NORTH GEORGIA JAGUAR CLUB

Newsletter

Vol.3, No.1, January, 2004


## PRESIDENTS LETTER

For anyone who missed it the Christmas party was our best yet!

We had good food, good music, good prizes, a good speaker, and great company. We have a firm date set for next year, so make your plans now to attend; it will be Sunday, December 12th at 6pm at the Vinings Club. I would like to again thank Hennessy Jaguar for arranging for Scott Thompson to come and speak to us! He shared good information on the "cats" yet to come, great memories of those we all share a passion for, and insight into the personalities that will shape Jaguar in the near future!

We have a new enthusiastic trio organizing events for 2004 and I think we will have a better variety of events to help you have fun with your Jags. If you have any additional ideas, please get in touch with the event committee (see article in this issue listing committee members and their phone numbers).

I would like briefly to discuss what has become what I will call "the question". Every time I meet someone and the discussion gets around to hobbies and I share with them that my passion is for old Jags, they always pause and ask, "Don`t you have a lot of trouble with them?" When I say, "No," they are amazed. I do not yet understand the depth of this belief with the American public. My experience has been just the opposite. I have owned Jags that by all rights and previous treatment should never run again but they do! I am almost to the point where I think they are bullet proof (at least mechanically)! I can`t believe it is just good luck, as that is not generally the case with me!

*Continued on page 2*

# TUNING THE XK ENGINE by Pat Harmon PART ONE

## Overview

The Jaguar XK engine, designed during the WWII air raids over London, was considerably ahead of its time in 1948 and proved to be one of the most durable and enduring designs of the 20th century. As with any machine, it's performance is dependent upon condition and tuning. This article is a basic primer on tuning this fabulous engine with tips and lessons-learned not included in the factory Workshop Manual.

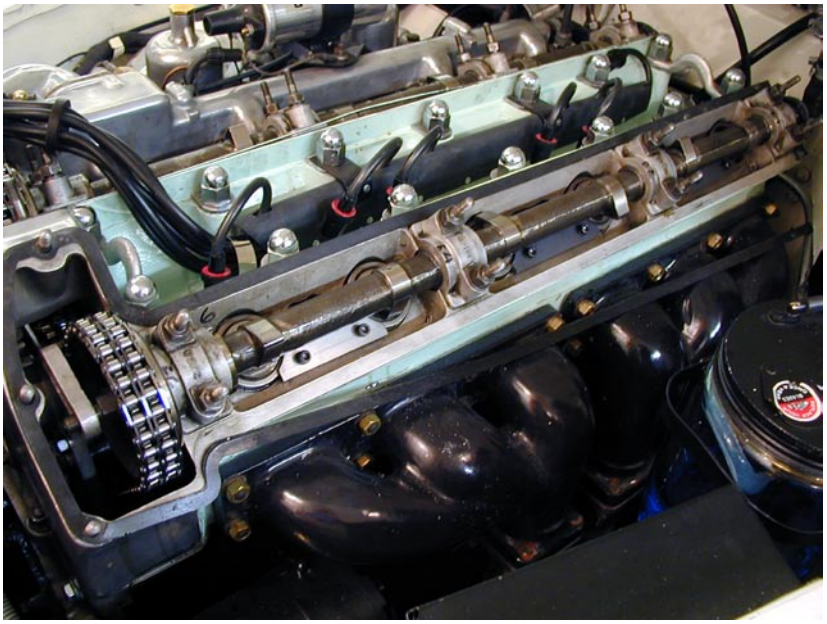
### *The Basics*

To properly tune an automobile engine, it's essential to have a basic understanding how they operate and the various components interrelate. All internal combustion engines operate on the same basic principles: loading a combustion chamber with the correct fuel-air mixture, compressing that mixture and igniting it at the correct time in the cycle so that it develops maximum power for the configuration. The XK engine (as are most automotive engines) is a four-stroke engine meaning that the pistons complete four strokes each cycle, two up and two down. The cycle begins with the piston at the top of its stroke. At this point the intake valve opens and the piston is pulled down (via the connecting rod to the crankshaft) drawing a fuel/air mixture from the carburetor(s) through the intake manifold. At the bottom of the stroke the intake valve closes and the piston travels upwards, compressing the fuel/air mixture. The piston then travels to the top of its stroke (called top dead center) and, the spark plug fires igniting the explosive fuel/air mixture. The exploding gases then force the piston downwards. At the bottom of the stroke the exhaust valve opens and the piston travels upwards expelling the spent mixture through the exhaust valve. At this point, the exhaust valve closes, the intake valve opens and the piston begins the next cycle drawing a new fuel/air mixture into the cylinder. While all this is going on, the distributor (which runs from a geared shaft to the crankshaft) is turning at a rate one-half that of the engine speed acts as a high voltage switch directing current to the spark plugs every other rotation.

### *Factors Affecting Engine Performance*

With these basics in mind, it should be clear to see that a number of factors determine how well an engine runs. A perfectly tuned engine must have all of them correct. In many cases, if one is off, it will affect the others. It's really not as complicated as it seems.

There are a number of things important to performance that cannot be "tuned." Typically these are set at manufacture or rebuilding. The engine must be able to adequately compress the fuel/air mixture. If the valves are worn/burned, cylinder/pistons worn then the mixture can leak out of the combustion chamber resulting in less power. The valves are opened and closed in a special sequence by the camshaft which (in the case of the XK engine) is driven by a timing chain from the main crankshaft. The valves opening and closing in relation to the crankshaft and pistons is called "valve timing" and must be correct. We don't want exhaust valves opening early robbing from the power stroke nor do we want intake valve opening too early (before the piston has reached top dead center (TDC)) or late (after the piston has already started downward creating a vacuum in the cylinder). Before an engine can be tuned to maximum performance, it is important that it be in good condition. A simple compression check (pressure gauge screwed into spark plug hole) is a quick way to check all the internals are in-order.



### *Basic Principles of Tuning*

There are seven interrelated functions that all must be set correctly for the engine to run it's best.

**Spark Plug Gap:** A simple, but important parameter. Use the manual specified plug and carefully gap to factory settings. Take care that all plugs are set identical. Sparkplugs must be clean and are so inexpensive they should be replaced at each tuning.

**TIP:** *Use anti-seize compound on steel plugs inserted into aluminum heads.*

**Valve Clearance:** Obviously, the valves must open and close to allow fuel/air to enter and exhaust to exit. How far the valves open and close is determined by the valve clearance. This also affects the valve timing to a certain extent, as a wider clearance will cause the valves to be opening earlier and closing later. For a smooth running engine, valve clearances should be as identical from cylinder to cylinder as much as possible. Otherwise one cylinder will be operating under different conditions than another.

*Continued on page 5*

*President's Letter Contunued*

I would like to hear from some of you about your experiences, as I know that you have been asked "the question" too!

Finally, let me say that I am looking forward to this year and hope that you are too! This is your club and the more people who participate, the more fun it will be for all! We have three great tech sessions planned for January, February, and March; please try to attend!

Best wishes for the New Year!
Joe Newell

## NGJC FEATURED IN JAGUAR JOURNAL

If you've read your November-December issue of the Jaguar Journal, you know that our club concours was featured in the current issue of the national (JCNA) club magazine. We've been told that an article on an SS100 owned by Wayne Phears, an NGJC member, will appear in a later issue.

## TECH SESSION ON PAINT

**WHAT:** Tech session on paint conducted by Terry Hulsey
**WHEN:** Saturday, January 17 at 10:30AM
**WHERE:** Joe Newell's Garage in Ellijay

Terry has a tremen dous amount of experience in this area and does some of the best painting in this area (see Joe Newell's Mark IX and the Michalski's XK140). He has done a lot of work to prepare for this and has some handouts for those of us whose memory needs help. The session will be followed by lunch at one of the local BBQ spots. Weather permitting, there will be a short mountain drive for those who wish to do so.

**DIRECTIONS TO JOE NEWELL'S GARAGE:**
From Atlanta, go north on I-75, turn onto I-575 which turns into Hwy. 515 around Jasper. When you reach Ellijay, go through three traffic lights on Hwy 515. After the third light (Hardees will be on your left), continue 4.5 miles on Hwy 515 and take a left onto Whitepath Road. Go 1.5 on Whitepath and turn left into Whitepath Golf Club and Buckhorn Estates (Large stacked stone sign just as you cross the Ellijay River Bridge). Proceed one mile on Cherokee (follow the yellow center stripe) and take a right on Shenandoah. Go approximately one-quarter mile and take the first left which is Choctaw Drive (blue house on corner of Choctaw and Shenandoah). Joe's house is the fourth house on the right with the black bear sign at the driveway. Garage is the two story brick building to the left at the top of the drive. If you get lost, call 706-276-6779 and Betty or Joe will come and get you.

## JAGUAR AND CLASSIC AUTOMOBILE CALENDAR OF EVENTS FOR 2004

**Jan 21-25 –** Barret-Jackson Classic Car Auction, Scottsdale, Arizona
**March 11-14 –** Amelia Island Concours
**March xx-xx –** Atlanta Auto Show
**March 11-14 –** JCNA AGM in Long Beach
**April 30-May 1 –** JSSC Lowcountry Classic Jaguar Concours, Charleston, SC
**May 7-9 –** XK Register (Jaguar Drivers Club) Spring Weekend in Sussex, England
**May 15 –** Smoky Mtn. Jaguar Club Concours, Gatlinburg, Tenn.
**May 8 –** British Motor Car Day, Chateau Elan
**June 13 –** Carolina Jaguar Club Concours (British Car Days South)-Salisbury, NC
**June 25-27 –** XK Register Weekend (JDC), Stamford, England
**June 27 –** International XK Day (JDC), Burghley House, Stamford, England
**June 25-27 –** Goodwood Festival of Speed – Goodwood, England
**August 15 –** Pebble Beach Concours d'Elegance – Pebble Beach, California
**September 3-5 –** Goodwood Revival – Goodwood, England
**October 15-17–** EURO 2004 Auto Festival at BMW manufacturing plant
**November 5-7 –** Southern British Car Club Weekend, Chattanooga, Tenn.

## TENTATIVE CLUB CALENDAR AND SCHEDULE OF EVENTS FOR 2004

**January 17 –** Tech session on Paint at Joe Newell's garage in Ellijay

**February 21 –** Tech session on detailing a car at Skip Smith's garage in Atlanta

**March 21 –** Tech session on the XK engine by Dick Maury of Coventry West (Note: This is on a Sunday afternoon)

**April XX –**

**May 8 –** British Motor Car Day

**June XX –**

**August XX –** Tech session / Judges training session for JCNA Concours

**September 19 –** JCNA sanctioned Concours at Chattahoochee Country Club in Gainesville

**October XX –** Fall Leaf Cruise

**17 –** EURO 2004 Auto Festival at BMW manufacturing plant

**November 5-7–** Southern British Weekend in Chattanooga

**20 –** Business Meeting in the Atlanta area – location to be announced

**December 12 –** Christmas Party at the Vinings Club



## EVENT PLANNING COMMITTEE

A committee of three members volunteered to cover the duties which would normally be handled by the Vice-President for Activities. The committee is comprised of Richard Bowers, George Haldane and Larry Kludt. If you have any ideas or suggestions for an event, trip, tech session, or tour, please contact one of them. Their contact information is as follows:

**Richard Bowers**
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**George Haldane**
**770-949-9779 or georgehal@comcast.net,**
**and**
**Larry Kludt**
**770-641-9249 or lrkludt@kcc.com.**

## FINAL REMINDER ON 2004 DUES

The annual dues for NGJC for 2004 will be $45 and are now past due. Between forty to fifty members have paid. If you are going to renew, please call or e-mail Roy Cleveland and let him know that your dues are in the mail. If you know you aren't renewing, he would appreciate knowing that as well. We have to send a roster to JCNA with dues payments for each member on the roster in early 2004 so it is very important that we have all our dues collected before January 1 or at least know who is renewing. Of the $45 that you pay in dues, NGJC pays $20 to JCNA. If you were a member at large, you would pay $28 for annual membership. In effect, it costs you only $17 per year to be a member of NGJC ($45 minus $28) assuming you intend to be a member of JCNA. For this $17, you receive a monthly newsletter, access to local events, a local club, and discounts from Hennessy Jaguar. We hope that you will decide that your membership has been worth its cost and will continue your membership for 2004. Please make your check payable for $45 to the North Georgia Jaguar Club and mail it to P.O. Box 1377, Gainesville, GA 30503.


## OFFICERS

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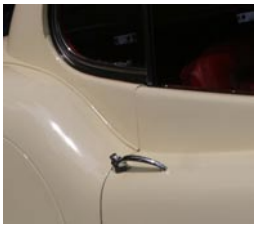
## NEW MEMBERS

We would like to welcome our new members since the last newsletter. They are **Don and Marlene Hart, Martin and Cher Spratt, Ronald and Remae Bridgers, John Carroll, Roy and Gail Elks, Mayra Alvarez and Ivan and Maureen Russell-Hill.** Roy is originally from England and Ivan and Maureen reside in Dublin, Ireland and are friends of Roy and Linda Cleveland and Tom Koballa. Martin and Cher are originally from Australia and some of you met them at the Christmas party.

Our membership is now up to 75. Membership lists are available to any member by mail or e-mail. If you would like one, call or e-mail Roy Cleveland.




NORTH GEORGIA JAGUAR CLUB

JAGUAR CLUBS OF NORTH AMERICA INC.

*Continued from front cover*

The XK engine is an overhead cam engine. From the front, the left side houses the intake camshaft and valve set. The right side houses the exhaust camshaft and valve set. Camshaft lobes ride directly on top of the valves on followers. Special thickness shims are installed under the followers (on top of the valve stems). The valve clearance is adjusted by installing various thickness shims

**Point Gap:** The distributor is nothing more than a dual function switch. A point contact unit within the distributor rides on a six lobed camshaft, which causes the points to open and close as a follower rides on the camshaft. These points are connected in series with the ignition and the spark coil. When closed the coil is connected directly to the battery. When the points open, the circuit is broken and the magnetic field built-up inside the coil collapses causing a high voltage to be generated in the secondary windings. This high voltage (over 10,000 volts) travels to the center of the distributor cap over a high voltage wire. From there the voltage is directed to one of the sparkplug wires via the rotor.

**Timing:** This determines when the spark plugs (in England called "sparking plugs.") fire in relation to the piston location. Recalling from above, as the piston raises to TDC and compresses the mixture we do not want it ignited to early or the exploding gasses will act against the upcoming piston. Also, we don't want it firing too late, as the full power from the combustion will not be achieved. Typically, it takes a bit of time for the mixture to ignite and build to full force so the timing is set to actually ignite the gas before the piston comes to TDC. Rotating the distributor in relation to the block (and thus the crankshaft) controls timing. Typical timing settings are 5 degrees before top dead center (BTDC). If the ignition occurs too early the engine will "ping" or "knock." If you think about it, grade of fuel is important as higher octane will burn quicker, with more force and require less timing advance than lower octane. XK distributors have a micrometer adjustment on the side of the distributor to adjust the timing for different grades of gasoline. This was more important in 1948 than it is now since most gasoline is standardized and quality controlled. Inside the distributor cap are six contacts – one for each spark plug and a rotor riding on top of the camshaft. This camshaft rotates once per every two engine revolutions and directs the high voltage from the rotor to the appropriate spark plug contact and then onto the sparkplug. By rotating the distributor you can see how the timing of the spark voltage to the spark plug can be changed. Timing can be measured statically (engine not running) by using a light bulb or ohmmeter to measure when the points are just opening. It can also be measured with a timing light, which fires upon high voltage sent to either the #1 (rear of engine) or #6 (front of engine) spark plugs.

**Idle Speed:** To facilitate acceleration/deceleration there are two controls, which vary the timing from its basic setting. One control (vacuum advance) varies the timing depending on intake manifold vacuum. At full acceleration, the carburetors are open, the vacuum is low, and the advance unit does nothing. When the vacuum is high; however, the advance unit

advances the timing. These are installed mainly for fuel economy. More important to tuning is the second advance control or centrifugal advance. Inside the distributor there are weights, counteracted by springs, which advance the timing more the faster they spin. On an XK engine, this control begins affecting the timing over 500 rpm. It's thus important that the engine be at 500 rpm while being tuned at idle.

**Carburetor Synchronization:** Most XK engines have twin SU carburetors with the 'S' models having three. For optimal performance, these carburetors must be synchronized so each does an equal part. They are designed so, at idle speed, the throttle plates are fully closed and incoming air is adjusted with idle/air adjusting screws (near the rear of the unit). At idle, the engine speed is controlled with these screws and each is to be adjusted so the carburetors are drawing equal amounts of air. Once the engine is accelerated above idle, the pistons rise within the suction chamber this raising the tapered needle in the jet seat allowing more fuel to flow into the unit.

**Fuel/Air Mixture:** This is set at the carburetor. As air is drawn through the carburetor venturi, a vacuum is created which draws gasoline past an adjustable jet. When the mixture has too much fuel per unit of air it is said to be "rich." When there is not enough fuel it is said to be "lean." In XK engines the jet opening is controlled by a tapered needle which fits into the jet opening. Raising or lowering the jet in relation to the needle controls the idle mixture. Lowering will cause a larger gap or opening and thus make the mixture richer. Raising the piston/needle combination a bit thus making the engine run lean checks the mixture. If the engine has been set to rich this will temporarily correct the mixture and the engine will speed up a tad. If the engine was running to lean then this operation will make the situation worse and the engine will slow down.

## Relationship of Tuning Elements

Understanding the above, the setting of one element will affect the other. Any change in one requires the rest to be reset for the engine to be in-tune. For example, an engine that has its fuel/air mixture set too rich can be compensated by changing the timing but at the detriment of overall performance. The best way to approach the tuning is to first adjust elements in the following order:

**Spark Plugs**
**Valve Clearances**
**Point Gap**
**Timing**
**Idle Speed/Synchronization**
**Fuel/Air Mixture**

Remember, these elements are interrelated. The first three are mandatory factory settings and need to be set first. Timing should be set to factory specifications first. After initial tuning, you may want to try advancing/retarding in small increments to optimize performance. Bear in mind that, both idle speed and fuel/air mixture will have to be readjusted each time the timing is changed – all three are interrelated.

***Disclaimer:*** Information contained herein is solely the opinion of the author and is by no means to be interpreted as factory authorized procedures. Use of these procedures is at the full discretion of the reader and the author held harmless from any damage resulting from same. Mention of particular products by name or manufacturer is only for reference and not a solicitation of them.

**Next Month**
**PART TWO: Timing Proceedures**

Can't wait until next month?
Go to www.pat@patsjags.com