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Product Review

Handheld Exercises IEEE-488 Test Systems

The manufacturer says . . .	ChipCenter's Alex Mendelsohn says . . .
Randolph, New Jersey--ADI American Distributors, Inc., and Tidal Engineering, suppliers of embedded computers incorporating the IEEE-488 interface, jointly introduced the MT488A portable handheld IEEE-488 test controller. The MiniTest 488 is the first of its kind—a miniature (10.5 × 4.7 × 1.9 inches and 1.5 lbs.) programmable microcomputer with built-in test peripherals including an IEEE-488 controller and a user interface.	
David Beck, President of ADI, and Craig Borax of Tidal Engineering made the announcement. The MT488A is a low-cost (less than $800) and portable personal test controller. It includes a fully integrated Windows-based C environment for program development. Users create test applications in the Integrated Development	This is one of those instruments that isn't well-promoted. Like me, you've probably never heard of either ADI or Tidal Engineering. Nonetheless, the MT488A shapes up as a useful controller that's worthy of attention from the test community.

Handheld, the MT488A can serve as a replacement for |

Environment (IDE) using a PC. The IDE supports edit, compile, and debug through a serial port on the PC.

Programs are downloaded to the battery-backed SRAM on the MT488A or are burned into EPROM (or flash) for permanent storage. Drivers are available for all the onboard peripherals, including the IEEE-488 interface and digital input and output. The IEEE-488 drivers are National-Instruments compatible, allowing upward and downward compatibility with existing test systems and test applications.

The MT488A is targeted at the following applications.

- Product demonstrations and trade shows.
- As a handheld programmable instrument interface, the MT488A stores repetitive command sequences and test setups.
- The MT488A saves space on the production test bench.
- It's a portable off-site field tester and calibration controller.

The MT488A is available with a numeric keypad and both LCD and VFD displays for standalone operation. It's also available without the LCD and keypad for use with an external dumb terminal. Drivers are available to direct the user interface to either the built-in LCD and keypad, to an external dumb terminal, or through the C environment's studio window. Test applications can be created easily by modifying sample applications.

The IEEE-488 interface, also known as the General-Purpose Interface Bus (GPIB), is the industry standard for connecting electronic instruments and peripherals to computers. The MT488A can control oscilloscopes, logic analyzers, power supplies, plotters, printers, etc. Current customers include several microwave-component manufacturers and companies using large power supplies.

Handheld, the MT488A can serve as a replacement for much larger notebook or desktop PC IEEE-488 hosts, as well as dedicated GPIB controllers. It can talk to as many as 15 instruments, implementing the full IEEE-488.1 protocol, and a partial IEEE-488.2 set. The block diagram suggests how its I/O and GPIB hooks can control an addressable frequency synthesizer and a network analyzer simultaneously in an RF test jig.
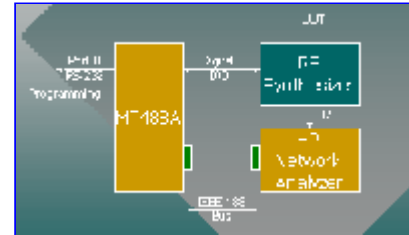
click for larger image

The MT488A is also customizable. It ships with a 20-character × 4-line display module, but you can order it with either a vacuum fluorescent display or a reflective LCD option. The fluorescent option adds about $50 to its cost, but you'll like the bright self-generating display if you need to work in poorly lighted areas.

You can modify an MT488A in other ways, too. The MT488A's 24-button membrane switch panel, for example, can be customized. ADI/Tidal gives you software that lets you create graphic overlay artwork for the keypad. That can be useful if the instrument is being used by nontechnical or semi-skilled operators.

An Embedded Heart

In any case, the goal is to detect the aligned or centered position of the target relative to this pair of sensors. The illustration below suggests an application in wafer laser-trimming.

Based on a C-programmed Zilog Z180 microcontroller chip embedded in a module from Z-World, Inc., the MT488A packs on-chip A/D converters and D/A converters. The unit's DMA and UART functions, voltage-level charge-pumps for proper serial I/O voltages, etc. are handled by the Z-World module.

The MT488A also packs two asynchronous 9,600 bits/second RS-232 serial ports for low-speed connectivity, as well as a programming/debug port. One RS-232 port can be used for things such as sending ASCII messages to a user terminal or a PC. The other port is used for programming the MT488A and interfacing to its LCD and keypad.
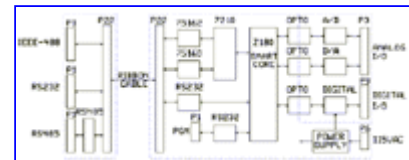
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ADI/Tidal say that their product relies on the National Instruments NEC7210 Talker/Listener/Controller chip,

which is a bit misleading. Actually, the NEC µPD7210 is a common IEEE-488 interface chip that's used by a lot of GPIB designers. National Instruments makes a drop-in replacement for the NEC chip, calling it the NAT7210.

In this instrument, the NI silicon works with NI's TNT4882 IEEE-488 interface chip (the register set of the TNT4882 is a superset of that of the TNT7210; most of the software that's written for the TNT7210 can be used on the TNT4882, sometimes with only minor modification).

The C hooks built in to the MT488A permit program coding without the need for any hardware emulators or logic analyzers. Downloading programs, setting breakpoints, observing variables, and single-stepping are supported by the supplied software. EPROM generation is automatic, and your programs can be stored in the battery-backed SRAM or perm'd in EPROM.

Development software includes drivers, as well as C libraries and C source code examples for Talker/Listener and Controller functions, RS-232 and I^CC I/O, and formatting and **printf** string functions. You also get C code samples to implement floating-point trigonometry. By the way, these coding examples can be downloaded now as Acrobat files from Tidal's Web site.

The press release mentions that programs are fed into the unit's battery-backed SRAM array (it uses a 3 V button cell), or are burned into EPROM or written into nonvolatile flash, but makes no mention of array size. The MT488A includes up to 128ZKbytes (32Kbytes minimum) of battery-backed RAM for program storage, and 512 bytes of PROM or flash for storage of calibration and other constants.

Other hardware features include a real-time clock and lots of bidirectional serial digital I/O lines based around the popular I^2C protocol. The digital I/O port uses Philips Type PCF8574 8-bit I/O expander chips to implement the 2-wire interface.

Significantly, the unit's 32 digital I/O lines are fitted with opto-isolation that gives you protection against spikes and errant voltages as high as 2.5 kV. Also, these ports can sink up to 10 mA and source up to 30 µA. Additional source current can be provided by built-in pull-up resistor networks.

ADI/Tidal also offers a related instrument dubbed the MT488A-RC. It's a remote-control controller that makes use of infrared connectivity. Like the MT488A, the -RC version is a handheld transmitter and receiver, and is supplied with a Windows-based C environment for program development. It's targeted at GPIB control in dangerous sites or in hazardous environments such as around high-voltage or toxic materials.