CMOS ICs in static protective tubes. Be careful, the type labels are handwritten so the devices are not genuine surplus from a distributor, test house or manufacturer. That's not to decry the value, though.

A gem and a rare find, this Philips 1966 databook. The smell alone beats any datasheet from the Internet, if you can find it in the first place for a device that's 40-ood years old.

Valves, surprisingly, are still around in good quantities, If possible go for new, boxed types from reputable suppliers. With some experience, RCA, Philips, Mullard, Valvo, Siemens and GEC cartons can be spotted from a mile.

Part Mining

what's junk to some, is gold to others

Jan Buiting

It's been said that within a few years the home constructor will be totally dependent on salvaged electronic equipment for even the commonest of parts. Others have faith in the combined power of the Internet and two or three mail order giants remaining after an slow but certain market shakeout. Whatever the outcome, now is the time to step into action if you are after that one elusive part for your project or repair job. Concentrate on What and Where, surf, dig, unearth, bargain and rummage around. The Old Curiosity Shop may be closer to you than you think.

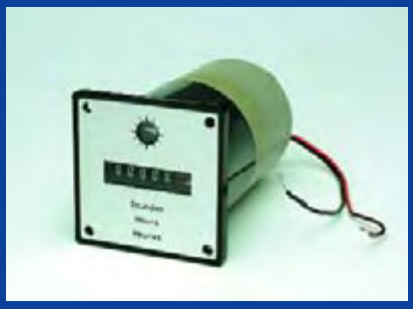
Vibrators for portable or semi-mobile valved equipment are often dead or worn out. Even new ones may not 'start' owing to internal contact oxidation. Be sure to know the voltage and base pinout.

At just one pound, this discarded cassette recorder was good value for its 6 V DC motor, electret microphone, audio playback amp, loudspeaker and a few PCB mount jack sockets.

These large electrolytics rated for 63 V are NOS and may look great for your restoration work on a 1980's PSU but be warned — their ESR was found to be poor due to dried out electrolyte inside.

Exact replacements for potentiometers for front panel mounting — impossible to find because they're equipment specific in most cases. Her are a few high-spec encapsulated pots with dust ingress protection.

Heatsinks are (1) expensive and (2) often at the rear of equipment so who cares if it has a few holes drilled by the previous owner? The small one shown here came with a free BYX-something power diode attached.



A fine specimen of valuable industrial automation surplus, this hours counter unit. Apparently it was never used. The operating voltage is uncertain and may require some careful experimenting to establish.

The days are long gone when you could pop out on a Saturday afternoon, run down the street to the local electronics store and get two resistors and a trannie to finish your experiment or repair job before teatime. Since the mid-1980s, electronic parts retailers have gradually disappeared even from mid-size cities. Initially, it seemed that some closed their shops and went 'mail-order' but only a few have survived and now find themselves struggling against largely anonymous mail order companies originally set up to supply professional users and the industry. That is not a problem in itself, after all, the parts can still be obtained, but with a few exceptions remaining there's no longer a counter, a shop owner to ask advice from, books to browse or a fellow enthusiast to chat to in the shop while you're waiting your turn (and there's a lot to learn from that!).

Industrial progress

About 30 years ago, devices like the humble BC107 transistor had a product lifetime of at least 10+ years and would be generally available for a few pence from five shops within 20 miles radius. Today, we're talking of lifetime in terms of months rather than years and designers tell us that certain ICs are declared obsolete before you can finish reading the colourful brochure. Apparently, in such cases the manufacturer has long since had an order for the product that's tall enough to close the production line and move on to the next device to turn into hard cash.

Today, production lines are shut done rather more efficiently than, say, 25 years ago, when it was quite common to have huge 'overshoot' stocks or 'mislaid' back orders. And that's exactly where we are after: NOS (new old stock), NIB (new in box) and HUO (home use only).

What to look (out) for

Unfortunately, there's no such thing as a guide to finding just *your* component from the tens of thousands devices already declared obsolete over the past 60 years or so. A lot of valuable components get thrown away when you would have paid a good price to get your hands on just one of them.

In the case of integrated circuits, you need to be aware of manufacturer-specific prefixes, infixes and suffixes that forever seem to clutter up the *functional* type code. One famous example is an IC identified by someone as "an MC14093BC-M04/85, must be very rare", when this is just Motorola's way of selling you an industry standard device like the CMOS 4093 that may lie dormant in your very own junkbox. The same with, for example, an UMC62LC64-30NBCA, which with some decoding translates into a plain vanilla CMOS 6264 64 kbit static RAM. While there are applications that will only work with just one specific IC installed, most likely things on the hobby desk will also function if you have a reasonable substitute available from a competitor.

Contrary to popular belief, PC junk has little to offer in the way of useful parts. This serial I/O board might be persuaded to give up its 18.432MHz UART xtal, DIP switch and sub-D connectors.

Anything that's' large and bulky is now generally shunned by buyers. However at 21 V, 1.2 A this brand new mains transformer has just the right specs to go into your first homemade benchtop PSU. Add two feet and Bob's your uncle.

Classic moving coil meters like these give a nostalgic, professional look to equipment. The thing about these meters is that you must be sure of their f.s.d. current specification — there's likely a shunt or series resistor inside.

Save the IC!

"A short guide to removal and re-use of soldered integrated circuits"

contribution by Jeroen Baars

A commonplace occurrence in the world of electronics that's equally applicable to the hobbyists and the high-end developer (confess it!): That One IC You've Been Struggling To Get Your Hands On For Years — there it is, in full view BUT securely soldered on a circuit board. Desoldering the chip is not usually an option at it often results in a 'dead' IC in your hands and an hour or so wasted. So, faithful to the saying "he who dares, wins" but also wary of another motto which goes "there's no crying over spilt milk", we present a few tips, mostly in pictures, that will enable you to 'un-board' an IC without damaging it, and to happily re-use the chip in your own project.

The first method pictured in **photographs A through D** employs the fact that printed circuit board tracks and pads used with SMD (surface mount devices) are often very thin and can be made to dislodge with no effort at all. This, by the way, is often the cause of board malfunctions! Of course, when applying this method you have to bear in mind the subtle interaction of forces — after all, if the tracks or pads do not come off the board surface the IC will 'die". With really rare or expensive ICs, it's often worthwhile to practice on a "lesser specimen" elsewhere on the board. Although your chances of success are pretty good, the method is a last resort. With some practising, even smaller ICs can be removed successfully and electrically intact too! In general, try to lift the ICs off the board as vertically as you can, as that minimises the force exerted on the pins. Do not prise or bend — it is a sure way to failure. Provided you remove the track and pad debris from the device pins and do the odd bit of straightening and cleaning, PLCC-housed ICs salvaged in this way can be inserted in a socket again without problems and SMD DIL ICs are ready for soldering the second time round — on your own board!

Method #2 is for DIL (dual in line) ICs. The IC may be cut loose using extremely sharp precision cutters (**photograph E**). The cutting edge method results in an IC with... yes, much shorter pins, which subsequently need to be redressed a bit.

Now, for yet another method that looks crude at first blush but actually works better than cutting. Not for the faint-hearted: hacking! Use a chisel to carefully dislodge the pins. The PCB should be firmly secured while the force of the mini chisel should be used with care. If necessary, work pin by pin (see **photographs G and H**). The method effectively turns this type of IC into a kind of oversize SMD chip (**photograph I**).

The final tip is to attack the IC pins with a scalpel or hobby knife, but this may not always work as some IC pins are simply too thick.

Ughh, what colours! Dappled, two-tone coloured wire like this was common in the 1970s. This picture was only taken to test our photographer and printers. What do you think?

Sensors are in great demand simply because they are specialist components and expensive to buy as new items from manufacturers.
Don't tell the seller — these two Figaro gas sensors are definitely a rare find.

Switching transistors and power transistors from a Bargain Lot. The only thing you have to do is research the type codes to deduct the electrical functionality. Do not be afraid of a BCX863ABC. Avoid unlabelled devices.

Broadly speaking, in the case of integrated circuits, the critical factors to know are:

1. the device may be a factory or test-house reject!

2. device supply voltage; not generally detectable from the type number alone.

3. device access speed; (-10 or -15 does not necessarily mean 100 ns and 150 ns respectively!)

4. device family like C (CMOS), low power CMOS (LC), low voltage (LV) etc. Essential to know for your interfacing.

5. confront 'expert sales staff' with actual samples of your defective devices, and present a datasheet.

6. do your homework: understand the functional type code and invest some time in finding possible equivalents.

Be very cautious about 'scoop purchases' of new, tube-packaged ICs especially of the memory chip type (EPROMs, EEPROMs and Flash devices) as there is a lot of rejected and imitation stuff around (see also Ref. 1). Also, beginners should not buy 'good as new' ICs from dubious Internet sources.

Where to look

The next step is to discover where you stand a fair chance of finding the elusive part or equipment — assuming of course it's no longer listed by Dixons and the likes. That brings us to our first possible source.

Shops from the past

Given the subject matter of this article, older readers of this magazine have an advantage because they may remember retailers that seem to have vanished simply because their adverts no longer appear in the electronics press. The good news is not only that some of these may still be around, but they will also happily sell you a one-off older device (like a Germanium power transistor) they no longer actively advertise. Four examples relative to this magazine are Grandata, Cricklewood, Viewcom and Electrovalue. Give them a try, you'll find that although stocks are much smaller these days, and there may no longer be a shop to visit, staff are generally much more knowledgeable than the temp on the phone at Mail Order & Co.

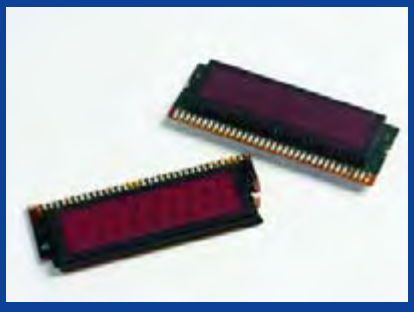
Usenet

Why not go underground and tap into the largest network of electronics hobbyists in the world? It's probably wise to first set up a new, temporary email account as unfortunately there's a lot of flack, off-topic drivel and spam in these areas. The best place to begin asking around is probably *alt.electronics.components*, but do use Google's Usenet search function to find other groups with similar coverage.

Internet

Be bold for a change and type the complete part number into Google's search box. If necessary, make the search narrower by adding words like 'IC', 'obso-

High voltage solid capacitors look bulky and dated in this day and age of low-voltage miniature portable equipment. For supply decoupling purposes, the value is not terribly important, so why not use that 0.068µF / 250V block capacitor?



Displays are a source of hot debates and a lot of research because the manufacturer is never known so no-one ever seems to know the pin functions. These two beauties contain LED elements and were carefully salvaged from a 1980s alarm clock.

While most publications including Elektor now seen to assume everyone's on 1% metal film, there are still a number of good reasons to have a small stock of carbon resistors. For one thing, you can read the value in the blink of an eye!

Just a curiosity, this bundle of wires that never made it to the wire loom stage. The individual wires are multi-strand, highly flexible and colour coded. Might reach Flog It status a bit later.

Germanium transistors with their funny AC and OC type codes have a ring of nostalgia around them. A few have been rescued from the landfills. Scratch off the black varnish on some of them and you have a photo sensor.

Intact equipment of the NIB variety! Watch 23cm amateur television (ATV) or Hotbird channels using this analogue satellite-TV receiver. But then, at a fiver you get a nice display, remote control, switch-mode PSU and a bunch of connectors.

lete', 'old stock', 'electronic', 'component' or 'part'. Unfortunately, eBay links among Google search results may be out of date but with some effort the seller may still be contacted (through "View seller's other items' or similar).

You're not necessarily in luck if you find an active eBay link listing the component you're after, the intricacies and pitfalls of eBay trading are however beyond the scope of the article.

Radio amateur markets, rallies, car-boot and jumble sales

Highly recommended, even if you do not have affinity with RF. Almost all items pictured in this article were obtained at radio surplus markets open to the general public. The range of goods offered on these semi social gatherings now extends well beyond transceivers, morse keys and antennas. Today's markets are a treasure trove for anyone with an active interest in electronics, reverse engineering, experimenting and modding. Fortunately, PC junk now seems to have vanished from most rallies, the once hopeful sellers of complete office networks having discovered that the value is nil in these developed countries.

The local Council's Waste Disposal Centre

This source may not be viable in all cases and success will depend on your ability to get friendly with staff willing to give you a ring if an interesting bit of equipment arrives.

Companies

Many companies these days will happily part with equipment 'surplus to requirements' as it may save them a penny or two in waste disposal fees and administrative work. Here, too, you need to know the right persons.

On boards and in equipment

Provided the price is reasonable, go for that bulky piece of equipment or circuit board if only for the one component you're after. Many spoilt hobbyists still believe parts should be supplied new and individually packaged, and give up if they can't find them like that. Actually, with a little effort, five off of the very same part, say, a Flash memory chip, are just waiting to be removed from a board picked up for one pound — see the **Save the IC! inset**.

Conclusion

Successful part mining depends on creativity, initiative, unconventional methods and general skills in electronics developed over the years. As with real mining, the resources are scarce, waste is high and competition is fierce if you do not protect your sources. The art is expanding rapidly however and not just for the thrill of striking 'gold' — very common parts are bound to go underground soon.

(050320-1)

Reference:

1. Bogus Electronic Parts, Elektor Electronics September 2004.

4004 and 8008 MPUs hit eBay

Old microprocessors are now among the most spectacular items sold on eBay, at least for those with an interest in electronics and early computing. Intel processors like the 4004, the world's first microprocessor from the early 1970s, and its 8-bit follower the 8008 seem to have reached the hype status. Original D4004 chips from Intel as well as second source devices like National Semiconductor's INS4004D pop up every now an then, fetching prices between 100 and 600 US dollars depending on the exact device specification and packaging (the ones with gold-plated pins and ceramic cases are the most valuable). Besides selling these historic chips on eBay, Chipscapes also kindly provides links to background information on these golden oldies. A while ago an original chip topology chart of the SC/MP microprocessor was auctioned off at 650 dollars. Unfortunately here at Elektor we are not aware of any mass-produced equipment with a 4004 or 8008 inside; else we could start part mining. Perhaps our readers can help in this area, suggestions and pointers welcomed. The craze for early Intel processors has spread across other brands, too, like early Motorola 6800s and even RCA's 1802, the first microprocessor to actually leave the earth and go in orbit.