**About the T2FD antenna type**

T2FD is a 600-900 ohms folded dipole, terminated with resistor. Feed impedance is coupled with 50/600 ohms voltage balun. It is a wide band antenna with rather low SWR over the full designed frequency range: antenna tuner is seldom needed. Antenna length is not critical: it works also beyond the designed frequency range, with less radiation while transmitting. Free space gain is 3-6 dB below fixed frequency half-wave dipole. Radiation pattern is similar to dipole with the same dimensions. It is a traveling wave antenna, which is rather immune to local noise sources and statics. This is a very quiet RX antenna. T2FD is an ideal construction for wide band reference antennas and for Slow Frequency Hop systems. It is also used as a high-quality receiving antenna, with low power terminator.

**Commercial T2FD antennas**

T2FD antenna type is widely used by military, commercial and broadcasting services:

- Codan C411
- Racal 3051-901
- Comrod AH51
- Barker & Williamson BDW-90
- Diamond WD-330
- Giovannini 1830/DL-M

**T2FD proto**

This proto was built for tests as amateur radio stations HF antenna. This antenna is assembled as inverted-V at 2/8/2 m height. SWR is from 1.1 to 2.4 full range: optional use with antenna tuner. 1.8 MHz operation is possible with tuner: low radiation, however. Antennas full length is 44m for frequencies from 3.5 to 30 MHz. Antenna length is tuned to optimal SWR on 7 MHz, so the SWR is below 2.0 on all amateur bands. See the SWR chart. Proto antennas wire spacing is 450 mm, range 200 to 450 mm. 5/500 mm glass fiber spacers was used between the wires, distance between spacers is about 3m. Spacers were fitted with gable ties. This antenna uses horizontal wires; vertical wires are also usable. 1.5 mm² PVC insulated stranded equipment wire was used as the antenna wire; suitable wire size ranges from 0.5 to 1.5 mm².

Input power range is up to 50W/CW and up to 100W/SSB with the current 50W terminator.
**Terminator Box**

680 Ohms low-inductance resistor is fitted in Al die-cast box. Resistor type is RCH50 680R 50W, Vishay (Elfa). Optional type is FPA100 680R 200W, Arcol (Elfa). Both boxes are fitted into an aluminum profile heatsink. Continuous 100% power up to 50W with RCH50, SSB up to 100W. Nylon insulators and 4mm wire-terminals for antenna wires.

**Balun Box**

Transformer type: 50 ohms to 600 ohms voltage balun. Uses Philips Ferrite Toroid 4C64, 36x23x15mm, 2 to 30 MHz. Primary winding is 2x6 turns Suhner Radox 125, 0.5 mm². Secondary winding is 2x11 turns Suhner Radox 125, 0.5 mm². The secondary must be wound tightly between the primary. Polypropylene capacitor at 50R input provides a DC block. This capacitor also reduces SWR at lower frequencies. Components are fitted with hot-glue into the Al die-cast box. Nylon insulators and 4mm wire-terminals for antenna wires. Grounded BNC or UHF connector for 50 ohms coaxial feed.

**Total Balun/Terminator SWR with 50W resistor**

<table>
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<th>MHz</th>
<th>2</th>
<th>3</th>
<th>5</th>
<th>7</th>
<th>10</th>
<th>15</th>
<th>20</th>
<th>25</th>
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<tbody>
<tr>
<td>SWR</td>
<td>1.0</td>
<td>1.5</td>
<td>2.0</td>
<td>2.5</td>
<td>3.0</td>
<td></td>
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**Total Balun/Terminator SWR with 200W resistor**

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<th>10</th>
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</tr>
</thead>
<tbody>
<tr>
<td>SWR</td>
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<td>1.5</td>
<td>2.0</td>
<td>2.5</td>
<td>3.0</td>
<td></td>
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</tbody>
</table>

**Support Bar**

Terminal/balun boxes are fitted for 450 mm horizontal wire-spacing. It is also possible to use the wires at vertical position. The antenna works like dipole: it is possible to use the antenna as inverted-V or as a sloper to get omni-directional direction pattern. Optimal center-point height is about 9 meters. Minimal wire height from ground is about 2 meters, due the high voltage on wires.
Antenna

- Voltage Balun 50/600R
- Wire spacing 0.20 to 0.45m
- Wire 0.5 to 1.5mm²
- Length 2x2x(22 to 24)m

Balun

- 50 Ohms unbalanced
- Output 600 ohms balanced

Balun Winding

- Primary 50R: 2x6 turns parallel
- Secondary 600R: 2x11 turns with center tap
  Tight winding with primary

Components:

- C1: 3.3 nF, 2.5 kW Polypropylene, RTI, PHE
- B1: Toroid, PVCips, 4CB5 38x23x15mm
- Wire: Sunner, Radox 0.5mm, or similar
- Terminator: 600R 50R, Varco, RC750
  600R 200W, Anco, RP1100

Designed by: OH1AYR
Checked by:
Approved by - date:
T2FD 15.08.2006

Title/Name: T2FD Antenna, 3.5 to 28 MHz, 100W

Drawing number: T2FD
Revision: 002
Sheet: 001