off introduced by the cable allows to contain the SWR on adaptable acceptable levels as seen from the apparatus.



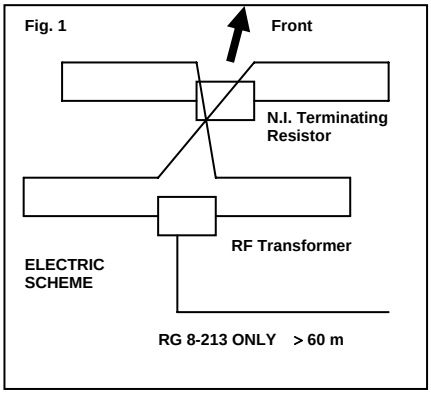


Operations

Considering that the **D2T** system has a resistive termination, specially active in waves of low frequency, the power admitted is to be considered to the schedule provided with due specification.
In the above-mentioned appearances of low frequency, 1.5 – 4 MHz, the **D2T** doesn't furnish with any gain; only starting from 10 MHz you have a directional net behaviour, and from 18 MHz a gain presence is noticed; at **21 MHz** the gain is **3 dbd**, the F/B ratio is 5 db and the F/S one is 10 db ; gain and directivity are increased by 24 and 28 MHz bands.
The D2T system is operative up to 200 MHz with semicircular radiation diagrams, SWR low at 50 MHz and acceptable at 145 MHz.
Though it is declared as a good yield even at a minimum height of two meters from the ground, it is commun practice and yield guarantee the installation at heights of some meters (5 – 7 m) on the roof and of some more on the ground.
As evidenced by technical data, the listening of the 1.8 and 3.7 MHz bands, 160 and 80 m, offers a sensitive reduction of noise which is usually elevated and, pertaining to this advantage, it is the closing of the electrical loop on the resistive termination like what happens in Beverage systems.
In case of DX traffic, for which a certain power level is required, the utilization of a vertical radiator may be useful for the transmission by reserving the D2T system to the reception where its characteristics excel.

Mechanical structure

The D2T antenna consists of a copper wire shaped for the junction of two " folded " elements plus a phase line (fig. 1).
Each element is six meters long



whereas the phase line, the length of which is equivalent to its spaciousness, is two meters long.
All system is supported by a dielectrical fiberglass structure with T6 aluminium boom; its final feature appears clearly on the photos.
The D2T antenna is packed in a kit and furnished with a 9-page assembly manual where the operations and sizes are described in a clear easy way ; there is no need of particular tools but only a few wrenches and good welding set.
Furthermore some information are given about the type of mast and rotators fit and furnishable by the constructor himself.

The structure is robust and, considered also the restricted dimensions of the system, able to resist heavy wind also in case of snow or ice.

Well, now that we have defined the technical details and realization, you will like to know how it behaves as to practice.

Practical tests

The most interesting practical tests would be those ones obtainable from the direct comparison with another or other antennas but it is impossible unless you have at your disposal some hectares of flat ground, some towers and some dozen antennas; this because the D2T operates actively from 1.8 MHz up to 200 MHz.

Consequently you will certainly be satisfied and rely on your bearer or better on me, the undersigned who was able to test a D2T installed, in this respect i wish to thank its owner publicly as he put at disposal also his radio-station for the tests. The radio-station, where the tests are executed, is furnished with several TRX for several bands as well as with a 40/80 dipole non-trapped.
The D2T antenna placed on a mast motorized is about three meters on the roof whereas the real height from the ground is computable within some ten meters in a very free open QTH.

1° - SWR measures

Frequency MHz	SWR	Frequency MHz	SWR
29.8	1.5	10.1	2.0
28.5	2.7	7.08	3.0
24.95	2.5	7.0	3.0
24.5	3.0	3.7	1.2
21.4	1.2	3.5	1.2
21.0	2.5	1.84	1.6
18.1	1.2	50.150	1.5
14.35	2.0	145.100	2.6
14.0	1.8		

NOTE: the SWR is measured at the RTX connector obviously without interposition of any tuner.

2° Comparison of signals

Band in MHz	D2T antenna	40/80 dipole antenna
3.65	Smeter= 7	Smeter= 9
7.055	Smeter= 9	Smeter=9+10
14.260	Smeter= 7	Smeter= 3
18.15	Smeter= 5 (directive)	Smeter= 3
24.94	Smeter= 5 (directive)	Smeter= 1

The comparison measure executed on reception is conformable to the measure which you want to execute (see note 3). Which can correctly be considered equivalent inasmuch as D2T is an antenna for general utilization.

The comparison with specific antennas is not considered correct.

3° Signal/noise comparison

The QTH of the tests is within residential/rural ambit, so it is fit for the valuation of the atmospherical noise except the electrical urban/civic noise no antenna succeeds in eliminating.
In the 7 MHz band the noise picked-up by the dipole is **three** Smeter points higher than D2T whereas in the 3.6-3.78 MHz band the noise picked-up by the dipole is **four** Smeter points higher than D2T.
Consequently D2T is confirmed to show a sensitive noise reduction picked-up even considering the less yield of D2T for these bands.

Final considerations

The large majority of antenna systems used by amateurs community are simple types and sometimes they are to be subtected to aesthetical problems. Therefore they are always some compromises; that is to say: they were and continue being a typical installation notwithstanding the WARC ones, a triband trapped but often a simple W3DZZ dipole trapped.
This situation is propagated on a world-wide level.
We all know we would obtain the best effectiveness of radiation and reception if we relied on directive multielement monoband antennas but this is a privilege reserved to a few saints.
Considered this situation, the D2T solution certainly represents the best possible ; some USA manufacturers offer some similar solutions but only with vertical antennas where we cannot at all speak of gains as the radiation is circular and the noise level is high just to say.
If compared, D2T offers directivity at least from 10 MHz and adds gain from 18 MHz, then just where it serves.
Furthermore it is utilizable with profit starting from 160 meters where **nobody** succeeds in installing an **efficient dipole**.
After the comparisons have been executed in a correct way, we have to affirm it is a rather valid and

EasyLog
Nome Log: IZ1BPO Log di Stazione di IZ1BPO Pagina: 1

Numero	Data	Ora ini	Nominativo	Freq. KHz	Banda metri	Modo	RST dat	RST ric	QTH
1	07/10/97	20:30	I1HQP	3650	80m	SSB	59	59	TORINO
2	07/10/97	20:30	IK1HSS	3650	80m	SSB	59	59	TORINO
3	07/10/97	20:40	I1HQP	7060	40m	SSB	59	59	TORINO
4	07/10/97	20:40	IK1HSS	7060	40m	SSB	59	59	TORINO
5	07/10/97	20:50	IK1HSS	21250	15m	SSB	59	59	TORINO
6	07/10/97	20:50	I1HQP	21250	15m	SSB	59	59	TORINO
7	07/10/97	21:00	IK1HSS	28500	10m	SSB	59	59	TORINO
8	07/10/97	21:00	I1HQP	28500	10m	SSB	59	59	TORINO
9	08/10/97	23:00	I0MYE	3647	80m	SSB	59	59	PESCIA ROMA
10	08/10/97	23:10	ON5FE	3785	80m	SSB	59	59	GRIVEGNEE
11	10/10/97	12:40	F5REL	7085	40m	SSB	59	59	ELOISE
12	10/10/97	12:40	F5MNK	7085	40m	SSB	59	59	PARIS
13	06/11/97	00:53	RU6FN	7053	40m	SSB	59	59	ALEX
14	14/03/98	15:50	ZS6BXN	28520	10m	SSB	59	59	Middelburg
15	14/03/98	22:50	UZ0LZ	7060	40m	SSB	59	59	
16	14/03/98	23:00	9A1CCJ	7065	40m	SSB	59	59	
17	14/03/98	23:10	K1LZ	3800	80m	SSB	59	59	
18	14/03/98	23:20	I5JVA	3800	80m	SSB	59	59	VICCHIO (FI)
19	14/03/98	23:30	RA3ZDV	7050	40m	SSB	59	59	
20	14/03/98	23:40	RK6LG	7073	40m	SSB	59	59	
21	22/03/98	00:20	PT2CC	14207	20m	SSB	59	59	BRAZILIA
22	22/03/98	00:39	IN3ZDC	1850	160m	SSB	59	59	
23	23/03/98	00:55	S51OI	3790	80m	SSB	59	59	
24	23/03/98	01:01	YT1BB	7073	40m	SSB	59	59	
25	29/03/98	10:38	DL1LAD	18131	17m	SSB	59	59	AMBURGO
26	31/03/98	17:10	IT9SUQ	14335	20m	SSB	59	59	DACALA (CT)
27	11/04/98	15:15	JH4TEW	18127	17m	SSB	59	59	

exploitable system with high profit; don't forget it is utilizable also at 50 MHz and 145 MHz.
The only objection we can make is the SWR ratio resulting not low within the limits of our test, but we have to remind that also the majority of modern apparatus are furnished with tuner, and that the SWR is brought to zero completely with a quick manoeuvre by allowing also the utilization of sophisticated solid-state apparatus.

Final

First of all i deeply thank IZ1BPO, Dr.Luciano Depace, who has very kindly granted the use of his own much equipped station for a whole afternoon and has allowed these tests with absolute freedom of interpretation; herewith i am enclosins a IZ1BPO's Log extract concerning some of his tests and QSO ones executed in different times.
Thanks to you all for reading with patience until now; i have nothing else to add but exchange information soon.

Note 1 – John Kraus ANTENNAS, 2° edition, page 454, par. 11-56 and pages 511-512-513 par. 11-19.
Note 2 – IDEM, page 502 etc., par.11-16.
Note 3 – IDEM, page 824, par. 18-6A.

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