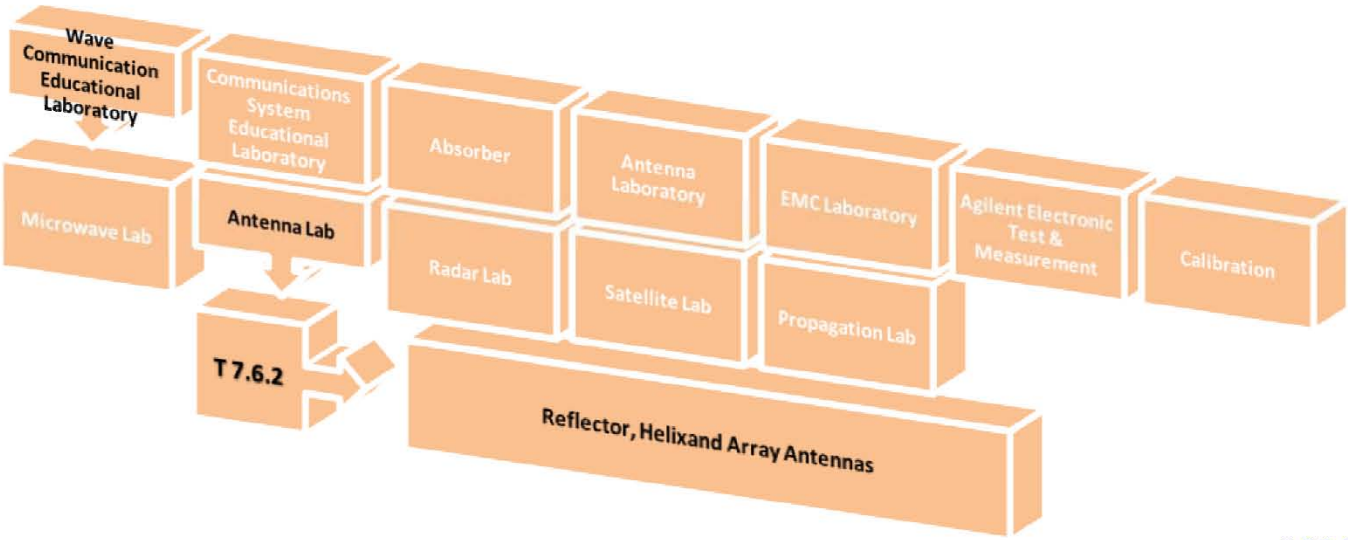
Topics

- The influence of reflections
- Circular polarizing antennas
- Helical antenna gain measurement
- Determining polarization attenuation
- Co-polarization and cross-polarization
- Parabolic reflector antennas
- Linear and planar array antennas
- Scanning with phase-arrays
- Determining the scan angle
- Secondary lobes
- Fan lobes and pencil beam



Advanced experiments

The antennas included in T 7.6.1 (dipole, Yagi and horn) are single radiator systems. They operate with linear polarization. This supplementary set covers the subject of array antennas (linear array, planar array). Beyond this, antenna systems with reflectors will be investigated. Helical antennas can be used to carry out experiments for circular polarization. Both equipment sets, T 7.6.1 and T 7.6.2, contain an appropriate selection of practice models from an incomprehensible variety of all existing antenna shapes. He who completes the experiments with LD antennas will also understand exotic models such as the butterfly, bat-wing, turnstile, etc..

Sentry in flight

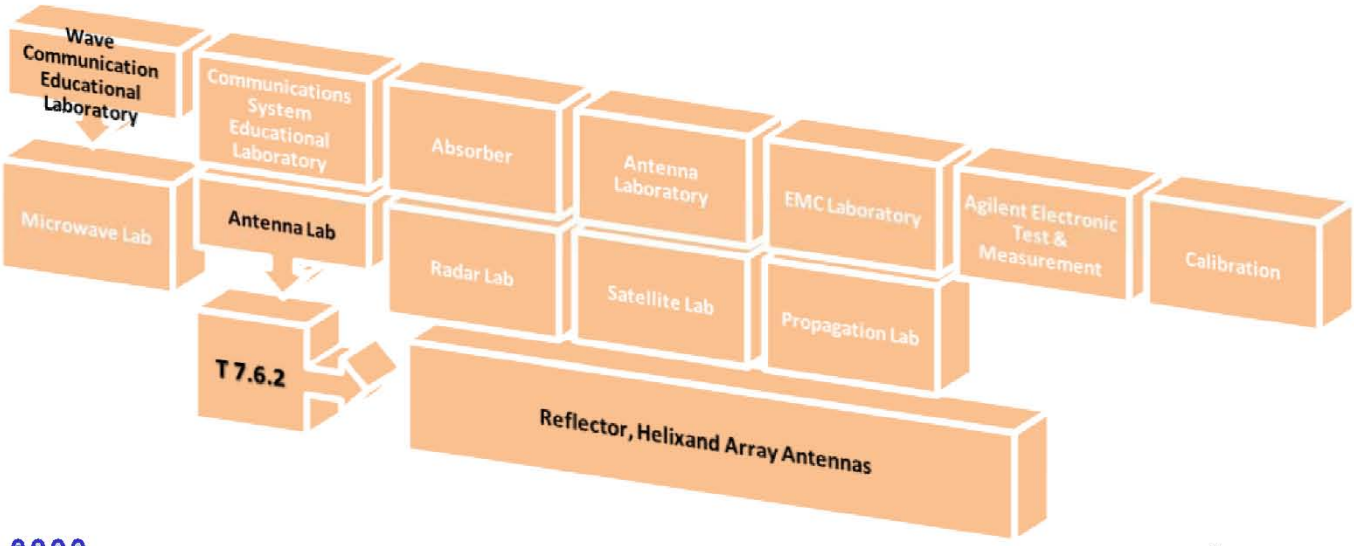
Airborne radar systems make it possible to realize effective mobile surveillance systems.

EQUIPMENT SET LIST

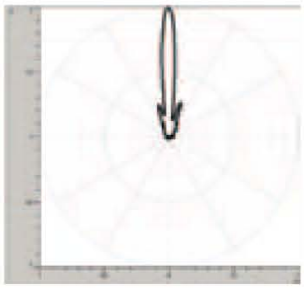
Reflector-, Helix-, and Array Antennas, Supplement Equipment Set to T 7.6.1

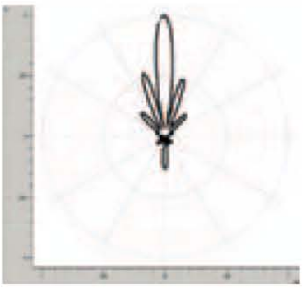
QUANTITY	CAT. NO	DESCRIPTION
1	737 033	Coax Transition Male/Male N, 50 Ohm
1	737 10	Moveable Short
1	737 14	Waveguide Termination
(1)	737 16	Frequency Meter
1	737 197	E-Bend
(1)	737 27	Physics Microwave Accessories I
1	737 424	Slot Antenna
1	737 427	Microstrip Antenna
1	737 440	Helical Antenna Kit
1	737 450	Dish Antenna

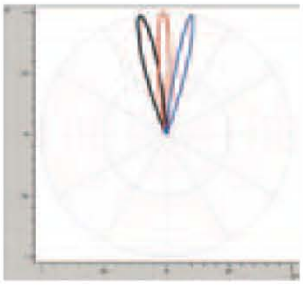
( ): recommended

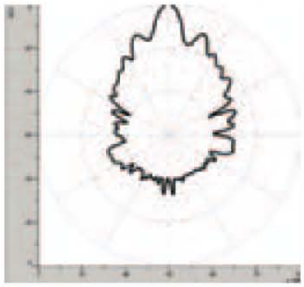


Measurement results





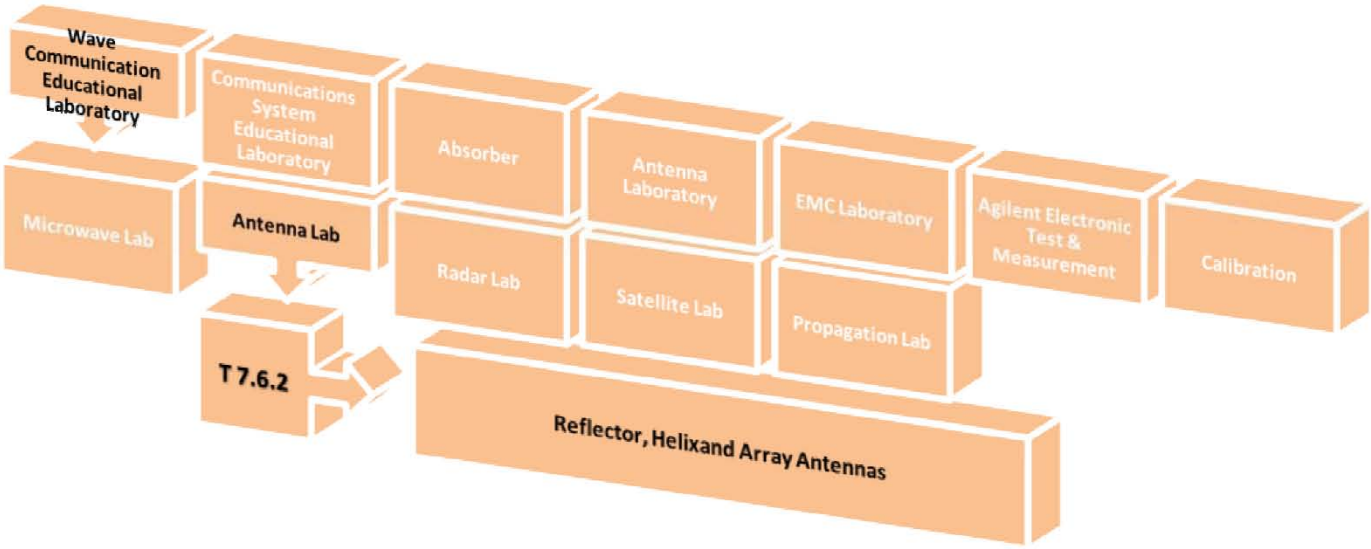




Arrays
Formation of secondary lobes (grating lobes)
Directional diagram of the horizontal slot antenna with covered center slots
Polar coordinates, linear presentation

Electronic scanning
Phase array
Directional diagram of the horizontal slot antenna at various frequencies
Scan angle: 16° for Δ f = 2 GHz

Parabola
Directional diagram with Yagi excitation
Polar coordinates,
linear presentation (top)
Polar coordinates, logarithmic presentation in dB (bottom)



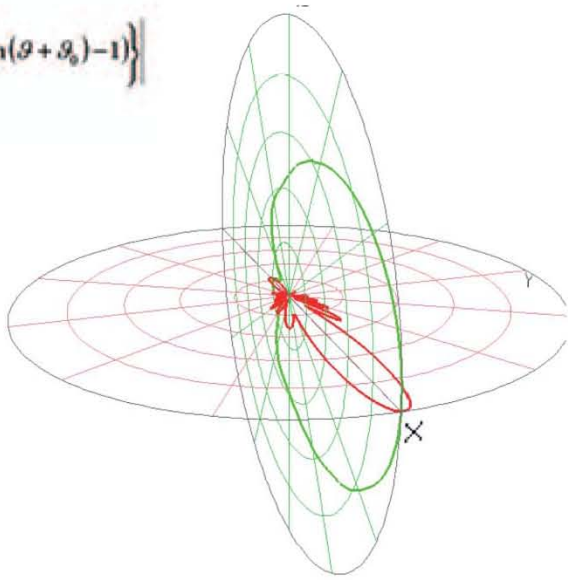
More than a thousand words

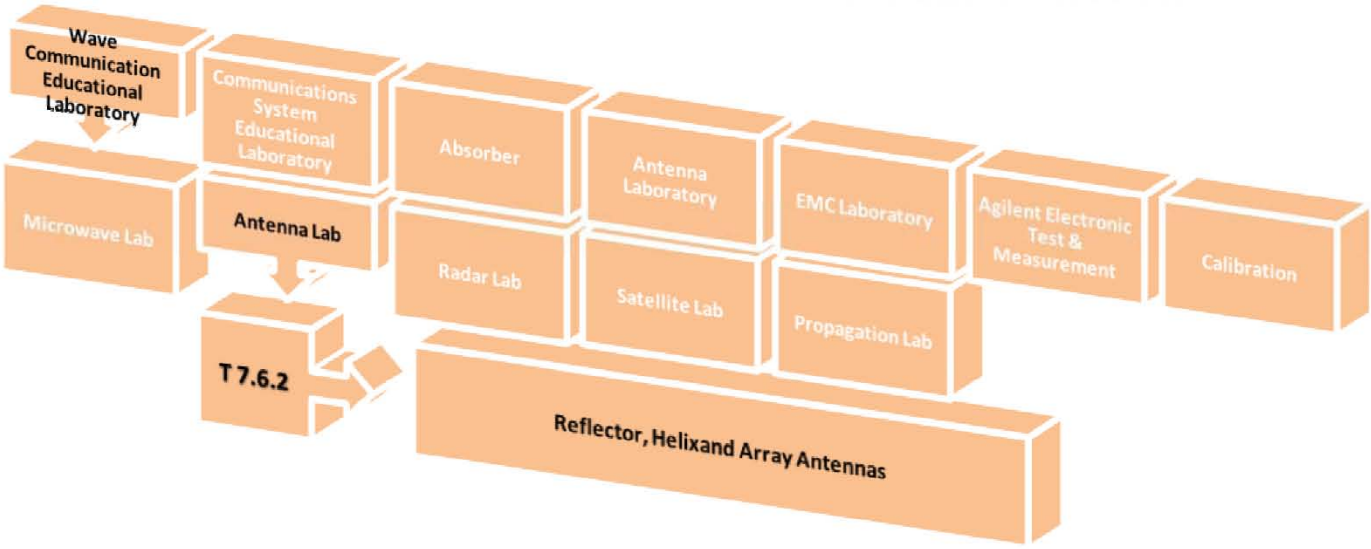
Where others are already overwhelmed with dipole and Yagi antennas, we keep going. The directional diagrams were not at all taken from technical literature or some computer animation. They are simply the results of our experiments!

Theory and practice

Even the equations for complex directional diagrams such as „slot antennas" with reflectors can be created with the formula editor. The result is shown as best fit approximation between theory and real measurements.

$$A * \left|\sin(\vartheta+\vartheta_0)\right| * \left|\frac{\sin\left(\frac{n\cdot\pi\cdot b}{\lambda_0}\cdot\cos(\vartheta+\vartheta_0)\right)}{\sin\left(\frac{\pi\cdot b}{\lambda_0}\cdot\cos(\vartheta+\vartheta_0)\right)}\right| * \left|2\cdot\cos\left\{\frac{\pi}{4}(\sin(\vartheta+\vartheta_0)-1)\right\}\right|$$



3D-Plots

Measurements of the horizontal and vertical directional diagrams can be combined to a 3 dimensional simulation.