



# VIRTUAL TUNING

## A new chip on the old block

by Michael Febbo

# T

here was a time when the average guy looking for real power gains could upgrade his intake and exhaust for decent results. To push for more, an aggressive cam went in. Intake and exhaust are still necessary steps on the path to more horsepower, but most tuners have lost interest in cams. Now they call in a geek with a laptop.

To illustrate the value of chip tuning in this guide, we dyno-tested three cars, at three different price points, representing some of the finest tuneable engines. We used our own long-term VW Jetta for the entry-level; it's equipped with possibly the best turbocharged four-cylinder currently available, the 2.0T. We tested it with the aforementioned intake and exhaust to give realistic numbers of what your average enthusiast is likely to see.

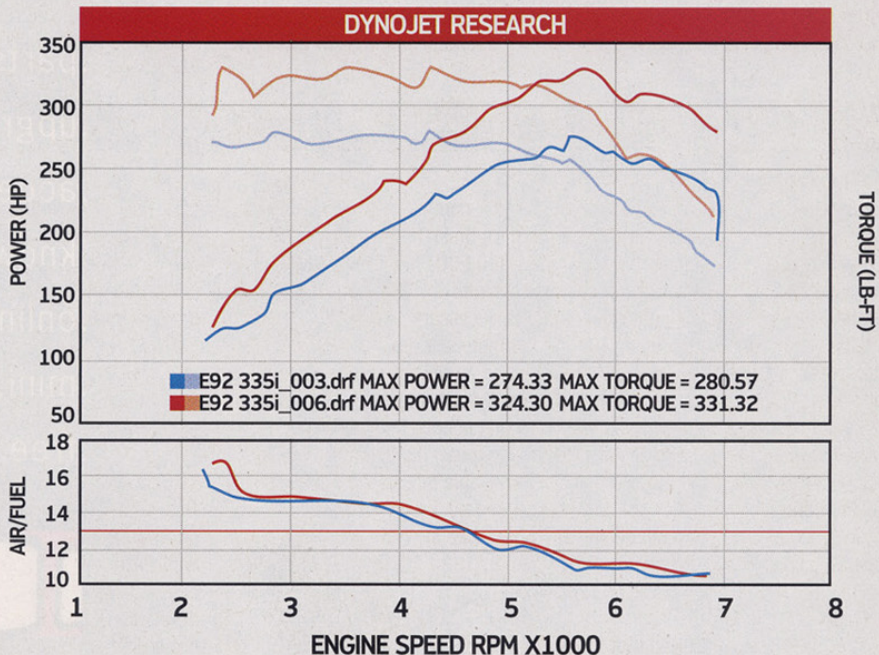
are willing to modify their 911 will rarely start with just a flash. They'll generally start with the exhaust, then get the flash.

The Jetta and Porsche were both tested at GIAC's facility in Irvine, California, using its Mustang four-wheel dynamometer. Mustangs are known to be a little more pessimistic than other dynos, and since we did baseline and flashed runs, the increase is what is relevant, not the final numbers. The BMW was tested at South Coast German Cars in Costa Mesa, California.

Next is a relative newcomer. We've already extolled the virtues of the BMW 335i—the term 'M3 Killer' comes up in every conversation about this car. And it's clear BMW left a bit on the table with this engine. At the time of writing, only a few options exist for software tuning. But by the time you read this there will probably be several more, and we will be testing them.

The third car is the Porsche 997 Turbo. Out of the box, it's far from sluggish. But, as with the BMW, we were stunned by how much Porsche left untapped. The real secret is running top-grade fuel. On factory programming with no mods, this car really struggles on the 91-octane gas in California. We've tested more than one car on 91, observing detonation and pinging which, quite frankly, scares us. This is a high-performance machine that deserves more than standard pump swill. Let's face it, if you're dropping the cash to buy this car, a few more bucks to mix in a little race gas with the 91 is hardly going to affect your lifestyle.

To replicate the most realistic scenario, we tested it on race gas with an aftermarket exhaust. Tuners who deal with these cars tell us that owners who





## Mustang Dynamometer Test Report

Updates, Documentation & More At  
www.MustangDyne.com  
Or Call 1-330-943-6400

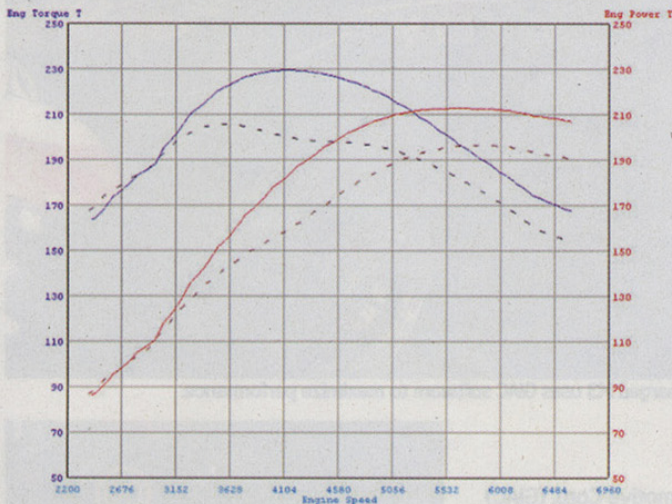


GARRETT INTEGRATED AUTOMOTIVE CORP



### POWER AT TWO WHEELS

Run#	Acquired	Test Comments
1	04/03 17:33:22	pump chip on 91 octane, a Eurosport Cat back exhaust and Intake.
2		
3	04/03 16:53:18	stock run on 91 octane, a Eurosport Cat back exhaust and Intake.



Channel / Run  
Eng Torque T  
Eng Power T

GIAC Chip	Stock Chip
229 (Ft-lbs)	206 (Ft-lbs)
213 (HP)	196 (HP)



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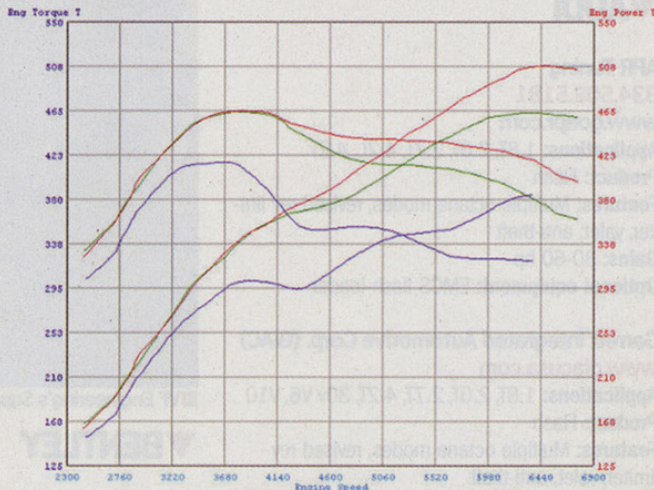


GARRETT INTEGRATED AUTOMOTIVE CORP



### POWER TO ALL FOUR WHEELS

Run#	License	Owner	Acquired	Test Comments
1	gag997c	Kutyba,	04/03 13:19:21	Race gas program 100 octane.
2	gag997c	Kutyba,	04/03 13:22:34	Pump chip 100 octane
3	997tspg	Espesi,	11/17 18:14:05	Stock car on 91 octane.



Channel / Run  
Eng Torque  
Eng Power

Race Gas GIAC Chip, 100 octane and GMG exhaust	Pump Gas GIAC Chip, 100 octane and GMG exhaust	Stock Chip, stock exhaust and 91 octane
464 (Ft-lbs)	464 (Ft-lbs)	416 (Ft-lbs)
509 (HP)	463 (HP)	395 (HP)

GIAC flashed its latest switching software on the Jetta, which includes stock, 91-octane, 100-octane and valet programs. The graph shows a fairly impressive power gain at its peak, but the real story is down low. Instead of just looking at peak gains, driveability improvement is best shown by the area under the curve. There are huge torque gains in a wide rev range that makes this thing pull like a V8 at the low end.

On the freeway, you seldom need a downshift to pass. Just put your foot down, the boost is there. GIAC does not claim the biggest numbers, but power is everywhere, in a safe, reliable package. The optional 100-octane and valet modes are a nice addition. We tested the valet mode on the dyno, just to see. On zero boost, the car still makes almost 150 hp at the wheels. It would still be quick, but not with the kind of power that would allow someone to kill your clutch.

With the BMW, we went outside the box, or rather outside the ECU. We tested a brand-new product from Split Second called Turbo Tuner. We were skeptical. We tested Vishnu's PROcede last month (The Clash, ec June '07), with good results. But this thing is half the price and appears even more straightforward. The Turbo Tuner is a two-minute install: unplug the TMAP sensor and plug the unit in line with it.

To be fair, we saw more performance from the PROcede, but at just under \$600, and considering the ease of install and the ability to transfer it from one car to another, this thing is quite a buy.

The Porsche was the biggest surprise of all. As stated above, we tested this car with a full exhaust and 100-octane fuel. We also tested the stock, 91-octane and 100-octane programs. Predictably, big gains were everywhere—and the great thing is that driveability is better than stock.

## TYPES OF SOFTWARE

### ■ Piggyback

Also referred to as an 'intercept' system, this is a computer which is physically separate from the car's brain. It is connected in-line between the electronics and ECU, and intercepts signals coming from various sensors before they reach the ECU, adjusting them as necessary to trick the computer into seeing factory parameters. It also intercepts the signals coming from the ECU and modifies them to electronically controlled components, thereby optimizing operating parameters and improving performance. A piggyback system can usually be installed or removed in minutes. Many will convince the computer it's operating within factory parameters, so in the event of a catastrophic failure, the owner can pull the computer out. When the ECU is scanned by the dealer, no evidence of tampering will be visible. This feature is especially useful for vehicles still under warranty.



### ■ Flash

Most ECUs in cars equipped with OBD-II are accessible straight through the connection port, generally found in the



car's dash. This makes software tuning more convenient for the average person. It's basically downloading a new program into the ECU. This is the most common method of software tuning on modern cars. Many tuners in this guide offer software switchers that allow the owner to select which particular program to run at any given time.

Flashing has really made software tuning what it is today. Any technician with a laptop can flash a car, and no parts need to be stocked. If an updated version becomes available, the program can be updated easily. Even end users can now use their own laptop to make changes.

### ■ Chip

This is the original method of software tuning. The ECU is removed from the vehicle and the ECU's chip, or EPROM, is physically replaced. This is generally used on older fuel-injected vehicles built prior to OBD-II implementation. The downside of chipping a vehicle is that distributors had to stock different chips for each application, and when updates became available, a newer chip had to be installed.





## ▼ AUDI

### APR Tuning

334.502.5181

www.goapr.com

Applications: 1.8T, 2.0T, 2.7T, 4.2L, 4.2T

Product: Flash

Features: Multiple octane modes, revised rev limiter, valet, anti-theft

Gains: 30-60 hp

Optional equipment: EMCS flash-loader

### Garrett Integrated Automotive Corp. (GIAC)

www.giacusa.com

Applications: 1.8T, 2.0T, 2.7T, 4.2T, 30v V6, V10

Product: Flash

Features: Multiple octane modes, revised rev limiter, valet, anti-theft

Gains: 6-25 hp (NA), 25-100 hp (FI)

Optional equipment: Hand-held flash-loader with firewall option

### Neuspeed

800.423.3623

www.neuspeed.com

Applications: Most models

Product: Flash, chip

Features: Revised fuel, timing and boost where applicable

Gains: Contact company

### Revo Technik Inc.

866.632.4060

www.revotechnik.com

Applications: 2000-current

Type of Product: Flash

Features: Dealer- and user-adjustable, using Variable Table Technology

Gains: Contact company

Optional equipment: SPS-Select software switcher



▼ VF Engineering's Supercharged M3 uses GIAC software to maximize performance.

## ▼ BENTLEY

### Garrett Integrated Automotive Corp. (GIAC)

www.giacusa.com

Applications: GT, GTC, Flying Spur

Product: Flash

Features: Multiple octane modes, revised rev-limiter, valet, anti-theft

Gains: 100-114 hp/120-130 lb-ft

Optional equipment: Hand-held flash-loader with firewall option

## ▼ BMW

### Active Autowerke

305.233.3900

www.activeautowerke.com

Applications: Most OBD-I and OBD-II applications

Product: Plug-in chip, flash and piggyback

Features: Revised rev-limiter, torque limiter, MAF calibration, valet, anti-theft

Gains: Contact company for dyno charts

Optional equipment: Laptop flash-loader for select OBD-II applications



### Bavarian Autosport

800.535.2002

www.bavauto.com

Applications: Most applications 1984-current

Product: Plug-in chip up to 1995, flash program '96-current

Features: Revised rev-limiter with 'soft' cut-out, two-year/24,000-mile warranty against defects

Gains: Chip: 8-20 percent overall; flash power programmer: 3-13 hp (model-dependent)

Optional equipment: Required battery charger for power programmer installation

### Dinan Engineering Inc.

800.341.5480

www.dinancars.com

Applications: Most models

Product: Chip, flash, piggyback (model-dependent)

Features: Street, race, valet, diagnostic; supports new-car warranty up to four years/50,000 miles

Gains: Contact company

Optional equipment: MIPP functions as programming and diagnostic tool

### Eurobahn Performance Inc.

866.EURO.POWER

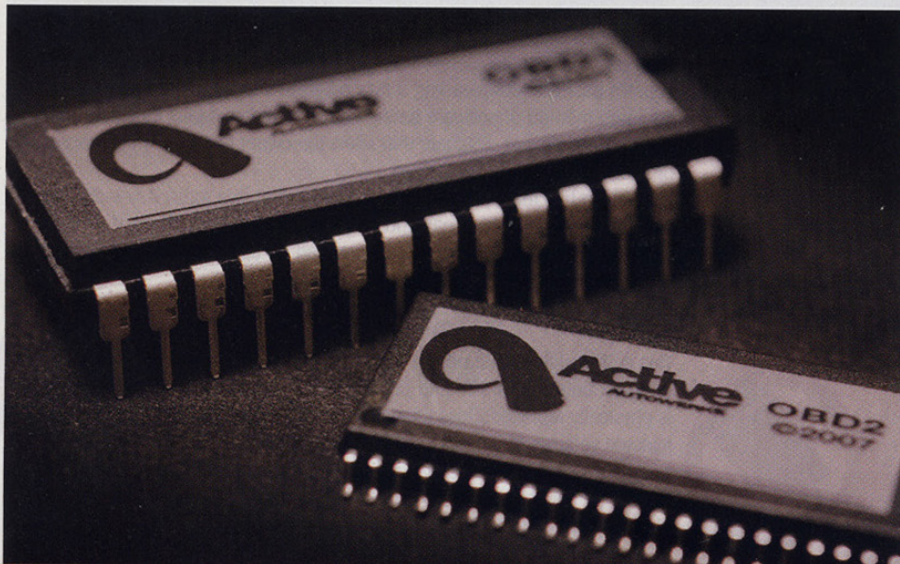
www.eurobahn.us

Applications: 335i

Product: Split Second piggyback computer

Features: Plug-and-play install, temperature compensation protection

Gains: 40 hp/50 lb-ft



Garrett Integrated Automotive Corp. (GIAC)

[www.giacusa.com](http://www.giacusa.com)

**Applications:** Most models

**Product:** Flash

**Features:** Multiple octane modes, revised rev-limiter, revised speed governor

**Gains:** Contact company

**Optional equipment:** Hand-held flash-loader with firewall option



•Conforti Shark Injector



•GIAC Flash Loader

Shark Injector by Jim Conforti  
(dist. by Turner Motorsports)

800.280.6966

[www.sharkinjector.com](http://www.sharkinjector.com)

**Applications:** Most OBD-II models

**Product:** Flash

**Features:** Revised rev limiter, completely reversible, fully encapsulated programmer

**Gains:** 13 hp/12 lb-ft (average, varies by application)

Turner Motorsport

800.280.6966

[www.turnermotorsport.com](http://www.turnermotorsport.com)

**Applications:** 2005-current

**Product:** Flash

**Features:** Revised fuel and timing maps

**Gains:** 5-40 hp/4-40 lb-ft (varies by application)

**Optional equipment:** Available soon as encapsulated programmer



•Turner Motorsport chipped ECU



■ Porsche 997 Turbo producing nearly 460 lb-ft of torque at 3800 rpm. Who needs a tow vehicle?



# BUYERS GUIDE

## Vishnu Performance Systems

925.648.7863

www.vishnutuning.com

Applications: 335i

Product: Piggyback

Features: Revised fuel, boost and timing maps, secondary output drivers, launch control, MAF scaling, valet

Gains: 60-80 hp/70-80 lb-ft (fuel-dependent)

Optional equipment: C-Reader OBD-II diagnostic tool

## MINI

### Dinan Engineering Inc.

www.dinancars.us

Applications: Supercharged 1.6L

Product: Flash

Features: Revised rev limiter, supports new car warranty up to four years/50,000 miles

Gains: 7 hp

Optional equipment: MIPP functions as programming and diagnostic tool

## PORSCHE

### APR Tuning

334.502.5181

www.goapr.com

Applications: All water-cooled models

Product: Flash

Features: Multiple octane modes, revised rev-limiter, valet, anti-theft

Gains: Contact company

Optional equipment: EMCS flash-loader

### Garrett Integrated Automotive Corp. (GIAC)

www.giacusa.com

Applications: Most electronically fuel injected models

Product: Flash, chip

Features: Multiple octane modes, revised rev limiter, revised speed governor

Gains: Contact company

Optional equipment: Hand-held flash-loader with firewall option

### Neuspeed

800.423.3623

www.neuspeed.com

Applications: Cayenne V8 and Turbo, 996 Turbo

Product: Flash

Features: Revised fuel maps, timing and boost

Gains: Contact company

### Revo Technik Inc.

866.632.4060

www.revotechnik.com

Applications: All models 2000-current (excluding Carrera GT)

Product: Flash

Features: Dealer- and user-adjustable, using Variable Table Technology

Gains: Contact company

Optional equipment: SPS-Select software switcher

## VOLKSWAGEN

### APR Tuning

334.502.5181

www.goapr.com

Applications: 1.8T, 2.0T, VR6

Product: Flash

Features: Multiple octane modes, revised rev limiter, valet, anti-theft

Gains: 30-60 hp

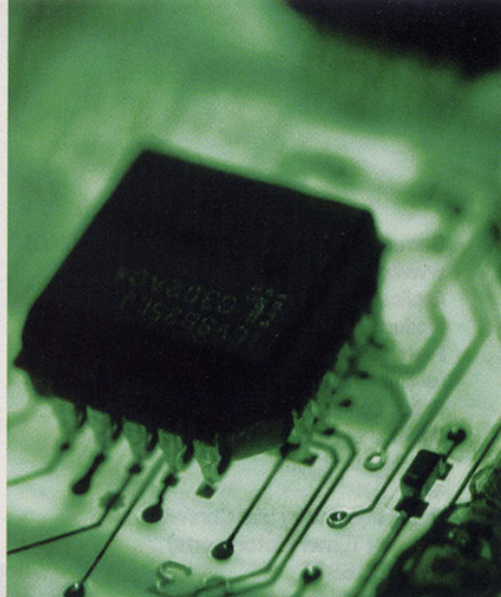
Optional equipment: EMCS flash-loader

### EIP Tuning

410.817.0406

www.eiptuning.com

Applications: All models 1992-current



•EIP Tuning laptop flashloader



**Product:** Flash, chip (model-dependent)  
**Features:** 2006 and later vehicles are laptop-flashable by customer  
**Gains:** 10-12 hp (NA), 35-40 hp (FI)

**Garrett Integrated Automotive Corp. (GIAC)**

[www.giacusa.com](http://www.giacusa.com)

**Applications:** Most OBD-II models

**Product:** Flash

**Features:** Multiple octane modes, revised rev limiter, revised speed governor

**Gains:** Contact company

**Optional equipment:**

Hand-held flash-loader with firewall option

**Neuspeed**

**800.423.3623**

[www.neuspeed.com](http://www.neuspeed.com)

**Applications:** Most models

**Product:** Flash, chip

**Features:** Revised fuel, timing, and boost

**Gains:** Contact company

**Revo Technik Inc.**

**866.632.4060**

[www.revotechnik.com](http://www.revotechnik.com)

**Applications:** 2000-current models

**Product:** Flash

**Features:** Dealer- and user-adjustable, using Variable Table Technology

**Performance figures:** Contact company

**Optional equipment:** SPS-Select software switcher

**ipd USA**

**800.444.6473**

[www.ipdusa.com](http://www.ipdusa.com)

**Applications:** All turbocharged Volvo models 1994-2007

**Product:** Flash

**Features:** Three stages offered: torque limit delete, revised governor, revised rev limiter

**Gains:** 25-65 hp (model-dependent)

**Optional equipment:** Soft-loader laptop interface



•ipd Soft-Loader



## ▼ MISCELLANEOUS

**Eurotek Designs**

**914.793.3889**

[www.eurotekdesigns.com](http://www.eurotekdesigns.com)

**Applications:** Specialized development for all Bosch, DENSO and Siemens control units for a range of high-end European vehicles

**Product:** Flash

**Features:** Revised rev limiter and top-speed governor, custom tuning to customer specs

**Gains:** Model-dependent

**Superchips UK**

**866.EURO.POWER**

[www.eurobahn.us](http://www.eurobahn.us)

**Applications:** Most European fuel-injected models

**Product:** Chip, piggyback

**Features:** Added power, driveability

**Gains:** Model-dependent

**Unichip North America**

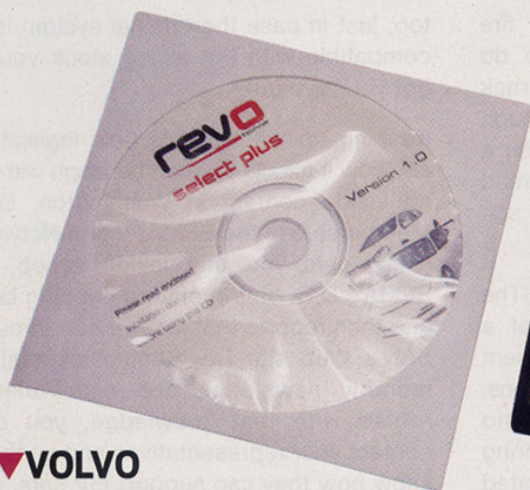
[www.unichip.us](http://www.unichip.us)

**Applications:** Most electronically fuel-injected car

**Product:** Piggyback

**Features:** Can be programmed to modify any channel of stock ECUs functionality

**Gains:** Model-dependent



•revo SPS Software Switcher

## ▼ VOLVO

**Evolve Cars Inc.**

**626.305.5379**

[www.evolvecars.com](http://www.evolvecars.com)

**Applications:** 2000-current Volvo cars

**Product:** Flash

**Features:** Tuneable to user-specified octane

**Gains:** 39 hp/37 lb-ft (model-dependent)

**Optional equipment:** Files available to work with modified vehicles



•Unichip Computer

# EVOLVE