BARNARD MICROSYSTEMS LIMITED

What we do...

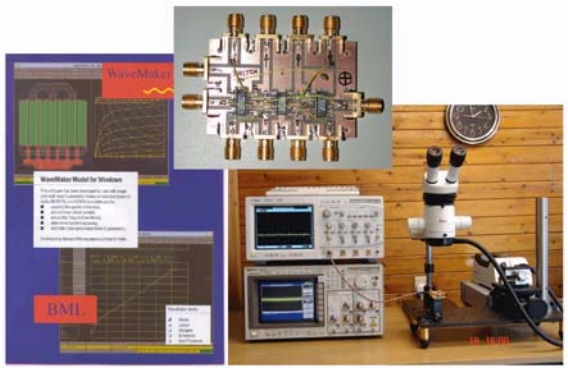
- We design miniature, high performance, systems:
  - UAV navigation, communication and flight control systems;
  - UAV collision sensing systems;
  - UAV based sensor systems.
- We develop small Unmanned Air Vehicles for use in Research and Development applications.
- We create software and develop strategies:
  - software to process and analyse data from instruments on a UAV;
  - Unmanned Air Vehicle application strategies.
- We specialise in high performance, low signal level and high frequency, electronic and optoelectronic circuit and system design. We also develop scientific data processing and data fusion software.

We provide independent, professional, advice and system design and development services. We are especially focused on the civilian aspects of Unmanned Air Vehicles and their sensor systems, although many of these high performance systems can be used in security applications.

We design navigation, communication and flight control systems for UAVs

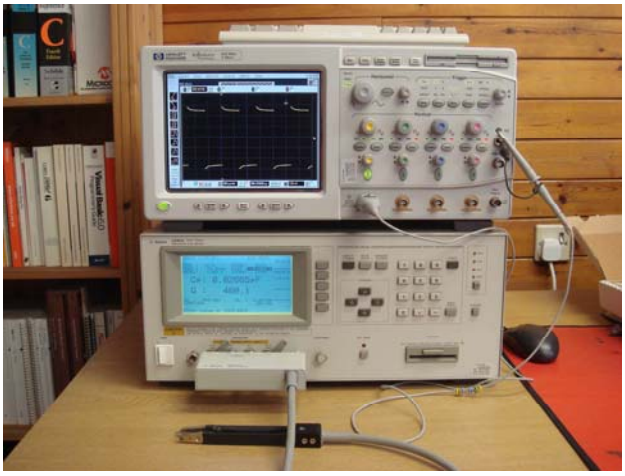
We design,develop and test high performance navigation, communication and flight control systems, based on years of experience in the design of optoelectronic transceivers operating from 155 MBit per second right up to 11.3 GBit per second.

- Inertial Measurement Unit (IMU)
- Flight Control Unit (FCU)
- Communications Management Unit (CMU)
- Air speed indicator unit for a UAV
- Ultrasonic altimeter, for use in automated take off and landing
- Precision microwave and millimetre wave altimeter and collision detection unit



We attend the major international technical conferences, such as the Optical Fiber Conference 2007 in Anaheim, so we are up to date with the latest technical advances, and are aware of the latest optoelectronic and microwave components.

We develop miniaturised sensor instruments for use on UAVs

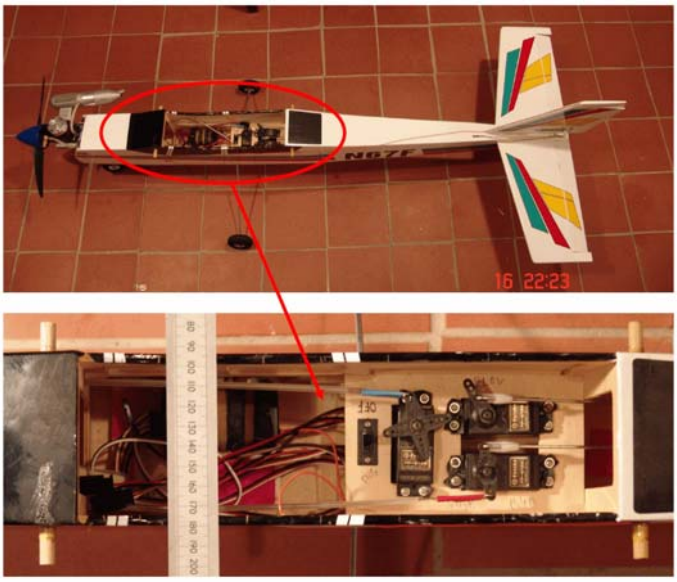


The latest additions to our microwave and optoelectronic test equipment: the HP 54825A oscilloscope with a bandwidth of 500 MHz and a sampling rate of 2 GSa/s, on top of an Agilent 4285A Precision LCR meter.

- Scanning LIDAR systems
- Imaging systems mounted on a stabilised platform:
  - high resolution visual
  - infra-red
  - thermal

- Stereo imaging systems mounted on a stabilized platform

We develop small UAVs for use in R+D applications



- We develop small UAVs, typically with a 1.5m wingspan, for use in Research and Development activities to test navigation, flight control, communication and sensor systems.
- We design towed sensor systems with active flight stabilisation

We create software to manage and analyse data from instruments on a UAV

- Ground control software
- Image correction and merging
- Management and display of stereo imagery
- Integration of:
    - visual, Infra-Red and thermal images
    - magnetic and gravity data into maps

We critique UAV related strategies for companies, start-ups and venture capital firms

UAV technology presents decisive advantages in many areas of activity. However, there may also be problems in the immediate application of this technology. Timing is critical. Wait too long and your competitors could well reap tremendous cost savings, or, benefit from more accurate survey data. Proceed without a strategy and you could waste money when you confront unexpected regulatory issues and the unreliability of current UAVs. We are a **completely independent company** and can help to define a detailed strategy, identifying areas in which UAV technology could benefit your business. We will suggest whether you should get involved at all and if so, when you should get involved and at what level.

Technology	• UAV lack of reliability and how this will be solved • Introduction of other air vehicle sense and avoid technology • Miniaturisation of sensor systems, to allow use of a small UAV
Business case	• Cost per line Km in a geophysical survey, including ground staff costs • When should one envisage the introduction of this technology • What activity needs to be started and when and what developments will be introduced by others and when • What are the development costs and the benefits of early use • Risk assessment of damage to reputation in the event of a crash

- we keep up to date with all the international UAV news;
- we subscribe to “Unmanned Vehicles,” published by The Shephard Press;
- we are a member of the Association of Unmanned Vehicle Systems International (AUVSI)
- we attend and contribute at major conferences, to keep abreast of the latest developments and requirements, in respect of UAVs and the associated navigation, flight control and sensor systems:
    - Defence Systems and Electronics International (DSEi) 2005 in London
    - Farnborough 2006 in the U.K.
    - The Society of Exploration Geophysicists Conference 2006 in New Orleans
    - Working Group 73 at EuroCAE meeting in Paris from 21 - 22 March 2007
    - The Optical Fibre Conference (OFC) 2007 in Anaheim, California
    - Working Group 73 Plenary Meeting at EuroControl HQ in Brussels from 29 - 31 May 2007
    - Presentation at UAV 2007 in Paris from 12 - 14 June 2007:

13 June 2007 - DAY 2 - WORKSHOP ON SMALL UAS (<150 kg)
Mezzanine - Haussmann Conference Hall

11.00-11.20	**The use of small UAVs in exploration & production** Dr J. Barnard, Barnard Microsystems, UK
11.20-11.40	**Inherently safe UAS by design - A conceptual framework to meet the Swedish CAA flight safety requirements** Olle Hagner, University of Agricultural Sciences & SmartPlanes AB, Sweden
11.40-12.00	**The Apollo framework for UAV systems: Experimental results** Pedro Miguel Duarte, University of Porto, Portugal
12.00-12.20	**Small UAS & airspace - An Australian operational account** Heidi Fourie, BAE Systems, Australia

- We are actively involved in Working Group 73 of EuroCAE developing the recommendations for the integration of Unmanned Air Vehicles in commercial air space.
- We produce a document, updated each year, covering UAV Features, Applications and Technologies.

Unmanned Air Vehicle
Features, Applications and Technologies
Version 26

Dr Joseph A. Barnard
2nd January 2007

Barnard Microsystems Limited

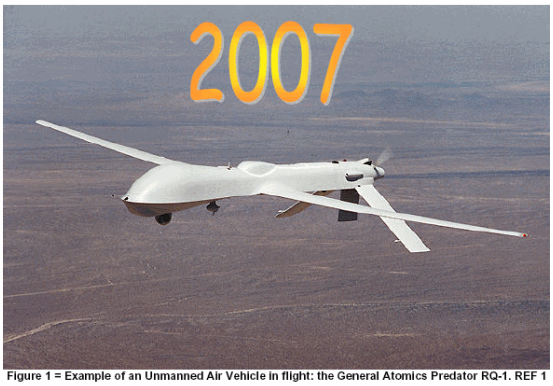


Figure 1 = Example of an Unmanned Air Vehicle in flight: the General Atomics Predator RQ-1. REF 1

The aim of this document is:
- to introduce the reader to the advantages of the UAV over manned light aircraft
- to explain the features of a UAV system, including ground control
- to identify technical developments that yet need to be made to enable UAVs to fulfil more of their tremendous potential
- to discuss the wide ranging potential applications for UAVs
- to examine the technologies and capabilities of some typical UAV payloads

Commercial - in - Confidence

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