



## 3 MHz Precision Component Analysers offer users a *great* deal!

Designed to allow complete and accurate characterisation of any component, Wayne Kerr's 6430A and 6440A Precision Component Analysers are aimed at users involved in the design or manufacture of components, or those who use components as part of their equipment designs. They provide the complete component test solution at the lowest market prices.

Key features include:

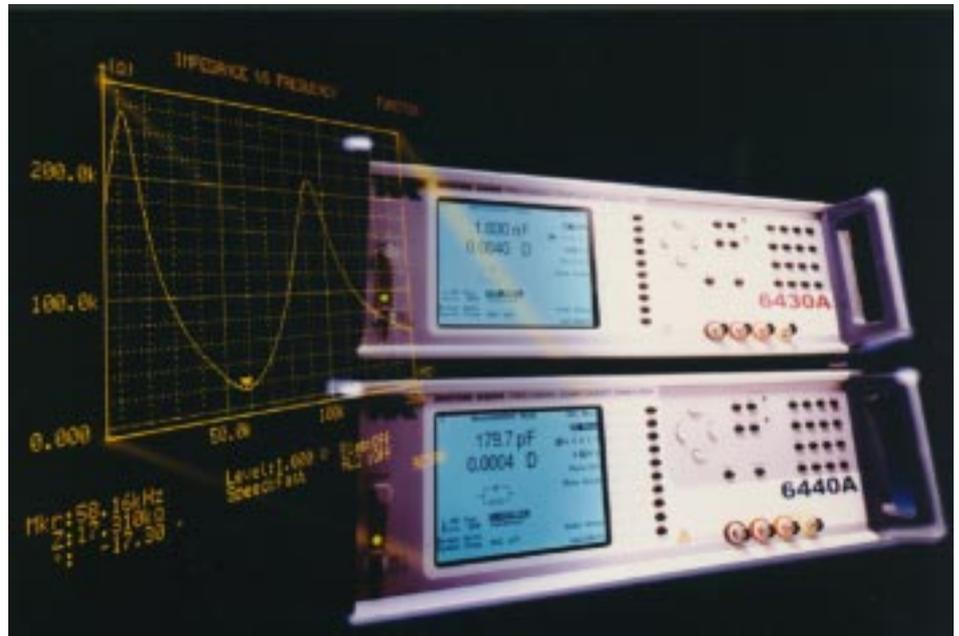
- \* Frequency Range 20 Hz to 3 MHz
- \* 0.02% Basic Accuracy/200 ppm on Dissipation Factor
- \* More measurement functions
- \* 'Graph' mode
- \* 'Multi Frequency' mode
- \* Intuitive commands, easy to use

The 6430A and 6440A deliver an industry-leading basic accuracy of 0.02% and for capacitor testing where accurate Dissipation Factor measurements are key, accuracy to 200 ppm.

In addition to the usual parameters, Admittance (Y), Conductance (G), Reactance (X), Susceptance (B) and Resonant Frequency extend the exceptional measurement range.

Characterising a component graphically over the full frequency band can be easily accomplished with the 6440A. Both units can automatically calculate any component's Resonant Frequency and its equivalent series or parallel circuit at resonance.

For component performance over a fixed number of frequencies, Multi Frequency mode allows the operator to decide which parameter is to be measured and at what frequency.



The 6440A can test any component up to 3 MHz and the 6430A to 500 kHz. Both instruments start at 20 Hz and frequencies can be set with a resolution of <1% on the 6440A.

Where high speed is critical, the 6430A and 6440A can operate at up to 20 measurements per second making them ideal for the production area as well as the design laboratory.

Whether it's a single parameter, a table of results in Multi Frequency or a

logarithmic graph of component performance, the 6430A and 6440A will print the results directly to a printer. A GPIB interface provides external control while output lines control tolerance levels in components.

The 6430A and 6440A offer users great performance and specifications at the most competitive selling prices in the market today.

### Contents

- Powerful DC bias current to over 25 A
- Forward Look
- Characterising Telecomm Transformers
- Chinese Service facility opens
- Brochure bridges the gap

# 3265A DC bias current to 25 Amps - and more!



**Performance of Inductors and Transformers can be significantly affected by the electrical conditions in which they operate. A typical factor is DC bias current.**

Different applications have different requirements. For example, Telecomm Transformers, as used in modem applications, are required to operate with very small levels of DC bias current. A small change in this bias current can significantly change the value of the transformer. Other applications such as switched mode power supplies and other high current devices require high levels of DC bias current. This can vary from between 1 A to over 100 A.

To address this need Wayne Kerr introduced the 3265A DC Bias Unit. Used in conjunction with the 3260A Precision Magnetic Analyser the user can select a bias current between 25 mA and 25 A in 0.025 A steps. If more DC bias current is required, up to 5 units can be connected together to provide 125 A. The unit provides 11 V of compliance voltage. Measurements can be made at frequencies from 20 Hz to 1 MHz. Due to the level of current involved a 'safety interlock' is provided along with a number of internal controls, which automatically switch off the current in the event of a failure. The safety interlock allows a Perspex protective cover or light shield to be used, which on opening



*3265A seen here being used with the PMA3260A Precision Magnetics Analyser*

automatically switches the bias current off.

Measurements can be performed without DC bias current flowing using the Kelvin leads to save re-configuring connections back to the inductance analyser. It is also possible to use only the high current leads to perform a lower activity 2-terminal measurement with bias current flowing.

## Forward Look

In this issue of 'LCR News' Ken Harrison, Sales Manager (Instruments) reviews two key topics - software drivers and technical support.

*All of our Instruments (LCR and RF) have GPIB interface facilities available, usually supplied with the instrument and meets the current IEEE-488.2 SCPI standards.*

*In addition we receive regular requests for software drivers which provide customers with instrument Set ups and ease of writing their own test program. From the variety of Driver Programs to choose from, Wayne Kerr have selected LabVIEW™ as the most popular and accepted industry standard.*

*We have always been aware that customers need to write software for specific applications. In the 1990's, Wayne Kerr supplied National Instruments LabWindows drivers for nearly all its instruments. Early in 2000 we will have National Instruments LabVIEW drivers available for all of the LCR Meters, including the latest Precision Component Analysers, 6430A and 6440A.*

*Providing technical support to customers is of real importance to us, whether it is how to use one of our instruments, a measurement application or software issue.*

*Very often, the customer's first contact with Wayne Kerr is through our application engineers who need to fully understand the question put before them and must accurately interpret this information in order to give a satisfactory and timely response. This is not always a simple process and in some cases requires engineering support and hardware tests to verify a particular measurement requirement.*

*Perhaps one of the most important functions of technical application support is the feedback to marketing and engineering that can influence additional features to existing instruments - or even lead to new products.*

*Application support is our life blood and we greatly value regular input from our customers, distributors and representatives.*

# Characterising Telecomm Transformers

Using external Low Bias Current to accurately simulate in-circuit use - by David Sheath

**With increasing demand for telecommunication devices such as mobile phones and modems comes increased pressure on component manufacturers to test components to more exacting standards. This application note explores one such requirement - the need to test components in the presence of small DC bias currents.**

Transformers used in modems will quite often be used in circuits where a small DC current passes through the primary winding. For transformer manufacturers, it is often imperative that their transformers are tested in a way that simulates the intended operating conditions.

Using the technique described in this application note it is possible to provide an extremely accurate DC bias current, which can be used to simulate in-circuit operation. By using a worked example, the application note explains how to make an external DC bias current device. The aim is to give an understanding of the external bias design so that it can be modified to suit any low DC bias current application.

The technique described uses a 3260A Precision Magnetics Analyser. However, the same technique can be used in conjunction with the 3255 Inductance Analyser.

## Low Bias Currents

It is common for telecomm transformers to have a small DC current flowing through the primary winding. It is important that when transformers are tested, the effects of any current (that will be present when the device is in circuit) are taken into account.

In some telecomm transformers the effect of the DC current can be quite significant and a very small variation in the DC current (a few micro amps up or down) can have dramatic effects on the transformers

characteristics. For this reason, transformers that will be used with a DC current flowing through the primary need to be tested under the same conditions.

The PMA3260A can be used to provide a DC bias current between 1 mA and 1 A. Although the lower current limit is 1 mA, it is not always possible to deliver low level DC bias current with enough accuracy for all applications. However, using the technique detailed in this application note it is relatively easy to obtain a level of current accuracy that is adequate for most applications.

## Connections

The instrument connections to the DUT remain the same. The measurement leads however, need to be intercepted to allow the external bias current to be introduced in to the circuit.

## Design Notes

### Resistor R1

R1 in the circuit diagram above acts as a V-I converter. When selecting the value for R1 you should consider the bias current required and the output range of the PSU. In this worked

example  $4k7\ \Omega$  was chosen, primarily because it was a readily available value but also because it required a relatively high base drive voltage of 4.7 V. This meant that to deliver the full range of required current, 1 to 2 mA, the voltage range required was 4.7 - 9.4 V. This gave a large margin for fine adjustment of the voltage therefore allowing the current to be set very accurately.

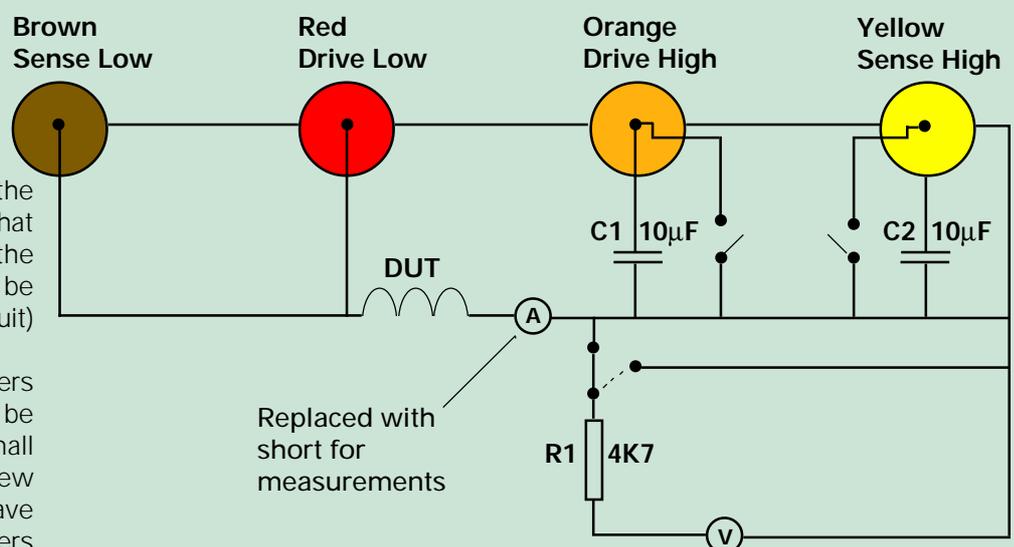
## Capacitors C1 and C2

C1 and C2 act as blocking capacitors to prevent the external bias flowing into the instrument. The specification of the blocking capacitor, C2, is critical. C2 will have an effect on the measurement accuracy of the instrument. C1 however is less critical and its value and type matches C2 purely for simplicity of design. Both capacitors must be non-polarised.  $10\ \mu\text{F}$  capacitors were used in this application. The details of why these were chosen are shown in the workings below.

## Ammeter

It is very important to design and build the circuit to allow the ammeter to be connected in series with the DUT. This will give the most accurate

*continued overleaf*



**Characterising  
Telecomm Transformers**  
(continued from the previous page)

reading of the current at the DUT. It is also important to use a suitably accurate (preferably) digital ammeter.

**Power Supply**

The power supply needs to meet certain requirements. It must have a stable, finely adjustable output. If the voltage output fluctuates or does not have fine enough adjustment then the required current at the DUT may be unobtainable. This situation will be made worse with an inaccurate ammeter. If possible, a linear power supply should be used. If the only power supply available is switch mode then you need to ensure that the switching frequency will not interfere with the measurement frequency.

**Switches S1, S2 and S3**

None of the switches shown in the circuit sketch on the previous page are required for the basic operation of the external bias source. However, S2 and S3 will allow certain operations to be performed that would otherwise require the external bias source to be removed. In addition, though not required, switch S1 is recommended.

**Comment Corner**

We always welcome comment about our newsletters and issues that affect you.

Please email us at:

**sales@wayne-kerr.co.uk**

or send a fax to *LCR News* on:

**+44 (0)1243 824698**

**NEW FACILITY OPENED IN CHINA**

China has increasingly become an important centre for high technology manufacturing and now supplies products all around the world. With this kind of development comes the need to provide the right level of local customer support in key locations. *And that is just what Wayne Kerr has done in China.*

A service and calibration facility was recently opened in Dongguan - one of the country's most important industrial centres. Situated just north of Hong Kong, Dongguan is ideally placed to provide service support to China's large industrial region.

To introduce both the new service facility and the latest LCR products, a seminar was held in Dongguan. It was well attended and all the delegates were impressed with the latest product offering.

This is another example of Wayne Kerr's commitment to providing customer support wherever it is needed in the world.



**Brochure Bridges the Gap**

Having the largest range of bridges on the market, there's almost certainly a Wayne Kerr product to suit your needs. brochure to help you decide which instrument is right for your application.

Ask for a copy of our



**Wayne Kerr Electronics Ltd**  
Durban Road, South Bersted  
Bognor Regis, West Sussex PO22 9RL, UK

Tel: +44 (0) 1243 825811 Fax: +44 (0) 1243 824698  
E-mail: sales@wayne-kerr.co.uk Website: www.wayne-kerr.co.uk



An Advance International Group Company