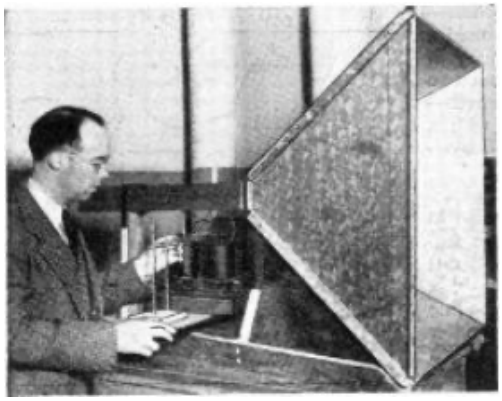
October 2020

# Making Big Antennas Small:
# A Whitepaper on CTG's New Flat Lens Antenna Technology (FLAT)

***THE PROBLEM:***

Wireless and radar technologies at UHF and VHF frequencies require directive antennas for research, testing, and quality assurance. VHF/UHF wavelengths are in the range of several feet, leading to current horn antenna technology that is large and heavy -- too awkward for transport or mounting without significant infrastructure. For example, a standard 0.2 - 2 GHz, dual-ridge horn weighs upwards of 30 lb. and is approximately 40" long x 35" wide x 27" tall.



*UHF horn antenna developed by Dr. W. Barrow (Short Wave Craft Mag., 1938). The size of modern versions hasn't changed much since then, until now…*

***THE NEED:***

"Measurement grade" antennas are used to test in laboratories, test chambers, factories, or field environments. To make these tests more practical and cost effective, a smaller and lighter antenna with the same electromagnetic performance (directivity and bandwidth) is needed. Increasing use of automation and scanning also dictate a maximum size and weight for an antenna to be suitable. Modern environments are often less than ideal. Dust, moisture, and electrostatic shock are all problems that plague conventional horn antennas. Thus, a new antenna is also needed to withstand these conditions while still being smaller and lightweight.

***THE SOLUTION:***

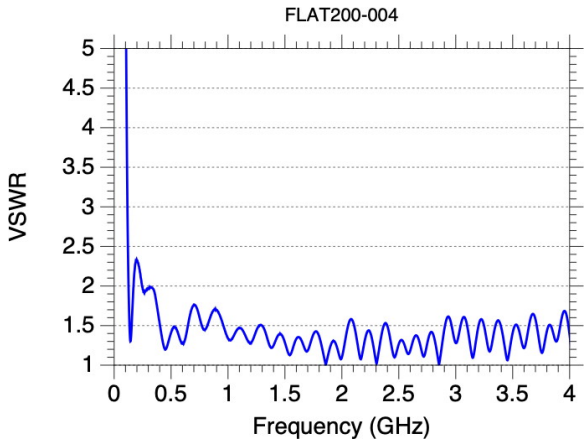
Under US Air Force SBIR support, CTG recently developed a new paradigm in VHF and UHF wideband antennas: FLAT or Flat Lens Antenna Technology.

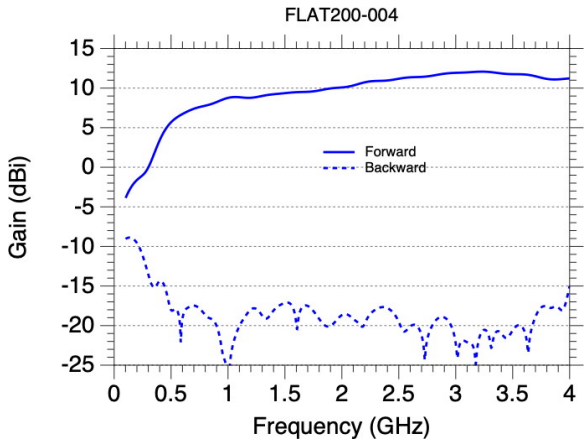
*CTG's new FLAT200 antenna with horn-like directivity from 200 MHz to 4 GHz*

October 2020

CTG used computational electromagnetic design codes to rethink the antenna with a very different strategy. FLAT combines engineered metamaterials and rugged composites manufacturing to result in an antenna with the directivity of a full-sized horn, but with a fraction of the weight. All in a compact package that can be easily transported or stored.

*CTG's FLAT200 linearly polarized antenna is less than 8 lbs.*




*CTG FLAT200 performs similar to a conventional horn but in a much smaller package…*

| | **CTG FLAT200** | Competitor 1 Horn (single pol) | Competitor 2 Horn (single pol) | Competitor 3 Horn (single pol) |
|---|---|---|---|---|
| Length | **30"** | 38" | 38.5" | 37" |
| Width | **2.25"** | 38" | 37" | 37" |
| Height | **20"** | 24" | 29" | 27" |
| Weight | **8 lb** | 22 lb | 26 lb | 29.5 lb |
| Frequency | **0.2 – 3+ GHz** | 0.2 - 2 GHz | 0.2 - 2.5 GHz | 0.2 - 2 GHz |
| Front/Back Ratio | 8 - 30 dB | 7 - 25 dB | ? - 25 dB | ? |
| Gain | -2 - 12 dBi | 6 - 14 dBi | 2 - 12 dBi | 4 - 9 dBi |
| VSWR | < 2.4 | < 2.4 | < 3 | < 3 |

FLAT200 is now in production
FLAT500 (500 MHz to 6 GHz) and FLAT1000 (1 – 10 GHz) are beginning soon

To contact us for information or to place an order send an email to info@compasstech.com