This ingenious piece of test equipment identifies the leadout connections of a wide variety of semiconductor devices and carries out a comprehensive range of tests on them. Michael Dranfield finds it an essential servicing aid

The Peak Atlas DCA55 Component Analyser

The Atlas DCA55 is the latest component analyser from Peak Electronics Ltd. I reviewed the last one, Model DCA50, in the March 1998 issue of *Television*. It's good, but this new one is a whole lot better. The DCA50 was designed primarily to analyse transistors of both the bipolar and MOSFET variety. The DCA55 can identify and check triacs, thyristors, diode networks and LEDs as well. It will even check bipolar transistors that incorporate an internal efficiency diode, such as the BU508DF.

Description

The Atlas is slightly smaller than the DCA50 and quite a lot thinner. Use of a different type of battery, the 12V GP23A type commonly used in car alarm keyfobs, has contributed to this reduced size. As a result the new instrument is very neat and compact. With overall dimensions of 10·5 x 7 x 1·5cm it's just right to fit in the top pocket of your shirt.

As before, the readout is a crystal clear LCD that measures 6·5 x 1·5cm. Because of the greater range of tests that can be carried out however the display has to be scrolled page by page by pressing the scroll button. When this button is held down, the unit powers off. This is necessary to reset it for the next component test. Power down also occurs after 30 seconds of inactivity.

Use

Analysis can take up to a couple of seconds depending on the type of component. The display then gives the result of the test. If the component is faulty, the message "faulty or unknown component" is displayed. I found the test probes a bit fiddly at first, but they are a good compromise and are ideal for small transistors such as the TO92 variety.

The transistor test is comprehensive. For example it tells you whether the transistor is a Darlington pair, whether it has a collector-emitter parallel diode, or a base-emitter resistor. When the Atlas detects a base-emitter resistor, the display warns you that this might affect the accuracy of the *Hfe* test (the transistor's current gain). The maximum *Hfe* the Atlas can display is 65,000: in comparison, the DCA50 could display a gain of only up to 995. The Atlas is thus ideal for checking Darlington transistors.

Another very useful test is the b-e voltage drop of the device being checked. This can be used to determine whether the transistor is a silicon or germanium device – the base-emitter voltage drop with a germanium transistor can be as low as 0·2V, compared with a silicon transistor's 0·7V. Although germanium transistors are no longer used in new equipment this is helpful if, like me, you collect and restore transistor radios from the Sixties and have tins full of salvaged transistors with no markings.

The component being checked can be connected to the three probes any way round. The display then tells you its pin connections, say red probe = collector, green probe = base and blue probe = emitter. In addition the Atlas lets you know the collector current at which the transistor is being tested and the base test current.

The most useful aspect of the MOSFET test is the display of gate threshold voltage

– the voltage at which source-drain conduction starts. The MOSFET pin connections are given, whether the device is of the p- or n-channel type, and the current at which the transistor is tested.

Triac and thyristor tests simply display the pin connections. The gate test current for these devices is limited to 4·5mA, which effectively precludes testing high-power devices such as the ones used for motor control in washing machines and vacuum cleaners. High-power devices generally require a gate current of 50mA or more before they switch on. The test current is kept low to avoid damage to sensitive devices. I would have liked to see a user-selectable test current to enable high-power devices to be tested.

Almost any type of diode can be analysed, and the Atlas will show whether the device is a common-cathode diode network, common-anode diode network, series-diode network or inverse-parallel diode network. This is very useful when checking surface-mounted components. Three-terminal devices that look like transistors can turn out to be diode networks.

Diode forward-voltage drop is also displayed. This enabled me to locate a faulty line output stage diode in a set fitted with the Sharp CS chassis – the forward-voltage drop was much more than 0·7V. A reading of 0·25V indicates that the diode is of the Schottky type, which is used in some chopper power supplies.

LEDs are tested in the same way, and the Atlas can even automatically identify two- or three-terminal bi-colour diodes.

As a test I connected a BU508DF (DF stands for Diode, Fully insulated) transistor to the test clips. The first message I got was "the Peak Atlas is analysing" then, after a short delay, "NPN bipolar transistor" came up together with an arrow pointing downwards at the right-hand side. This tells the user to press the scroll button to display further data page by page. When I did so I was given the device's pin connections, in this case red probe = collector, green probe = base, blue probe = emitter. Scrolling down again brought up the message "diode protection between collector-emitter". This is of course the internal efficiency diode. The next page showed the current gain: "*Hfe* = 7" was displayed. Very low current gain is common with high-power devices – a base drive of several amperes is required to drive a line output transistor. The next page gave the collector current at which the device was tested (*Ic* = 2·5A)*. After that I was told the base-emitter voltage drop, which was 0·61V, then finally the base current at which the device was tested (4·68mA). What more could you want from a semiconductor tester?

The instrument is ideal for selecting and matching transistor pairs for use in audio amplifiers. When the battery is failing, the warning "low battery" is displayed at switch on. On completion of a test, the information is displayed for thirty seconds after removal of the device. Unfortunately the instrument is not suitable for in-circuit testing.

To guard against leakage, battery replacement every twelve months is reco-mmended. In common with many new VCRs, the Atlas has a built-in self-test. If an internal problem is detected, an error code is displayed after which the unit switches itself off. You then contact the manufacturer.

Conclusion

This is one of those things you don't know how much you need until you've tried one. The Atlas component analyser can be obtained direct from the manufacturer Peak Electronic Design Ltd., West Road House, West Road, Buxton, Derbyshire SK17 6HF at the all-inclusive price of £60 (UK – for overseas orders add £5). Peak's telephone number is 01298 70 012. The web address is **www.peakelec.co.uk**

Free and unlimited technical support for the Atlas is provided. The DCA50 continues to be available for the time being.

***Correction in article:** (Ic=2.5A) in second column should read (Ic=2.50mA).