

What You Need to Know to Get the Right Engine Calibration For Your LT5

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The Shortcomings of the Stock Calibrations From the Car Owner's Point of View

- The ignition spark timing is conservative. Most of the stock calibrations are set for 25 degrees of ignition spark advance at wide open throttle above 4000 rpm. With 93 octane fuel, most LT5's will produce about +10 ft. lbs. of torque and +10 hp with 28 degrees of ignition spark advance.
- The engine cooling fans use high temperature turn on points. Generally the primary fan goes on at 228 degrees and the secondary fan goes on at 232 degrees.
- Power fade out with high engine compartment temperature
- CAGS

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GM Service Calibrations

- GM provides the latest versions of the LT5 calibrations through their service parts operation.
- For the '90, '91, '93 and first half of the '94 model years, this includes upgrades that address problems that they identified.

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GM Service Calibrations on Parade



Service Calibration Application Summary

Model Year	Broadcast Code	Scanner ID	Part Number
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1990	AYBK	3921	16163905
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AYBK was released to address; idle fluctuation, high idle after a hot restart and high idle speed during coast down. Service bulletin 476503.

1991	BFXB	3431	16193416
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BFXB was released to address hard starting when the engine is hot. Service bulletin 476503.

1992	BPPA	9991	16219916
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BPPA was released in March of '95. I have never been able to find out why.

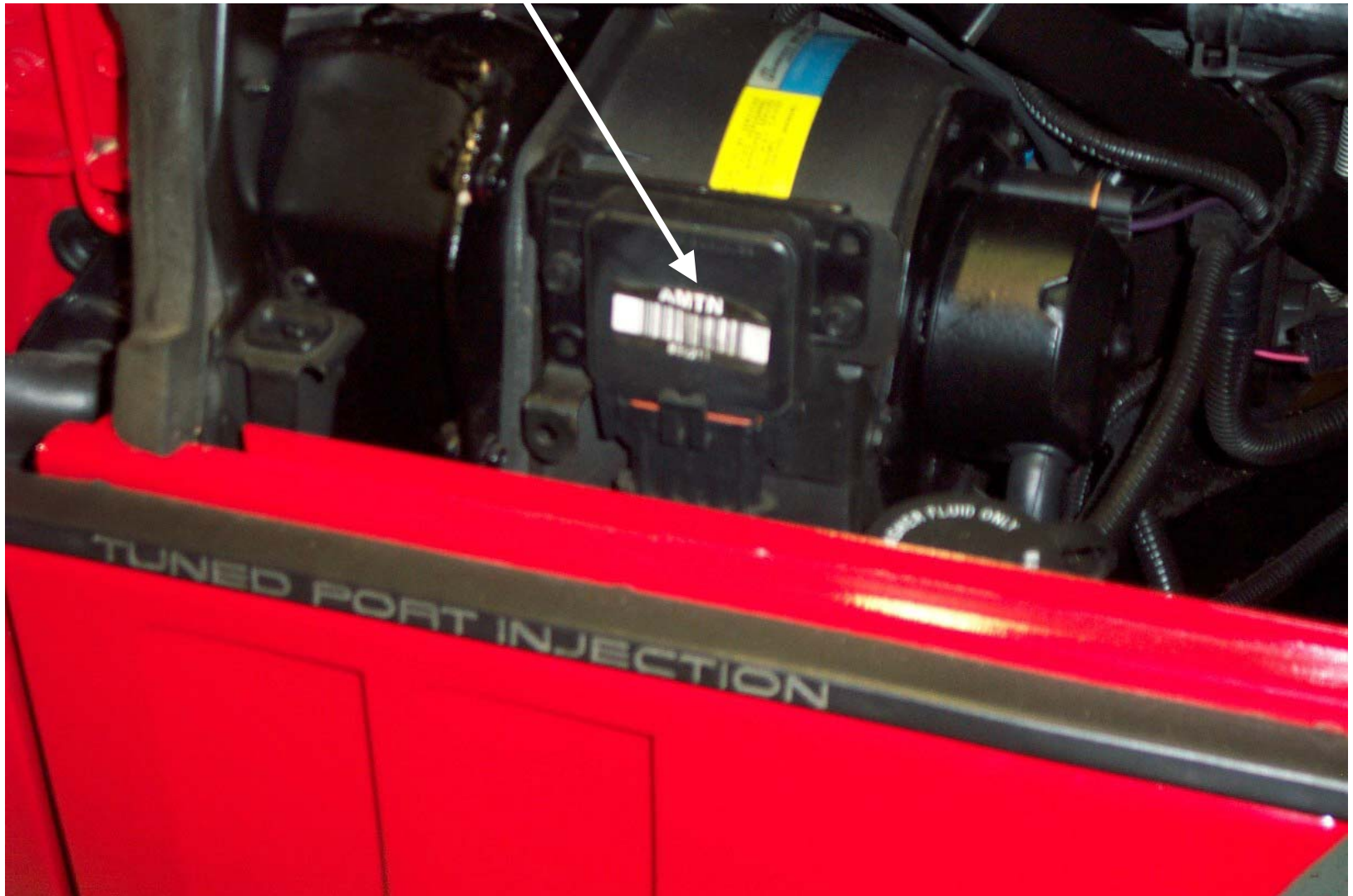
1993 and 1994	BMCB	9011	16209008
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BMCB was issued to address a sag in acceleration at 2500 RPM under high load and light throttle. Service Bulletin 576514. BMCB also corrects the intermittent ASR errors that the '93 production calibration BFDM occasionally gets at startup.

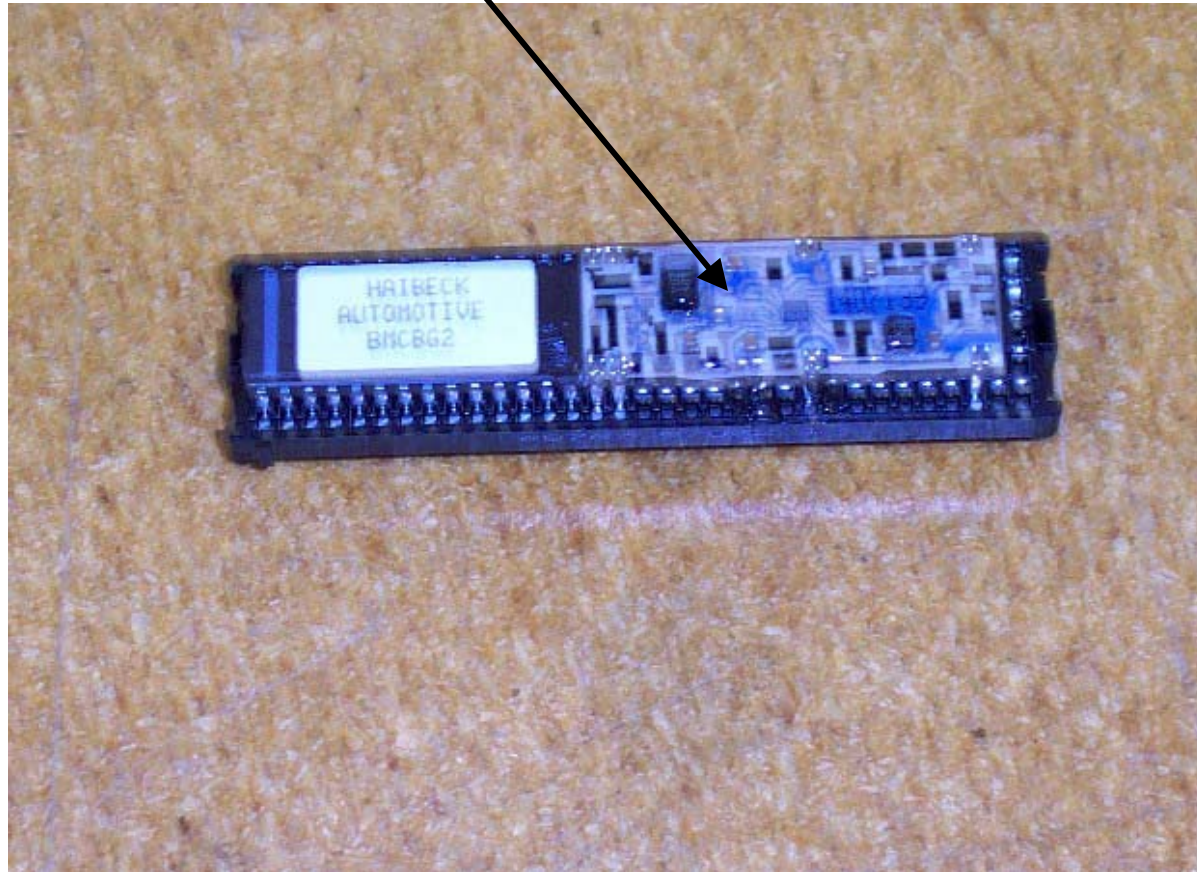
Ignition Spark Knock Control

- Knock Filters
 - Hardware
 - Software
- False knocks
 - In '90-'92 LT5's
 - In '93-'95 LT5's
- How to control the effect of false knocks

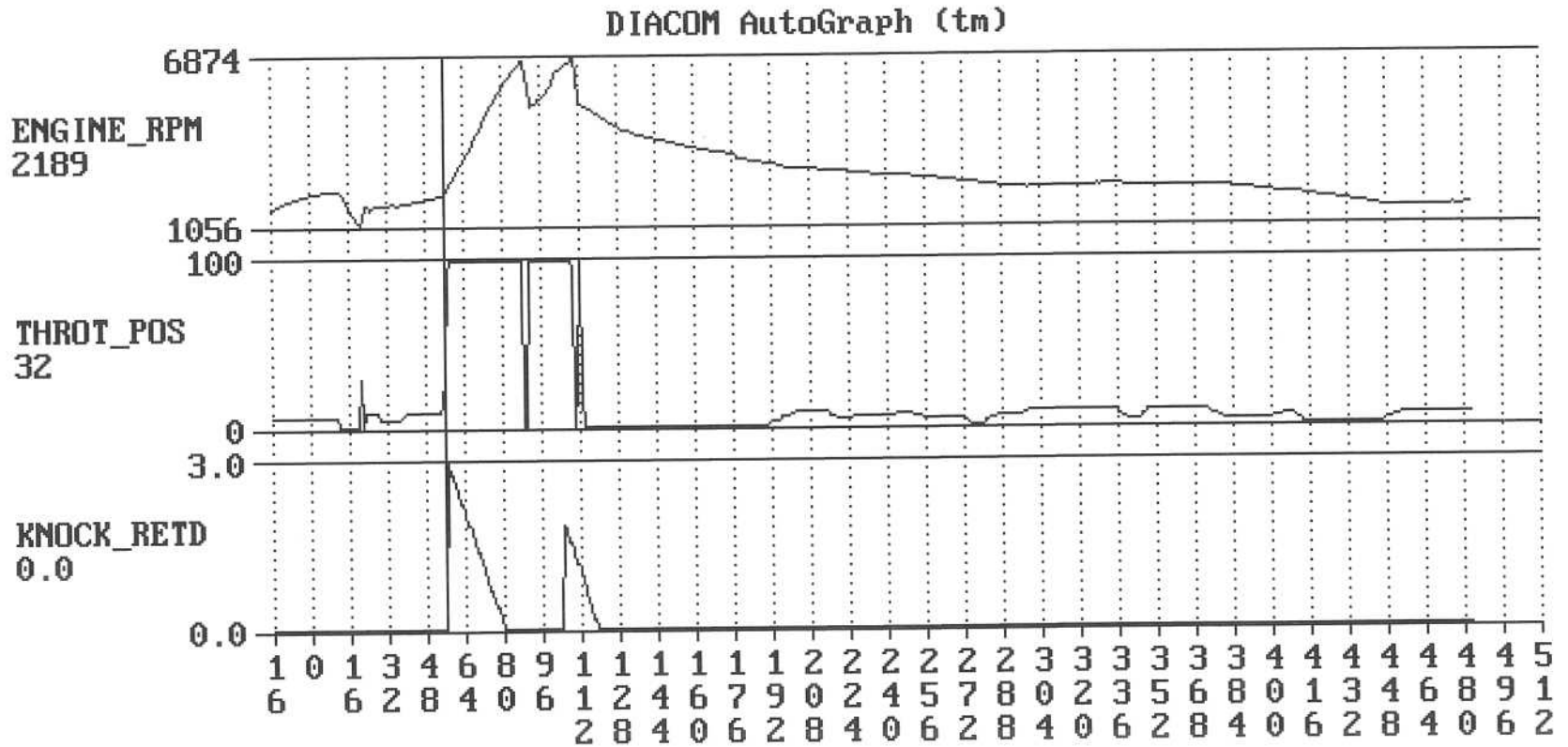
Knock Filter Packaging and Location for '90 LT5's



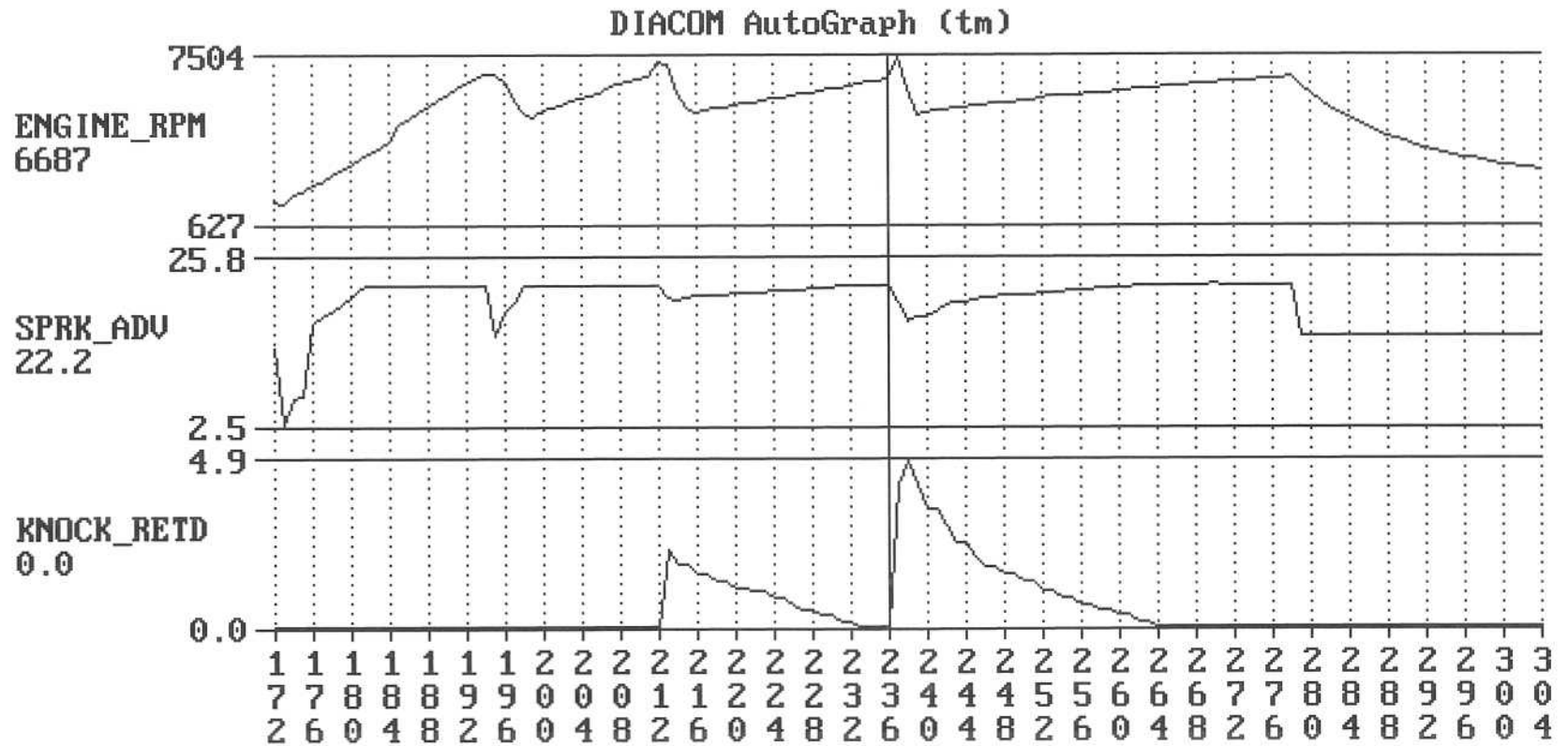
Knock Filter Packaging and Location for '91 – '95 LT5's



Typical Tip In Knock Encountered on '90 – '92's



Typical Shift Knock Encountered on '93 - '95's



Controlling False Knocks

- The calibration can control:
 - Knock retard amount in Deg./Msec.
 - Recovery rate in %/Sec.
 - The above can be specified in 400 RPM band increments.
For example: 1200-1600 RPM, 1600-2000 RPM, 2000-2400 RPM and so on...

Cooling Fan Control

- The service calibrations turn on the primary fan at 221 to 226 degrees depending on the model year.
- They turn on the secondary fan at 230 to 234 degrees depending on the model year.
- They are switched off when the respective temperature drops about 10 degrees.
- The chief cooling fan problems:
 - Under certain circumstances the system will reach equilibrium before the turn off temperature. Generally this results in an engine that runs hot. 215 degrees for example.
 - Fans set to run at very low temperatures. The fans then run all of the time. This leads the loading of the radiator with debris. Then the engine is doomed to run hot.

A Cooling Fan Control Solution

1. Turn both fans on to cause a quick and positive heat removal. For example, at 205 degrees.
2. Turn both fans off above the thermostat regulation temperature. For example, at 200 degrees.

Generally the fans will run when the car is not moving and then turn off soon after the car is moving over 10 mph

The Hot Engine Fadeout Problem

- The GM calibrations retard the ignition spark timing 3.2 degrees whenever the temperature of the air horn is above 110 degrees

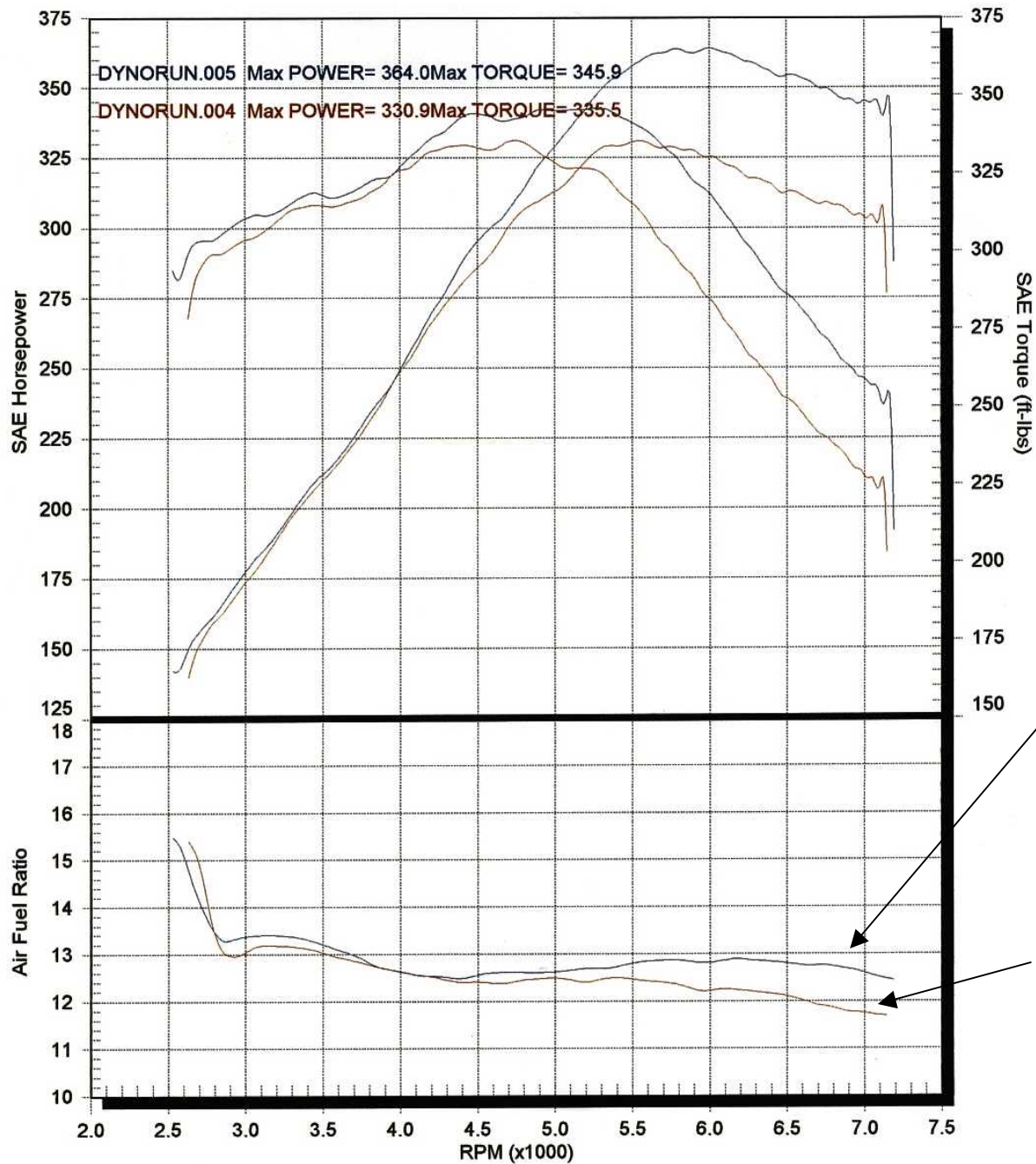
This results in a scenario that is similar to this. When the engine is started cold it runs strong. After slowing in traffic or a short hot shutdown the engine power loses its edge.

- The solution is to set the retard to occur above the normal engine compartment temperature range.

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Fueling

- The GM calibrations are about 6% rich
- Modifications that increase engine volumetric efficiency will lean the AFR. At about 450 CHP the stock fueling is roughly ideal.



After adding 33 WHP the fueling is about perfect

Typical stock fueling

Fueling for Highly Modified Engines

- Fuel usually needs to be added for engines that go beyond 450 CHP
 - In the 450 to 485 CHP range, fuel is added when the engine is in the power enrichment mode. The closed loop system will usually auto tune the light load operational range to meet the stoichiometric (14.7:1) AFR.
- Beyond 485 CHP it is usually necessary to modify the volumetric efficiency tables to put the light load fueling back within the range of the control of the auto tuning system
 - This may include removing fuel at very low speeds if the engine has been designed for high speed operation
 - Longer duration camshafts may reduce the manifold vacuum. The control system uses the vacuum level as the primary factor for fueling. Low vacuum will cause additional fuel delivery. This is usually the opposite of what the engine really needs. In this case, the volumetric efficiency table values are reduced to reduce the fuel delivery at the lower engine speeds.

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EGR

- Used on '93 – '95 engines
- EGR failures resulting in code 32 are common. The problem is usually with a sticky, slow moving, EGR valve.
- Most headers don't support EGR
- The EGR can be disabled for off road use by setting the enabling engine coolant temperature beyond the normal operating temperature of the engine

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CAGS

- It can be disabled for off road use by setting the enabling engine coolant temperature beyond the normal operating temperature of the engine
 - This also turns off the annoying “One to Four” lamp

Backfire Problems

- Some engines have occasional backfires during shifts
- Some engines with headers have significant backfire problems

Improved Performance Calibrations for Stock Engines

- Based on the latest versions of the GM LT5 calibrations
 - AYBKG For '90's
 - BFXBG For '91's
 - BPPAG For '92's
 - BMCBG For '93 to '95's

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Description of AYBKG

Specifically for '90's. Features Also Apply to Subsequent Model Years

- Generally increases torque and horsepower by 10 respectively. It also reduces power fadeout associated with engine heat. The engine will be more powerful and the output will be more consistent as the engine thoroughly warms up.
- The ignition spark advance is increased 10% at all engine speeds. As a result, the advance at wide open throttle is increased by 3 over the stock calibration to 28 degrees.
- Both of the cooling fans turn on at 205 degrees. Both turn off at 200 degrees.
- The stock calibration retards the ignition spark advance when the intake air temperature is over 90 degrees F. This is revised to 160 degrees and the amount of retard is decreased.
- The CAGS (1 to 4 shift) is disabled.
- The fuel delivery at wide open throttle is about 6% rich in the stock calibration. The fueling is reduced by 3%.

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Description of BFXBG

Specifically for '91's. Features Also Apply to Subsequent Model Years

- The features are the same as AYBKG except the power key default setting is “On”

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Description of BPPAG

Specifically for '92's. Features Also Apply to Subsequent Model Years

- The features are the same as BFXBG

What You Need to Know to Get the Right Engine Calibration For Your LT5

Description of BCMBG

Specifically for '93 – '95 Model Years

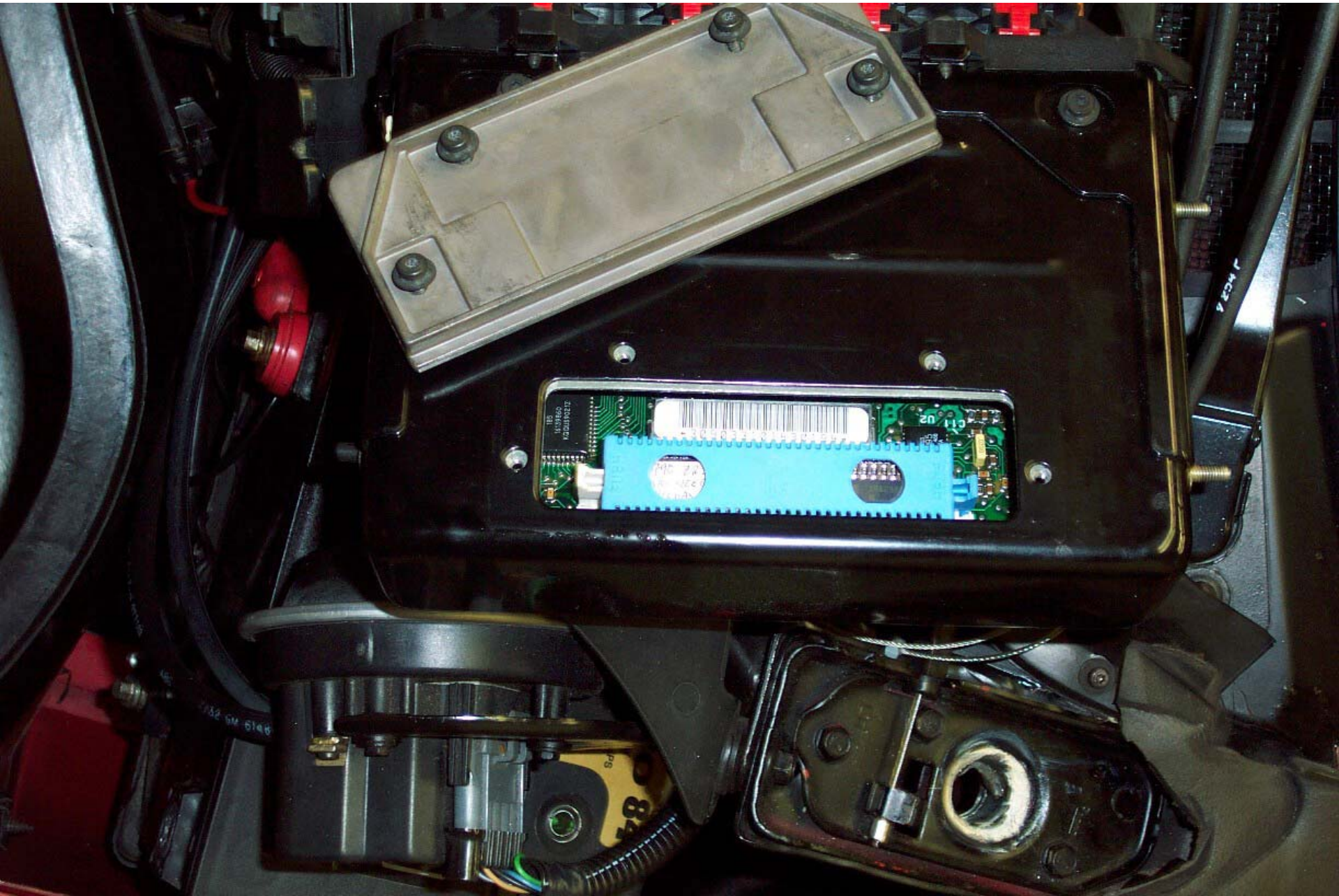
- The features are the same as BPPAG except:
 - The stock calibration tends to falsely detect detonation on shifts at over 6000 rpm. This can cause a 10 hp power reduction for about a second in the next gear. The effect of these false knocks is reduced by about 50%.

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Installing a Mem-Cal/CalPack

- Plugs into a socket in the bottom of the ECM
- There's no need to remove the battery cable

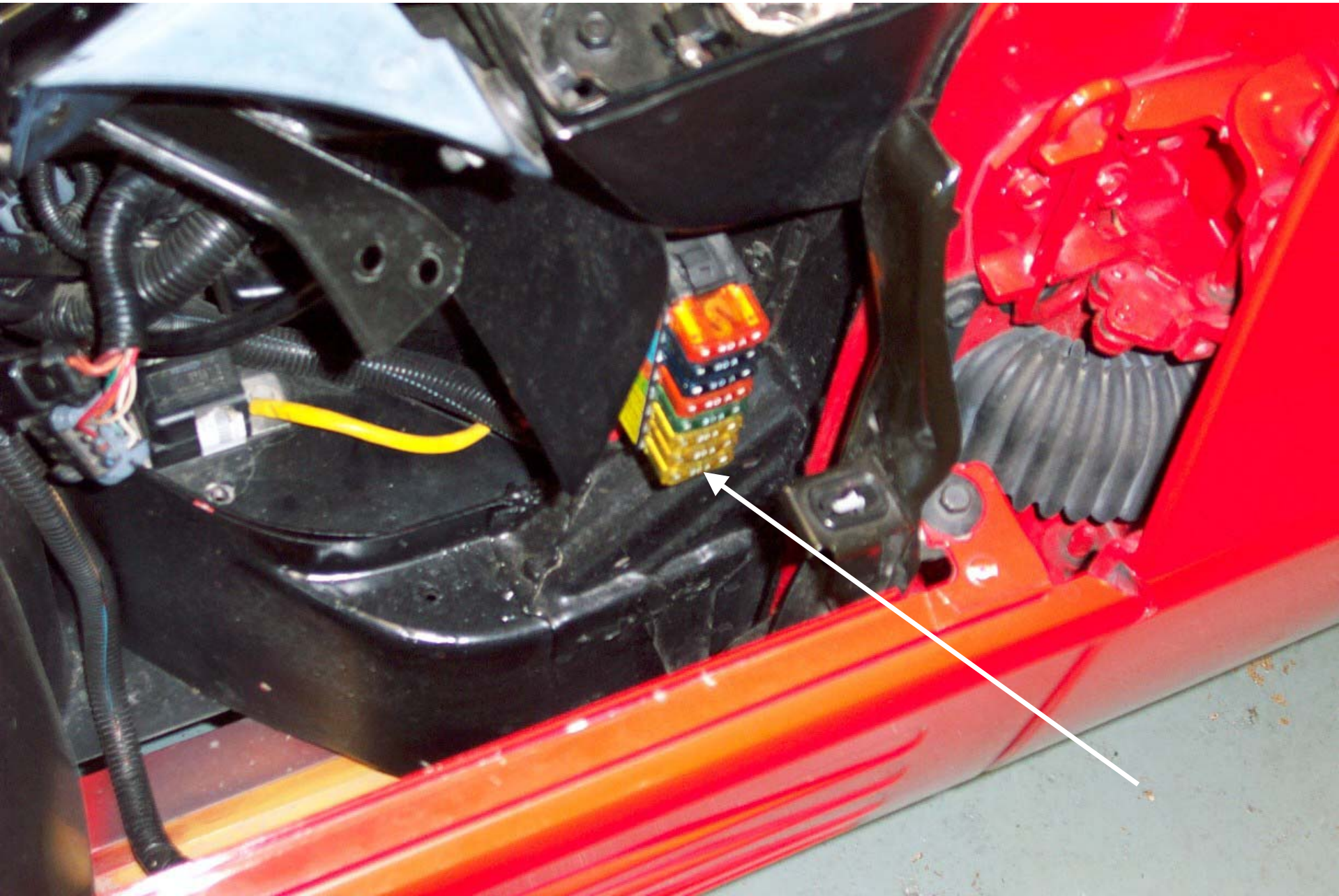
The Bottom of the ECM With the CalPack Cover Removed



The ECM Power Connector for the '90 – '92 Cars



The ECM Fuse for the '93 – '95 Cars



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