

MICRO-CHIP MEGA-TEST

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SILICONE IMPLANTS

The modern chip is like an Army Ant - performing functions greater than its size suggests. Hot chips do a few extra functions.

PAMELA ANDERSON isn't the only one into silicone enhancements - scads of motorists are finding that a little undercover augmentation can dramatically alter their 'performance'. There are, however, some major differences - no waiting list, no inconvenience, no social downers. And the surgery is virtually painless - physically and on the hip pocket nerve.

Performance chips are plastic surgery for automobiles - without the side effects.

Proven in action, they have achieved total social acceptance (provided the supplier is reputable). Heck, even new car dealers slyly recommend them to customers (or even fit them)!

Good chips are effective, bullet proof

and undetectable. In many cases, they can be self-installed. Some are even switchable.

For those who need to know, a Chip is a small silicon microchip which controls the car's computer (or brain). This small computer, which now has the power of a late-model desktop PC, utilizes its computing power to control everything from gearshift points to servicing - but particularly to manage the electronic fuel injection system.

The Chip contains a 'Map' or 'directory' which the computer uses to control a variety of engine functions. Mass production methods, government regulations and variations from country to country mean that the average standard 'Map' is very restricted. But

white-coated tuning experts in their climate-controlled labs can change the 'Map' to make the perform better with little more than a few simple keystrokes on the computer keyboard.

Checked and tested on the road and dyno, the changes can be written into the replacement chip for instance, 'non-engineering improvement. While initial development may have been restricted to prestige and more expensive models, the speed with which costs have dropped in relation to the development of electronic componentry has been such that the 'technology leak down' to base model cars has become a downpour! The industry catchcry suggests the Chip is the 'Instant Fix' to all motoring woes - but the real trick is finding the right application.



Australian Road & Track

SILICONE IMPLANTS

The modern chip is like an Army Ant - performing functions greater than its size suggests. Hot chips do a few extra functions.

The Targets

In spite of what the sales brochures and 'customer advisers' claim, today's electronically 'whizz banged' cars do still have problems. And the majority of those problems, often as not, are engine related. Today's engines are often 'strangled' by the manufactures to meet emissions requirements and fuel economy needs. This in itself results in common problems such as flat spots at various in the power or acceleration curve, lumpy, uneven idling, indeterminate shift points in auto transmissions, hot spots in the ignition and lean running at the top end of the rev range, resulting in poor acceleration performance at crucial overtaking speeds. Smaller, high-revving, multi-valve engines have also become very fuel sensitive -

reacting poorly to the widely varying octane ratings of lead-free fuels, a situation the fuel manufactures seem to ignore. For the average driver, this manifest itself as sluggish performance and poor engine response

This can all be fixed - and without the inconvenience of having your car off the road while your dealer's service department struggles to overcome a problem it's own diagnostic computer claims does not exist! After all, the computer is only as good as what you feed into it - and it is unlikely to pick up a 'Manufactures-introduced' fault!

Quote: Enter the 'aftermarket' Chip - the grease-free replacement fix for electro-mechanical headaches; the ten minute installation that should solve your woes and provide a little more driving pleasure

to boot!

The Benefits

Immediately obvious are smoother, easier starting, improved performance - generally in the low and mid ranges - and much improved throttle response. Hand-in-hand comes smoother auto shifting and better engine response overall.

Brainstorming...

The clever part about 'Chips' is the fact that so much can be achieved with so little.

The standard replacement chip is remapped to alter the way in which fuel is delivered. At the same time the spark is usually reset (advanced/retard) to suit the known



demands of the specific engines. Settings will also allow changes to the maximum revs available for the engines - while staying within manufactures' limits (allowing for the fact that off the shelf redlines are generally conservative).

It may well be that the Chip will also allow you to use higher octane unleaded fuel (Ultra etc) - and certainly if you request a custom chip, the use of a higher octane fuel can be included in your specific requirements.

What we call the standard replacement chip will, in general, have been mapped to correct the 'common' problems associated with a particular car/engine. However, if your car has what you believe to be a specific problem, information can be downloaded from the standard engine management system, analysed and compensated for by a 'custom' chip programmed to overcome that specific problem. This is commonly referred to as 'tuning-out a problem'.

Other benefits include lifting the rev limit, removing top speed limitations, altering the change points in the transmission, improving fuel economy and altering ignition timing.

The use of remapping chips is not restricted just to new, fuel-injected naturally aspired cars either, the technology also applies to older vehicles whose engine management systems can be updated to run efficiently on unleaded fuel, and to turbo and supercharged motors, utilising special packages which include intercoolers, turbo-timers, boost adjusters and limiters.

Good, Better, Best

The ultimate solution is an integrated package with the re-programmed chip as the core component. An ideal package includes a replacement (high quality) air filter, and a new exhaust system to complement the Chip.



RESTYLED ram air-pods are the perfect partner for high-flow air filters.

This 'package' is based on the idea of getting the air flow in and out of the engine in a balanced, smooth delivery, in concert with re-mapping fuel delivery and spark timing. This type of package can itself be formulated at several levels - for example by fitting either a replacement muffler system (from the Cat back) or re-engineering from the engine block with a full extractor system. In each case, reputable chip companies will produce a Custom Chip tailored to the particular application.

And remember - all of this is achieved with the relative ease of quick-fit, bolt-on components (the engine does not

'Good chips are effective, bullet-proof and undetectable. In many cases, they can be self installed. Some are even switchable'.

need to be 'cracked'). Nothing can match this approach for cost-effectiveness or performance value-for-money.

For those who want to get more serious, the next step is changing the Cam. Since a lot of enthusiasts motorists already preform engine strip downs for blueprinting/balancing and top-end makeovers, a Cam upgrade is a logical step and will REQUIRE reprogramming of the ECU (i.e. a new chip).

Another direction is a completely upgraded ECU (stage 6)- instead of changing the chip you change the computer. At present, the application is mostly used by racers - from club to Top end. But the idea is appealing more-and-more to out-and-out enthusiasts. Companies such as Motec, which is famous for building the ECUs for group A and super touring cars, can now provide a high-tech ECU to suit almost every vehicle and every requirement. Advantages of this system include 'dial-your-own-tuning', and the ability to vary high-tech equipment such as traction control and ABS. This system offers



PLUG-IN TECHNOLOGY, like this unit which accesses the Mercedes Benz ECU via the diagnostic port, has opened up a vast new potential for cars thought to be 'unchippable'.

the option of plugging directly into a laptop computer to vary the car's computer settings on the spot, via a special software program supplied with the replacement ECU.

All these processes are, as you would expect, more time consuming, more effective and more expensive.

Such extensions of the electronic tuning art are generally limited to the top five percent of the market. Most people want the bolt-in, drive-away benefits of an 'instant' changeover.

The Retail Details

The ready availability of the Chip is now one of its most appealing features. There are plenty of manufactures out there and the majority are professional and reputable... names such as Powerchip, of Melbourne, Fueltronics, and ChipTorque. All are compact, dedicated operations which have developed high profiles as a result of their input at the leading edge of this aftermarket technology. Australian Road & Track has worked with all of them and will continue to do so as the technology breaks new boundaries.

The Chip is the 'silent partner' of 'New Era' performance- it's invisible, undetectable and therefore will not attract the unwanted attention of registration and insurance authorities - those seemingly vested with the responsibility of ensuring that any small pleasure that remains in driving is removed! In most cases, even your dealer will never know you've upgraded the engine management system - and those that do may well be using after-market chips them-



'Never has so much been achieved with so little - Chips are the ultimate compact, cost-effective 'fix' for modern cars'.

selves. Thus your warranty remains unaffected.

Today's Chips come with full warranty and technical support, and a sensible price structure determined by what you ask for and expect.

A key development is the advent of D.I.Y Chips. This business has been developed to a fine art by Powerchip and has almost eliminated the 'Fit-n-Chip shop'. Mail order Chips sets now incorporate a D.I.Y pack containing everything the average motorist needs to install the replacement Chip on the home driveway. And there's a back-up Helpline as well.

The changeover is quick, and can be handled by most motorists in as little as two minutes with simple tools and no prior experience.

Some manufactures offer a range of Chips for each model, including custom versions. For example, one chip for Standard Unleaded Fuel and another for Premium Unleaded. Most advanced Custom Chips are designed to mate with 'Packages' including air filters and exhaust systems. Still others are designed to complement the installation of new 'sticks' (Cams). Of course, you can go the whole hog and have your own Chip custom-designed especially - just add time (and money).

And if you have any doubts about what can be achieved, most manufactures can offer genuine testimonials and are quite happy to put you in touch with satisfied customers. Such has been the success of the Chip business, that many buyers have adopted a proprietorial attitude towards their favourite Chip supplier and are only too happy to talk to potential new customers and extol the virtues of the automotive 'silicone implant'.

A Fascinating Future...

The future holds no limits - already available technology is capable of expanding the performance of the Chip - to include provision for on-board reprogramming, owner-friendly self set-up (for example, a keyboard inside the lid of your glove-box!) and the ability to interpret a number of different programs to suit your specific use at a specific time. On-demand selections might vary from city/economy driving to interstate cruising or weekend club-racing. Another option is 'percentage' chips. These will provide programs allowing you to select from 1-100 percent effect - lend the car to the kids and knock it back to 60 percent, dial it back to 100 for your own use...

Still other advances will see the Chip encompassing on-board technology to offer options on traction control, use and application of ABS, partial and full-time four wheel, front wheel or rear wheel

'The after-market Chip is the grease-free 'fix' for electro-mechanical headaches'.

drive. There will also be complex on-board monitoring systems to keep you informed of items from revs to catalytic converter performance; compression ratios to power and torque output; and instantaneous updating of fuel efficiency.

The sky is, quite literally, the limit!

All that aside however, it's the performance and benefits of today's technology that is of the most interest to you, the consumer, and that's what we are here to evaluate.

High Tech Testing

AUSTRALIAN ROAD & TRACK pioneered the evaluation of Chips in Australia and established the test procedures for the proper assessment of products in the marketplace. As a result, the publication is long regarded as the only professional authorities equipped to offer independent and unbiased testing.

In the past, we have compared and evaluated products from many different companies and established the principle of back-to-back testing to evaluate Chip performance.

In this, our latest foray into the fascinating world of Microchip technology, we utilised a range of products provided by Powerchip of Melbourne. This is not to say that Powerchip is the only company in the field or the most dominant. However, like AR&T, Powerchip is small, aggressive, professional and innovative - and is prepared to supply products to meet our requirements for impartial testing.

Powerchip is arguably the pioneer of D.I.Y Chip marketing in Australia and has certainly developed this approach to a refined level. It is one of the highest volume operators in the country with an exemplary Service, Warranty and Customer Satisfaction record.

More than three months went into the planning and research for this project and Powerchip's Wayne Besanko provided product and data for more than a dozen vehicles, 11 of which were tested for this review. We utilised the world class facilities of Calder Park International Raceway, including the Drag Strip, International Circuit and the Thunderdome Speedbowl, and of course supplemented this with on-road evaluations. All-up, we sampled more than 20 cars, over more than a week of varied and demanding testing.

Facts and figures were compiled using Australian Road & Track's computerised electronic test equipment - including the Datron Correvit and Vericom VC2000, the most advanced test equipment in use in this country and the equal of anything available anywhere in the world.



QUALITY, free-breathing replacement air-filters stimulate optimum Chip performance.



MAZDA 626, 5-spd manual

In its standard trim the 2.5-litre V6 Mazda was not a very pleasant car to drive. Plagued by flat spots - at 5750, and between 6600 and 6750rpm - it was lumpy and rough, unresponsive and very harsh.

THE CHIP

10% more power, 8% more torque - that's the claim, but more significant is the improved smoothness of the engine and the lack of flat spots. Again, attention has been paid to improving throttle response and getting the air/fuel mixture right. A

THE TEST

Acceleration runs showed good gains in in-gear performance and much improved handling on the

\$650.00 investment in a new Powerchip is a simple, straightforward and cost effective fix.

track, thanks to good throttle response which allowed the car to be driven through the corners. The car was very disappointing with the standard chip fitted - the engine was rough and noisy and suffered from noticeable flat spotting

at crucial points, particularly when changing gear.

The addition of the modified chip smoothed out the engine, got rid of the flat spots and changed the car's characteristics almost totally. It became pleasant to drive and much more responsive. Over the Standing Quarter the car showed a significant improvement in the wet with the chip fitted - compared with the standard car's time in the dry! (Each way runs).

Bear in mind, this car had nothing but a chip changed - standard air filter, standard exhaust!

MAZDA 626, 5-spd manual

	Std	Powerchip
S 1/4 (Dry road surface)	16.5	-
S 1/4 (Wet road surface)	-	15.82
60-100km/h (3rd gear)	5.87	5.00
60-100km/h (4th gear)	8.24	7.16
80-120km/h (3rd gear)	6.13	5.15



NISSAN 200SX SPORT TURBO, 5-spd manual

The 200SX is one of the few things Nissan has done right in Australia in the past few years. A pretty little car, it offers a nice combination of style, performance and balance. It has proven to be a popular import for Nissan and performance modifications for it are keenly sought. In the 'Sport' package, the SX runs premium unleaded fuel, direct from the factory.

THE CHIP

Because of the turbo, Power Chip developed a unique package for the SX. It comprises an additional small computer (not a plug-in chip) - the Powerchip FCD - which links into the car's existing system to alter the boost signals. Then there's an electronic boost controller - the Powerchip EBC - which

meters the boost being delivered, ensuring fast response down low and controlled boost higher up. The car was also fitted with a sports air filter.

The combination smooths out the application of boost, providing a much more pleasant, controlled power curve which is far more 'user friendly' than in standard form.

The result of the Powerchip rework is an increase in maximum power from a standard 147kw to a healthy 168kw. Torque is also increased, from 265 to 287 Nm across a much wider rev range.

THE TEST

The transformation of the car, after fitting the Powerchip modifications was nothing

short of sensational. The combination of increased turbo boost and the benefits offered by the EBC showed up immediately both in the straight line runs and on the track.

Acceleration was much improved in gears, the changes were much smoother both up and down and the whole feel of the car was altered for the better.

Throttle response - and turbo cut in - in the gears showed a vast improvement.

Against the clock, the SX showed terrific improvements compared with the standard chip - slicing more than a second off the 60-100km/h and 80-120km/h brackets.

NISSAN 200SX SPORT TURBO, 5-spd manual



	Std	Powerchip
60-100km/h (Drive/Power)	5.95	4.95
80-120km/h (Drive/Power)	7.91	6.18
Power (@ 5200rpm)	147kW	168kW
Torque (@ 3600rpm)	265Nm	287Nm



VOLKSWAGON GOLF VR6, 5-spd manual

A cult-car of the late 70s and early-80s the Golf GTi was the poor man's Porsche. Chiefly because of price, Volkswagon's new generation Golfs have not quite hit the spot, although the VR6 is beginning to gain something of the following.

Still often tagged with the 'yuppie' label, the Golf is a good little car and in V6 form, not a bad little highway stormer.

THE CHIP

Twelve additional kilowatts and 18 Newton meters of torque are the measurable gains offered by Powerchip

Powerchip for an investment of just \$650.00. This means the Golf VR6 has 140kw of power when 'chipped'. The chip also extends the rev limit on the on the V6 engine by 500rpm. Other than the Chip, the test vehicle was stock standard.

THE TEST

Picking up a second here and a second there, the 'Chipped' Golf showed surprising gains on the each-way runs against the electronic timers. Gearshifts were easier and smoother and the car felt better generally. Much smoother,

more responsive and easier to drive - the benefits of the Chip will win the hearts of 'yuppie' owners more concerned with comfort and ease of driving, than outright performance.

Pulling those seconds out of the overtaking brackets will obviously improve the car's on-road safety.

What is really obvious however, is that there are major benefits still to be gained with this car - namely by fitting a good exhaust (Remus) and an improved air filter - then fitting the custom Chip accordingly.

VOLKSWAGON GOLF VR6, 5-spd manual

	Std	Powerchip
60-100km/h (3rd)	7.57	5.98
80-120km/h (3rd)	6.68	5.53
Power	128kW	140kW
Torque	235Nm	253Nm



SUBARU WRX TURBO, 5-spd manual

An exciting car at any time, the Subaru WRX for this test came equipped with a Powerchip (\$650.00), turbo boost controller, sports exhaust system and sports air filter.

One of the best 'production' four cylinder performance cars currently available in an off-the-shelf package, the WRX is an excellent example of race/rally car technology (World Rally Championship) being passed down to a road-going model.

THE CHIP

Powerchip is proud of its Subaru WRX

chip - claiming to have made the car 'come alive'. Even though the Subaru offers a great power package as standard, it's superbly engineered chassis tends to make its on-road performance feel a bit bland.

The Powerchip increases the turbo's boost pressure which adds around 15kw of power. This is a simple Chip which remaps the boost, advances the spark at low revs and richens the fuel to compensate for the greater boost.

THE TEST

The Subaru is a very special car - lightning fast and amazingly surefooted,

yet deceptively smooth and pleasant to drive. The four-wheel-drive system is superbly tuned and even with full acceleration put its power to the ground to slingshot the car out of a hole without so much as a chirp from the tyres.

With the increased boost, chip and better breathing, the car shows big performance gains in the gears, yet still remains a pleasant, smooth car to drive.

Spectacular gains are available higher up in the third and fourth gear overtaking brackets between 80 and 120km/h!

SUBARU WRX TURBO, 5-spd manual

	Std	Powerchip
0-100km/h	6.70	5.50
S 1/4	14.8	13.99
60-100km/h (2nd)	3.88	2.64
60-100km/h (3rd)	5.05	3.70
80-120km/h (3rd)	5.53	3.49





BMW 318iS, Auto

The 318is came to us dressed up as a M3 and sporting a Powerchip, Remus exhaust system and K&N cotton filter. Typically BMW, it's an excellent package straight out of the box for the dollars you pay. Being a BMW built to a price however, the 318is lacks power and is today one of the most popular consumers of chip technology.

THE CHIP

The Chip is designed to increase the rev limit, allow the engine to run smoother, smooth-out the idle and most importantly, get rid of the flat spots which seem to be inherent in the 318iS

engine at around the 3500rpm and 5200rpm marks. It achieves the admirably! The Chip adds 12kw to the engine output along with much crisper throttle response and increased acceleration in the crucial 3000-to-6000rpm bracket. Gone too, are those annoying flat spots! Cost: 650.00 for the Chip.

THE TEST

Our program of back-to-back testing showed significant gains against the clock. The car got off the line quickly and smoothly with the new Chip and gear changes were quick and precise.

The manual change points occurred higher in the rev range (by about 250rpm) with the Powerchip fitted and this showed up in the times. The rev limit increased by 500rpm.

However the change down/acceleration times in the overtaking brackets improved significantly when the Powerchip was fitted - stripping a second-plus off the 60-100km/h time and two seconds-plus off that all-important 80-120km/h bracket.

What is significant though, is that the total package - chip, exhaust and air filter - gave marked improvements in ALL ranges and a huge improvement in engine smoothness.

BMW 318iS, Auto

	Std	Powerchip
0-100km/h (Sport/Drive)	12.44	11.42
S 1/4 (Sport/Drive)	18.60	18.20
60-100km/h (Sport/Drive)	6.31	5.15
60-100km/h (Man 2)	6.34	5.30
80-120km/h (Sport/Drive)	8.11	6.04



HOLDEN VL COMMODORE, 6-Cyl., auto

The VL Commodore is arguably one of the most popular Commodores built - traditional (3.0-litre) straight six (something the market understood) and a good, reliable slugger which 'does the business'. Forget the turbo version, it frightened buyers away in droves.

The big question is, what to do when you want to update; add a little spark; refresh the performance? You don't want to get rid of the car, it's too good - and besides, you like it.

Well, forget the workshop and the performance tuner - invest instead a

mere \$490.00 in a new chip and an alternative, free breathing filter.

THE CHIP

The standard VL Powerchip is a 10-15 minute changeover using an exchange ECU. Because the VL's standard chip is soldered in place, its simpler to provide a replacement unit pre-programmed and ready to slip into place. All you need to do is locate the original ECU, remove it, replace it and return the standard 'blackbox' to Powerchip. Job done!

Minimum improvement in power -

10 percent; similarly in torque and a lot more responsiveness from the old straight six. Not only that but the engine runs smoother.

THE TEST

This is what it's all about - measuring, in-gear, tramp-your-foot-and-go figures. The car lurches better, it has noticeably more mid-range power and response and it revs freely to a new, extended upper rev limit.

Simply? Plant it and go - harder, smoother, easier!

HOLDEN VL COMMODORE, 6-cyl., auto

	Std	Powerchip
60-100km/h (Drive/Power)	5.95	4.95
80-120km/h (Drive/Power)	7.91	6.18
Power (@ 5200rpm)	114kW	125kW
Torque (@ 3600rpm)	247Nm	263Nm





TOYOTA RAV4, 4-spd auto

Developing an electronic performance enhancer for the RAV4 was no easy chore - firstly because its standard Toyota ECU is one of those made 'unchippable' by the manufacturer, and secondly because it's an all-terrain-vehicle. The only problem this presents is in taking care that any modification is not too extreme, making the vehicle untractable in those occasional situations when it is used off road.

THE CHIP

The so-called 'unchippable' ECU is generally a fully sealed unit - it can't be opened, altered, added to or changed. If it goes wrong, you replace it!

But where there's a will, there's a way and tapping into technology developed overseas, Powerchip ICON. The ICON is a high

performance engine management system which can be connected to the standard ECU by a four wire connection, which will then interface with the host board.

The ICON intercepts ignition pulses from the vehicle's own ECU and recalculates them using an ignition map developed for the vehicle.

The ICON uses the latest PIC micro-controller which runs at more than four times the speed of the Original Equipment ECU, calculating a new ignition and advance pulse for each and every spark.

The result is more mid-range torque, added throttle response and power increases of up to 10 percent. The

ICON is also re-programmable, so it can be readjusted to maximise the benefits of other modifications, as and

when they are made. In the case of the RAV4, which was fitted only with an ICON and no other modifications, power is increased from 96 to 106kW and torque jumps from 180 to 195Nm - particularly in the important 3200-to-4500rpm range. The ICON retails for \$750.00

THE TEST

Most noticeable was the RAV's improved tractability at low rpms... something which will translate to real value in off road situations. While power increases were only minimal, the vehicle was nevertheless far more responsive, smoother and faster both in drive and when changing the auto shift manually.

Surprisingly large gains for relatively small improvements and certainly a cost effective performance gain.

TOYOTA RAV4, 4-spd auto

	Std	Powerchip
60-100km/h (Drive)	7.95	7.00
80-120km/h (Drive)	12.86	10.81



1990 HONDA INTEGRA, 1.8-litre, auto

It's nice to get a older vehicle that's been well cared for and see someone put a little effort to keep it right on the pace. This car was fitted with a Powerchip and a ram pod air filter assembly; and the suspension had been lowered and the springs retuned.

A very pleasant package.

THE CHIP

The Powerchip for this car was designed for improved driveability and a power

increase of around 10 percent. It removes Honda's 'economiser' fuel overrun cutoff program for a much smoother feel in traffic and at low revs. Dyno figures show 11 extra kilowatts (up from 103 to 114) and slight increases in torque, up to 183Nm. Standard pricing: \$650.00 for the chip alone.

THE TEST

With the changes made to it, the Integra is a very pleasant car to drive.

Noticeable improvement in passing speeds; smoother through the gears and a 'happy' exhaust note. The addition of the new chip also got rid of a nasty flat spot.

With its lowered and retuned suspension, the Integra was an absolute delight to drive on the Calder circuit.

This is a typical example of how a Chip or Chip-package can provide significant benefits for older (but fuel injected) Japanese cars.



1990 HONDA INTEGRA, 1.8-litre, auto

	Std	Powerchip
60-100km/h (Drive)	5.60	5.21
80-120km/h (Drive)	7.50	6.99
Power	103kW	114kW
Torque	170Nm	183Nm



PORSCHE 911/993, Carrera 2, 6-spd manual

Who would set out to improve on the 'best of the best'? Surely Porsche with all its experience must have programmed the black box with the 'ultimate' settings. YES and NO. Porsche is no different to any other manufacturer when it comes to meeting emissions standards or engineering for 'safe' engine performance. Of course any mistakes made in over-boosting performance, could prove mightily expensive at the warranty claim end of the business. So, once again, the settings tend to be 'conservative' - even for Porsche.

THE CHIP

Powerchip claims a 33 horsepower gain over the standard engine with significant increases in low-end torque. The chip has been remapped for both part the full-throttle settings for improved driveability. The standard fuel overrun cut-off fuel completely when you lift

your foot off the accelerator, producing good fuel economy, but hesitant pickup and driveline shunt. With the chip, this is removed. The Powerchip program also increases fuel flow for better dynamic response and increased power. A slight increase in fuel consumption overall, for a significant improvement in power. Cost \$650.00. The car was also equipped with a Fitzgerald Racing custom exhaust system.

THE TEST

Back-to-back standing start tests conducted on a dump track revealed the Porsche was quicker in standard trim to 100km/h, and slightly quicker over the standing quarter. However, the standard exhaust note was ragged and blurtly, suggesting some mild form of 'traction control' built into the standard ECU. Certainly the car did not spin the wheels on getaway as easily as it did with the

reprogrammed chip.

In-gear figures were another matter. The replacement chip provided handy gains in almost every speed interval in every gear - including a full second in fifth in the crucial 80-120km/h bracket. The car was noticeably smoother on up and down shifts with less rpm 'drop off'.

At the top end of the power curve, the reprogrammed chip provided around 450 more rpm peaking at 6250rpm as apposed to the standard 5800rpm.

This car is always a joy to drive, but is now smoother and slightly quicker in the passing ranges. For less than 0.5% of the purchase price, the replacement chip looks like sound value for money. It does not adversely affect emissions, shows only a minimal increase in fuel consumption and passed through a Porsche service without comment.



PORSCHE 911/993, Carrera 2, 6-spd manual

	Std	Powerchip
0-100km/h	5.72	5.85
S 1/4	13.83	13.93
60-100km/h (3rd gear)	4.39	3.45
60-100km/h (4th gear)	5.73	5.15
80-120km/h (4th gear)	5.48	4.52
80-120km/h (5th gear)	7.26	6.68

*Standard times performed in the dry - Powerchip figures in the wet.

HOLDEN VS Commodore, V6, Auto

A bread-and-butter family car, the 3.8-litre Commodore V6 auto is not a bad package on the road, the result of a continuous refinement program.

Today's Commodore is far removed from the first models introduced back in the late '70s, but just the same took on a new lease of life with the addition of a chip, replacement air filter and new cold-air induction box.

THE CHIP

Nine kW is the power boost claimed from Powerchip for the VS Commodore - lifting the engine's output from 147kW to 156kW. Not too significant we hear you say - but what the chip does is completely reprogram the electronic

transmission in the auto to resemble that of the HSV models with harder, firmer shifts for better acceleration.

The changes also provide higher lockup points in 2nd, 3rd and 4th gears. The Chip provides better fuelling and more spark advance to add power in both the mid and top-end ranges while smoothing out the idle - probably Commodore's most annoying drawback. The Powerchip MemCal replacement costs just \$340 - you also keep the original MemCal.

THE TEST

In the back-to-back tests using our electronic equipment, the Powerchip-

equipped Commodore (running in Power Mode) showed significant gains in both the 60-100km/h passing ranges.

However, it was on the oval track of the Thunderdome that the real significance of the changes showed up. The car was a full 20km/h faster coming of the back straight on the Thunderdome Bowl than when equipped with standard MemCal. In fact, the difference in driveable performance was so great we re-run the tests again just to be sure. The result was unchanged.



There was simply no comparison of the power in and out of the turns and top speed at the end of the straight. Had we put two cars on the track and run them for 50 laps, the Chip-equipped car would have finished at least two laps ahead!

HOLDEN VS Commodore, V6, Auto

	Std	Powerchip
60-100km/h (Power/Drive)	5.12	4.31
80-120km/h (Power/Drive)	6.51	5.30

PARTING (CHIP) SHOT

The most striking aspect of this test (apart from the lower times), was the consistency of the results gathered. And that's what you want on the road - consistency. Something that really works.

Overall, Powerchip's claims that its product reduces engine harshness, smoothes the shift points and increases all-round performance seem to be right on the money. But it forgot to mention its Chips solved flatspots, cure 'surging' and eliminated 'gear

hunt' - or that they don't cost a fortune, are guaranteed, can be installed by anybody (and quickly too) and can be mail ordered (with a full set of instructions and special tools, if necessary).

The gains measured during the test were impressive - considering most only had a Chip fitted. Importantly, the power and torque curves improved throughout the rev range - dispelling the theory that Chips only

produce extra power because of the extended redline. Naturally, a complete package (Chip, air filter and exhaust) would be the ideal way to go, and would result in sharper times.

In the future, Powerchip promises even more exciting developments. Whatever path it decides to take, it can only be good news for enthusiasts.

Why not chip away at the performance envelope yourself?

PLUG-IN PACKAGING

An increasing number of vehicles are now being produced with sealed ECUs which were first thought to be 'unchippable'. Their development was not a matter of bloody-mindedness on the part of the manufactures, but rather one of manufacturing technology and economy.

A fully-sealed unit offers the benefits of being protected from the elements, minimises the chances of damage and interference and fits nicely with new service policies of remove-and-replace rather than remove-and-repair!

Ford started the trend as far back as 1984 and since then many manufactures, particularly European, have adopted the same production techniques. For a while, they had the chip tuners beaten.



That's no longer the case and the latest developments, such as the Powerchip ICON, now offer a vast range of possibilities for retuning the 'unchippable' ECU.

The ICON is a self contained engine management computer which 'plugs in' to the car's existing ECU or computer system - working at much faster speeds and intercepting then recalculating signals to remap, literally 'on the run'.

In some cases, (Mercedes Benz for example), the ICON simply plugs in via the OEM unit's diagnostic port - it is simple, foolproof and effective. On those vehicles which offer diagnostic downloading, this is the way to go.

Switchable features enable the motorist to change from standard Unleaded to Premium Unleaded - each with its own individual program.

On other completely sealed units however, it's a matter of tapping into the ECU wiring loom. This is quite straightforward.

One of the major benefits of the ICON is that it is re-programmable - even

while the engine is running - offering tremendous potential for custom set-up and tuning.



THE 'TOTAL' performance workshop of the Nineties. Whitecoats and whitegloves replace overalls and grease!

Taking the concept even further is the Powerchip ICON Race, a unit developed for normally-aspirated vehicles running 'conventional' coil and distributing ignition systems. The 'Race' comes with its own ignition mapping software and a small programming adaptor which plugs into the parallel port of any lap or desktop PC - allowing you to alter ignition timing by up to 20 percent at home or in the workshop.

It is the ICON - and units like it - which are paving the way to the future and opening the doors to engine management technology which until now, has been the sole realm of the manufacture.