

## Handheld vs. bench DMMs — no longer a clear cut choice

### Application Note

The decision of whether to purchase a handheld or a bench digital multimeter (DMM) used to be pretty simple. If you were doing design work or needed a high degree of accuracy, you went with a benchtop model. Today however, rapidly shrinking component technology has blurred the performance differences, resulting in handheld units with near benchtop capabilities.

There have always been tradeoffs of course. The accuracy and functionality of the benchtop meter came with a hefty price tag. And you also had to deal with portability issues when you needed to make a measurement in the field. Being able to take a bench DMM into the field usually meant paying extra for a rechargeable battery pack, if available, or having line power available at the remote location. All in all, it was an expensive and cumbersome solution for field work.

#### Feature rich

Today's handheld DMMs have many more features, more resolution, and significant accuracy improvements over their predecessors. As this trend of packing more features and capability into handheld test equipment continues, the decision of choosing between a handheld or bench DMM has been transformed into a matter of personal preferences rather than feature availability.

Accuracy and resolution usually found only in bench DMMs of the past are now pretty common in their handheld counterparts. For example, the Fluke 170 Series products have a basic V dc accuracy of up to 0.09 % and a resolution of 6000 counts. The Fluke 180 Series products are a step up with a resolution of 50,000 counts and a basic V dc accuracy of 0.025 %. All of these meters can be calibrated and have traceability to industry standards, just like their bench counterparts. With specifications like these, it's possible to maintain and calibrate equipment requiring the tightest of tolerances using handheld DMMs.

#### Early handheld DMMs were limited

The early handheld DMMs didn't have the accuracy, resolution and the advanced functionality necessary to be a versatile instrument on the bench. They also had small displays that were hard to read.

Since the first handhelds were introduced in the late 70s, DMMs have been transformed by user demand. The need to take benchtop capability out into the field came with advances in technology and the "electronification" of much of our world as electrical and electronic equipment became more complex over the years and circuit miniaturization put



greater capability in remote locations. In turn this drove the need to make troubleshooting, repair and calibration possible in the field.

Test equipment manufacturers like Fluke, responded to the need to have more than ac and dc measurement capability "on-site." Advances in circuit design have not only put more capability in a smaller package, but significant gains in computing power and lower power consumption rates have been realized as well. As a result, handheld DMMs have changed significantly.

## **Today's handheld DMMs have undergone revolutionary change**

Today's handheld DMMs not only have gotten smaller, taking up much less real estate on the bench, they are now packed with advanced functionality like frequency, pulse width, duty cycle, dB and temperature and a computer interface. Many of these functions were only found on high priced bench DMMs. In addition the accuracy and resolution of these new high powered handheld DMMs has improved significantly. Some DMMs even have on-board memory for saving individual measurements or logging data over time. Modern DMM designs, like Fluke's model 189, have display digits that are larger and easier to read than many bench meters and can even display two parameters at once.

Features and functions like these allow the technician the ability to test, troubleshoot and calibrate equipment whether it be on the bench or on location at a field site without having to worry about limited bench space, remote site line power or lugging big heavy bench test equipment into the field.

Taking measurements with your DMM and then passing those measurements on to a PC for further analysis and storage has become very common for the more advanced handheld units. In fact, the ability to set up the handheld DMM to take measurements over a period of time (up to three days) and then bring that stored data back to a PC for downloading

and analysis is not only convenient, but efficient as well. The PC isn't tied up downloading each measurement the DMM makes. All the measurement data is stored in the DMM's memory and downloaded all at once after the readings have been taken. The Fluke 180 Series has the storage memory and electronic interface for communicating with a computer. Whether a series of independent measurements on multiple test points, or a string of recorded measurements on one test point, the recording and documenting process is done quickly and easily with Fluke's FlukeView® Forms Documenting Software package.

## **Battery power**

Even though the handheld DMM still depends on batteries for power, many special circuits have been added to help increase battery life from tens of hours to hundreds of hours. Not only have there been advances in low power consumption circuits, but the addition of auto-shutoff (sleep mode) features help preserve battery power by automatically turning off the meter when it's left unattended for a specified period of time. When the batteries do finally die, access to the battery has been made much easier, making replacement quick and painless. In the case of Fluke's 110, 170 and 180 Series products, a special battery access door has been designed into the case for easy and quick replacement of the battery without breaking the calibration seal.

## **Conclusion**

Bench DMMs and handheld DMMs both have their place in today's test and measurement world. However, the overlap of applications where both products can do the job is steadily increasing, as manufacturers such as Fluke keep packing more capability into their handheld meters. The appeal of being able to take a feature rich, high accuracy, low cost DMM into the field for testing, makes a handheld DMM the preferred choice of technicians and engineers alike. Who couldn't use a portable product that takes measurements that a counter/timer, bench DMM and thermometer could do in one simple portable handheld device?

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Printed in U.S.A. 9/2003 2106398 A-ENG-N Rev A