

# Wide Coverage Antennas

RUAG Space offers a comprehensive portfolio of Wide Coverage Antennas for a various applications such as telemetry and command, data downlinks or GPS reception.



If RUAG Space's standard, off the shelf antennas with more than 30 years heritage fit your needs, RUAG can offer you high-performance products at low prices for almost instant delivery. For needs where tailoring is necessary, RUAG Space has all the skills and tools to serve you.

RUAG Space designs to your needs, RUAG does GTD analysis or satellite mockup measurements if you prefer. RUAG Space also has all expertise necessary to design and deliver accessories like test caps, booms and brackets. It goes without saying that RUAG masters design and manufacture of all component types needed like filters, diplexers, OMT's, polarisers, waveguides and cables.



HRPT antenna for L-band

## Reliable antennas from RUAG Space

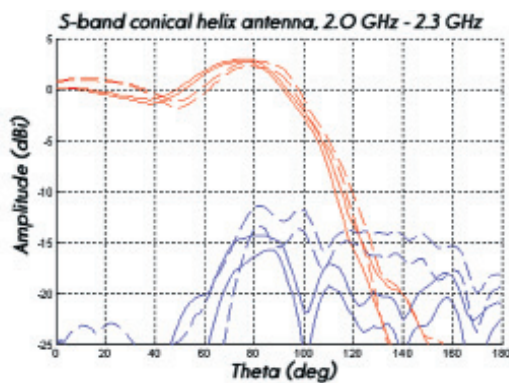
RUAG Space antennas are used for a number of satellite applications including telemetry and command, data downlinks and GPS reception. Also Ariane 5 launchers rely on telemetry antennas from RUAG Space AB. RUAG's basic radiator designs are quadrifilar helices, waveguide radiators, horns and patch excited cups depending on frequency range, coverage requirements and application. RUAG's antenna designs range from L-band through S,C,X and Ku-band to Ka-band. In total more than 350 wide coverage antennas have been delivered.

Typical coverages are:

- Hemispherical
- Isoflux
- Fill-in
- Toroidal
- Global/semi-global



S-band conical helix antenna with test cap (in red)



Typical radiation pattern for the 90° coverage S-band helix antenna

## S-band Telemetry and Command Antennas

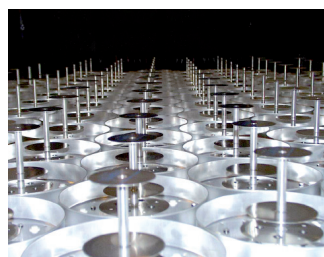
S-band helix antennas. This antenna became well renowned already at its introduction in the mid 70's. Today, RUAG Space has delivered more than a hundred antennas. This antenna type has served numerous scientific and telecommunication satellites in their crucial Telemetry and Telecommand communication. Some variations of the basic theme have been developed including cylindrical and conical helices with varying coverage requirements. The antennas have excellent performance combined with low mass and tight manufacturing tolerances.



GPS receiver antenna with atomic oxygen protective cover

## L-band helix antennas

L-band antennas have been developed for satellite-born GPS receivers and for Earth Observation satellite downlinks. The GPS antennas have excellent performance at both GPS frequencies (1227 and 1575 MHz). The downlink antennas have an isoflux radiation pattern to give equally good link performance independently of receiving ground station location. Frequencies span from 1500 up to 1700 MHz.



Thousands of mobile communication array antenna elements have been delivered.

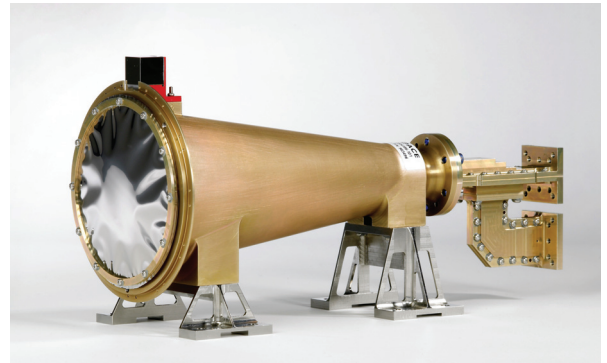
## L and S-band Patch Excited Cups

This radiator type can be used either as a free-standing medium-gain antenna for telemetry and telecommand as in the Smart-1 and LCROSS moon missions or as a radiator element in large array antennas for mobile communications as in ICO or Thuraya payloads. For those projects, thousands of antenna elements have been delivered to Boeing Space Systems for antenna system integration.

The numbers required has resulted in a very cost-efficient design, yet advanced due to competing design requirements for electrostatic discharge and passive intermodulation (PIM).

## Horn antennas

RUAG Space has designed horn antennas for global or semi-global coverage for telecommunication satellites with Ka- and Ku-band payloads. These antennas are used for telemetry and telecommand but also as beacon antennas for pointing of ground stations. Antennas have been delivered to both Eurostar and Spacebus platforms.



17 dBi gain corrugated Ku-band horn for global coverage and dual polarisation

## Corrugated flange (choke ring) waveguide antennas

Waveguide antennas of this kind have been designed in a number of shapes and for a number of frequencies: C, X, Ku and Ka-band. They have been designed for hemispherical and fill-in coverages. These antennas are very robust mechanically and can be built with a minimum of parts.



C-band antenna for MEO satellites

## C-band waveguide antenna

A C-band antenna has been developed to serve as a medium gain compact up/downlink antenna. It is an all metal design with low complexity.

## Toroidal coverage antenna

A horizontally polarised TTC antenna has been developed with a toroidal radiation pattern. This design has two ports per band for redundant receiver/transmitter inputs. The cross polar radiation is lower than for conventional designs. It receives at 14-14.5 GHz and transmits at 11.3 -12.75 GHz.



Horizontally polarised toroidal coverage antenna

## X-band helix antenna

An X-band helix antenna has been developed under an ESA contract to respond to the need for cost effective antennas for downlinking of data from LEO satellites. This antenna has isoflux coverage, but can also be adapted to other coverages. The antenna features a novel, waveguide-fed helix design that has very few parts and therefore offers cost-efficient production and stable performance with small production variations.



Isoflux coverage X-band antenna for earth observation data downlinks

## Ka-band antennas

The latest addition to RUAG Space already wide product portfolio is a family of Ka-band antennas:

- Hemispherical coverage, circular polarization TT&C antennas using waveguide radiators.
- Toroidal coverage, bi-conical dualfrequency antennas.
- Global coverage horns.



Family of Ka-band antennas gathered

## Antenna types

The following antenna designs are available, most of them with heritage through Flight Model deliveries:

- L-band conical isoflux helix
- L-band cylindrical isoflux helix
- L-band patch excited cup
- S-band hemispherical conical helix
- S-band hemispherical cylindrical helix
- S-band cylindrical isoflux helix
- S-band fill-in coverage patch excited cup
- S-band fill-in coverage patch antenna
- S-band patch excited cup
- S-band launcher TM antenna
- C-band hemispherical conical helix
- C-band fill-in coverage WG pipe antenna
- C-band toroidal coverage
- C-band isoflux WG antenna
- X-band isoflux cylindrical helix
- X-band isoflux WG antenna
- Ku-band global coverage telemetry horn
- Ku-band global coverage telecommand horn
- Ku-band rectangular global horn V polarization
- Ku-band rectangular global horn H polarization
- Ku-band rectangular semi-global horn
- Ku-band fill-in WG pipe antenna
- Ku-band 90 degrees coverage WG pipe antenna
- Ku-band 120 degrees coverage WG pipe antenna
- Ku-band toroidal coverage
- Ka-band global horn
- Ka-band WG pipe antenna
- Ka-band toroidal coverage antenna
- Ka-band semiglobal coverage horns