The Peak Electronic Design Passive & Active Component Analysers

George G3RJV discovered that with the handy Peak Electronic Design analysers in the workshop, identifying components is made much easier. Read on to share the experience!

The Rev. George Dobbs G3RJV received a message from *PW* pre-empting the arrival of Father Christmas! He was being asked to review two extremely useful components analysers that some readers have already discovered for themselves.

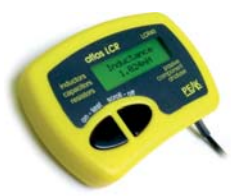

Fig. 1: The first unit reviewed by G3RJV is the Peak LCR40, which analyses passive components (see text).

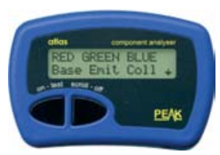

Fig. 2: The second unit to be reviewed is the Peak Component Analyser DCA55, which identifies and analyses active devices (see text).

"What a coincidence", I thought when *PW* Editor, **Rob Mannion G3XFD** contacted me with the invitation to review the Peak Electronic Design company's passive and active component analysers. The coincidence being that my wife had just ordered, and received, the passive component version as a Christmas gift!

Although I had one of the two analysers, Rob asked Peak Electronics to send me both versions on loan as asking my wife, **Joanna G0OWH**, to un-gift wrap is a request too far!

Throughout my history as an electronic constructor I have always been interested in test equipment to check the values and operation of components, especially those which measure capacitance and inductance. I have made many tuned circuits with home wound inductors and variable capacitors of uncertain value.

In the past, inductance has not been an easy parameter to measure nor has the capacitance of junk box variable capacitors. This is to say nothing of the stock of active devices, many with in-house markings or no markings at all, they can be bits of black plastic with three indeterminable legs.

Classic Bridge

My very first component tester was the classic AVO Test Bridge; a traditional Wheatstone bridge with a single valve and a notoriously difficult to read logarithmic scale. It did give indistinct readings of resistance and capacitance, but usually failed to give any reliable readings for air-spaced variable capacitors and had no facilities for inductance.

Later I coveted the Marconi Instruments Universal Bridge that one of my Radio Amateur friends owned. It measured resistance, capacitance and inductance over a wide range but was not exactly simple to use, involving skilful manipulation of controls and reading null points on a meter. This was emphasised by the makers including an engraved plate of instructions of the top of the instrument. It also weighed in the order of 10kg!

So, the chance to try instruments that would fit in a shirt pocket and tell me what I wanted to know on a digital display seemed too good to turn down. It was a pleasure to accept Rob's review commission.

Two Products Reviewed

The two products produced by Peak Electronic Designs are the **Peak Atlas DCA55 Component Analyser** and the **Peak Atlas LCR40 Component Analyser**. The former is for active components and the latter for passive components.

Although the active analyser was the first of the products to come from Peak Electronics, I'll deal with the passive analyser first. It was the first I was able to test and it was the same model as my Christmas gift.

Passive Component Analyser

The Atlas LCR Component Analyser arrived in a small cardboard box with a simple manual. In fact it's really so simple; two push buttons, two hook-on probes and an l.c.d. display, that it's tempting just to go ahead and use it. Despite this I recommend that a new owner reads the Introduction and the Warning page. Sensibly, this warns against connecting the probes to powered equipment or components with stored energy such as charged electrolytic capacitors.

An extra sheet with the manual describes how to perform a probe compensation routine for the unit. This ensures that the readings take the probe characteristics into account when making measurements. This will happen for the new user anyway, because on initial switch-on the probe compensation routine comes up on the display.

The compensation procedure is extremely simple involving the shorting and opening of the two probes. The probe compensation can be repeated at any time. I must confess though, that the compensation was not quite the first thing I did with the Atlas LCR!

Instead, I had my usual look inside the box of something new. The inside revealed a single printed circuit board (p.c.b.) with a high component density. As might be expected the circuitry is based around a PIC processor with an 8MHz crystal signal source.

The unit is powered by a single 12V alkaline battery of the type often used in automotive remote key fobs. The battery life is long, although Peak Electronics advise replacement every 12 months to prevent leakage damage. Spare batteries are easy to obtain from motor spares outlets, or can be bought directly from Peak Electronic Design.

So, what does the passive component analyser do? The answer is simple - a lot! The unit tells the user the component type, resistor, capacitor or inductor, automatically selects the best signal level and frequency (d.c., 1, 15 or 200kHz) to test the component and then provides component value data. The range of measurement and technical specifications are impressive.

In The Workshop

I like simple-to-use equipment in my workshop. Unfortunately, too many items of equipment in my workshop, station and even around the house are just not easy-to-use. Useful functions lurk a layer or two down in the bowels of their software. But I don't have the memory of a younger person nor the cavalier 'poke and try' attitude so I'm constantly reverting to the manuals, assuming I can find them!

There's no problem with the Atlas LCR Analyser though. It really is child's play to use. (What I really mean to say is that it's a 'mature person's play' as children seem to have no problems whatsoever operating menu-led equipment!).

The operation of the Atlas LCR is self evident. Pushing the left (**on – test**) button switches the unit on. The display gives a quick indication of when the next factory calibration is required. This is followed by a five second countdown to the readings. The count down is to allow time to attach the

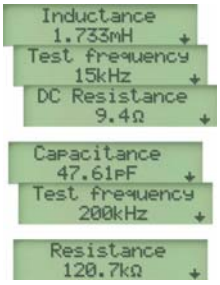

Fig. 3: Sample displays as provided by the Peak LCR40 on its built-in l.c.d. display (see text).

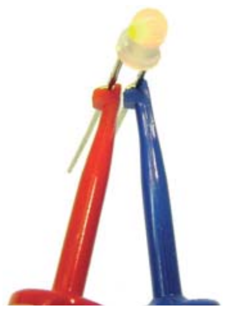

Fig. 4: The probes used on both units are of the wire-ended hook on type. (See text for comments).

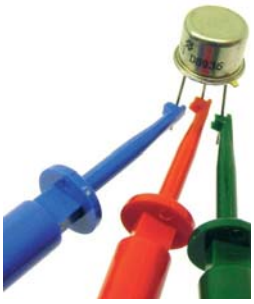

Fig. 5: The Active Component Analyser, the DCA55, uses three colour coded hook-on probes for testing (see text).

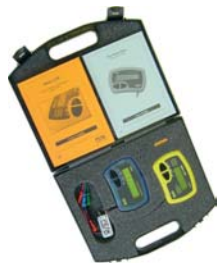

Fig. 6: A handy carry-case with room for both analysers, instructions and spare batteries is available from the manufacturers. Contact Peak Electronic Design directly for further details on a full range of accessories and other units.

probes to the component. If this has already been done, another press of the button will cancel the five second delay.

The two line, 16 character l.c.d. display will then come up with the type of component and the value. Pressing the right button (**scroll – off**) will scroll through the test frequency used and, in the case of an inductor, the d.c. resistance of the component (some sample displays are shown in **Fig. 3**). The unit can then be switched off by holding down the right button, although it shuts down automatically after a few seconds.

Some Simple Tests

I decided to try something simple as a first test and chose a 1kΩ resistor, which was then connected across the probes and the unit switched on. After displaying the calibration date briefly, it timed down to give a reading of '1.001kΩ'.

The resistance test was fine but the real test, for me, was to be with capacitors and inductors. The lower and higher values appeared to give good results some of the higher values were expressed in **millifarads** (mF); a 2200µF electrolytic capacitor read as '2.282mF'. Incidentally, the probes may be connected either way round to read electrolytic capacitors as the test voltage is no more than 1V.

The tests with variable capacitors were even more fun and I've quite a large collection of air-spaced variable capacitors. Such components are expensive to buy as new items, so over the years I have gathered them whenever the opportunity arose.

Most of my stock variables bear no outward markings as to their value. Now, however, I was able to sort some of them out! So, armed with a spirit based felt tipped pen and the Atlas LCR, I set about sorting out and labelling my entire collection.

The Atlas LCR didn't fail me. It gave values for every capacitor I offered to its probes, ranging from some huge transmitter type variable capacitors to some tiny solid dielectric trimmers.

I also tried some unusual capacitance measurements. For example, the capacitance between two adjacent tracks on a piece of Veroboard 650mm long is 7pF!

By this time I was really enjoying myself, and as I have some very thin doubled sided p.c.b. material, I soldered short lengths of wire to each side of a small piece 350 x 250mm and this formed a capacitor with a value of 188.3pF. This could be useful for making small custom value capacitors or measuring capacitance on double-sided p.c.b.s in r.f. applications.

Hook-On Probes

At this point I ought to add a word of caution about the probes. They are of the small hook-on type, **Fig. 4**, which grasps the component with a little wire hook. I have similar probes on other items of test equipment and experience has taught that the hooks are only really designed to clip onto wire leads of a modest diameter. Attempting to clip them on to large chunks of metal will bend the hooks out of shape or even break them.

Several different types of probes are available from Peak Electronics for use with the analyser including tweezer probes for measuring surface mount devices (SMD) components. Whenever I measured components with large terminations, I soldered a small length of wire on each terminal to enable me to use the hook-on probes.

Measuring Inductance

As I'd had no problems measuring capacitance, I progressed on to inductance. A small moulded axial choke colour-coded at 100µH was reassuringly measured as being 95.2µH, having a resistance of 3.0Ω which was measured at 200kHz.

An unknown pile-wound r.f. choke came up as 261.6µH with a resistance of 3.4Ω. I then tried a whole range of junk box inductors and each one produced a reading, which, as far as I could tell, seemed appropriate. Several little impromptu inductors were wound using insulated stiff wire and all but the smallest gave viable inductance readings.

Finding a T37-2 core with seven turns of thick wire, I applied it to the unit which told me it was "low resistance and inductance", scrolled to 0.0Ω, and then scrolled on to 0.2µH. My little program which tells me the number of turns to wind on Micrometals toroids told me that to obtain 0.2µH, I would have to use 7.1 turns. So my software was accurate, or at least agreed with the Atlas LCR.

I'm very pleased with the Atlas LCR and hope I can find my wife a gift nearly as useful when her next birthday comes around. The analyser will remain with easy reach on my workbench.

Semiconductor Analyser

Now to the semiconductor analyser. In outward appearance the Atlas DCA55 is like the Atlas LCR with a different coloured case, (see Fig. 2), and three colour coded leads, **Fig. 5**. It has the same two buttons (**on-test** and **scroll-off**) and two line, 16 character, l.c.d. display.

What the manufacturers claim for this version is very impressive. Peak Electronics say; "It doesn't matter how you connect the test clips to the component, the Atlas can analyse a vast number of different component types including bipolar transistors, enhancement mode m.o.s.f.e.t.s, depletion mode m.o.s.f.e.t.s, junction f.e.t.s., low power thyristors and triacs (less than 5mA trigger and hold), diodes, multiple diode networks, l.e.d.s, bi-colour and tri-colour l.e.d.s. The analyser will even identify special component features such as diode protection and shunt resistors in transistors. For two-leaded components such as diodes and l.e.d.s, any pair of test clips can be applied to the component any way round, the Atlas sorts it all out for you".

Impressive! This is a far cry from my first home-built transistor tester with a few resistors, a couple of switches and a surplus meter. The DCA55's specification looks good.

For a first check I connected the three hook-on probes randomly to the leads of a 2N2222A transistor; and as readers will know from Carrying On The Practical Way I have lots of those! After a few seconds it told me "***npn bipolar transistor***".

With the first push of the scroll button it indicated "***RED : emit, GREEN : base, BLUE ; coll***" the next scroll "***Current gain H_{FE} = 175***" the next scroll "***Test current Ic = 2.50mA***", next "***B-E voltage V_{BE} = 0.74V***" next "***Test current I_B = 4.54mA***" next "***Leakage current I_C = 0.00mA***". The analyser certainly delivers a lot of information very quickly.

I was impressed by the automatic identification of the leads. All other active device testers I've used have required the user to know the identification of the leads and connect them to the appropriate terminals. As a result I have wasted too much of my life finding the appropriate data book, thumbing through too much information, and straining over small print to find out device connections I had forgotten or did not know.

Although I didn't test the facility, the analyser will also indicate the presence of diode protection or resistor shunts in bipolar devices.

Diode Testing

So what about diode testing? I randomly connected a 1N914 (the cockroach of silicon diodes) to the unit and went through the test routine. It told me "***Diode or diode junction[s]"***, "***RED : Cath, BLUE Anod***", "***Forward voltage V_F = 0.71V***", "***Test current 4.58mA***".

A red l.e.d. connected to the probes read "***LED or diode junction[s]***", the connections, "***Forward voltage V_F = 1.84V***", "***Test current I_F = 3.37mA***".

The Atlas DCA55 will recognise an l.e.d. if the forward voltage is greater than 1.5V. It can also recognise bicolour l.e.d packages. Germanium diodes may be recognised by their low forward voltage (0.37V for the OA47 I tried) and Schottky diodes should have an even lower forward voltage (0.3V for the BAT85 I tested). The DCA55 will also recognise popular types of three terminal diode networks.

Another Favourite

Next I pulled out an IRF510, another favourite device I have used in r.f. power amplifiers. The DCA55 told me I had an "***Enhancement mode N-Ch MOSFET***", it gave the lead connections, the Gate Threshold and the Test Current.

Next, a J310 came up as an "***N-Channel Junction FET***", then it indicated "***Drain and Source not identified***" because the internal structure of j.f.e.t.s. is symmetrical about the gate terminal, but it did indicate the Gate lead.

Like the LCR analyser, the use of the DCA55 is simple and self evident. It's simply a clever little unit which took me far beyond what I have been able to measure for active devices. I have added it to my next gift list but I may not be able to wait that long and it might become a gift to myself!

Both analysers supplied by Peak Electronics did exactly what they claimed, which is a lot from small and simple to use pieces of equipment. I expect to have them both on my workbench, near at hand for frequent use. They are worthy additions to any amateur constructor's bench at an affordable price. Well done Peak Electronics! **PW**

Products
The Peak Electonic Design Ltd's LCR40 Passive Component Analyser and the DCA55 Active Component Analyser.

Company
Peak Electronic Designs Ltd (Manufacturer).

Contact
Peak Sales on Tel: (01298) 70012,
FAX: (01298) 70046 or via secure website **www.peakelec.co.uk** and by post.

Pros & Cons
Pros: Both analysers did exactly what they claimed, which is a lot from small and simple to use pieces of equipment. They are worthy additions to any amateur constructor's bench at an affordable price. Well done Peak Electronics!

Cons: probe hooks only suitable for small diameter leads (see text for suggestions)

Prices
(Direct from Peak) also available from Maplin and Farnell. DCA55 £49, LCR40 £69. Prices include battery, probes (as reviewed) and battery.

Supplier
Peak Electronic Design Ltd., Atlas House, Kiln Lane, Harpur Industrial Estate, Buxton, Derbyshire SK17 9JL.