

## Using HT BASIC for Instrumentation and control programming

Course No: HTB-8A

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### Course Overview

This is course designed for maintenance technicians, scientists and engineers who have some knowledge of computer programming but whose main task is to maintain or modify existing test systems. This course covers the main features and capabilities of HT BASIC from some straight forward programming concepts and features through to modular, structured programming and includes an understanding of how to control external equipment. The student will learn about programming and debugging techniques and specifically how to understand and debug instrument control programs.

This course covers the key features and the extensive capabilities that HT BASIC has to communicate with GP-IB (IEEE-488) instruments. The student will understand how the IEEE-488 and RS-232 interfaces are defined and used to communicate with instruments and external devices.

### Who should attend

Scientists, Engineers or Technicians who are involved in testing products and who use a computer to assist them in the main duties that they perform or people who need to modify or debug existing programs. Applications are typically technical in nature and often involve the use of external instruments to make measurements.

Features	Benefits
<ul style="list-style-type: none"><li>• Understand the program features to enable debugging and program modification.</li><li>• Learn how to solve common instrument control problems.</li><li>• Learn practical techniques available to communicate with instrumentation</li><li>• Re-enforce lecture sessions with extensive labs</li><li>• Use lab solutions as a valuable reference for later work</li></ul>	<ul style="list-style-type: none"><li>• Reduce support costs and improve productivity by fixing problems faster.</li><li>• Quickly resolve problems so that solutions may be found.</li><li>• Get instrument control programs running sooner</li><li>• Fully understand what has been taught</li><li>• Minimise time-wasting through insufficient knowledge</li></ul>

### Course Objectives

**Given:** A student with some knowledge of programming and some experience of using Test and Measurement equipment.

**Objectives:** On completion of the course the student will be able to:

1. Use the HT BASIC editor to write and debug programs.
2. Understand how the display system operates sufficiently to write programs that communicate with the operator through the visual display unit.
3. Understand and use the 4 loop structuring constructs in developing and modifying a program
4. Understand and use Subroutines, Subprograms and user defined functions and know where they are applicable.
5. Be able to store data in ASCII and BDAT data files
6. Understand and use GPIB and RS-232 instrument control programs

# Atlantis

The following features are covered in formal tuition sessions:

- Using flowcharting to understand how programs work.
- Efficient use of the editor
- Numeric functions
- Matrix operators and functions
- Structured programming techniques  
REPEAT - UNTIL  
SELECT - CASE
- Data Types  
REAL, INTEGER, STRING, @PATH
- Data output  
Printing to screen and printer.
- Program Debugging  
INDENT, STEP, TRACE PAUSE
- Debugging Instrument control programs
- Modular programming.  
Subroutines, Subprograms and Functions
- Interrupt programming  
The key to elegant programs  
ON KEY, ON KBD, ON ERROR
- Data storage techniques  
BDAT and ASCII files
- Formatting data for screen and printer presentation.
- IEEE - 488 Defined
- Interface select codes used  
GP-IB, RS-232, CENTRONICS
- Data I/O  
OUTPUT  
ENTER
- Serial and Parallel polling instrument status
- SCPI - Standard Commands for Programmable Instruments
- Advanced I/O formatting  
FORMAT ON, FORMAT OFF  
Item terminators  
CR/LF, EOI
- Common commands and queries using  
IEEE-488.2  
\*RST, \*IDN?, \*LRN?, \*TST?
- Debugging instrument control programs  
SPOLL, RESET 7, CLEAR 7
- Interrupt programming  
ENABLE INTR  
ON INTR
- The RS-232 Interface in detail  
Modem communication, hardware / software handshaking.

## Course Length

3 days

## Quality

Our policy is to offer the highest quality training and software services. This is achieved by using student feedback forms and comments to continually update and improve our services.

## Format

Students are provided with a training manual that contain all of the slides with accompanying notes. A selection of the topics will be presented during lecture periods and include use of a whiteboard (when available) to expand upon ideas and concepts. Interaction to clear up or explore any confusing point is positively encouraged. During the lecture time students will perform examples of the ideas and concepts taught as a group before spending time individually on labs that enable the student to think for themselves with the guidance of the instructor. Each lab consists of a number of exercises of increasing difficulty.

Sample solutions for each exercise are provided which may be reviewed at a later date

## Questions?

If you have any comments regarding training or further questions we would be pleased to hear from you. We trust that you will find one or more of our training courses of use in your business. Please call us on (0203) 091 7601 or email [tony.bolding@atlantiss.co.uk](mailto:tony.bolding@atlantiss.co.uk)