STAHL HEADERS/CAMS
1513/1515 Mt. Rose Ave.
York, PA 17403

December 1988

STAHL HEADERS/CAMS NEWSLETTER

ISSUE #7

STAHL CAM RESULTS

We are trying to avoid the traditional technique of using car owners/drivers to build a performance image to sell cams. We are attempting to work through engine builders who are equipped to test. We have a program that permits engine builders to do cam testing for minimum investment. Call for details. **We** are extremely proud that Stahl Cams have won more races at several major eastern dirt late model tracks than all other cams combined from 355's turning as high as 8500 to 420 cubic inches geared to turn 7500 every lap. (That is real axle shaft torque.) Our cams have won sprint car races and finished second at Syracuse in 1988. At both NASCAR **MODIFIED** and **BUSCH** GRAND NATIONALS Stahl Cam equipped cars have won poles, sat on the front row, and won more races than one person has fingers and toes to count them on. Our SCCA Trans Am wins were as gratifying as the small block dirt modifieds track championship in Upstate New York, not to mention that we have over one dozen D.1.R.T big block modified wins. We are most proud that we have only one report of a broken valve spring and that took place within the first three laps in an engine with a set of $60 valve springs. We've had people run 250 miles in a single race revving the engine from a low rpm of 7500 in the turns to 8800 on the chutes at Bristol on the highly banked l/2 mile; Trans Arn racers shifting at 9000 every shift; dirt modified racers turning only 5700 and commenting about the incredible smoothness of the engine to drive. We prefer not to throw terms like "intake runner mean velocity 20 deg ATDC" etc. around. We'd rather just say there are NO OTHER CAMS that will drive any smoother than a Stahl Cam. Driveability wins races, not competing in terminology contests.

STAHL CAMS (717) 846-3123

STAHL HEADERS (717) 846-1632

STAHL HEADERS/CAMS NEWSLETTER QUESTIONNAIRE

Your Name: _____

Company _____

Address: _____

_____

Phone: _____

Flow Bench: _____
Brand Model

Dyno: _____
Brand Model

Computer:

Specialty:
Drag Race: _____
Oval Track: _____
Road Race: _____
Other: _____

Cams Used Most:
Flat Tappet : _____
Roller : _____

Please complete & return to:
STAHL HEADERS/CAMS
1515 Mt. Rose Ave.
York, PA *17403*
(717) 846-1632 *or 846-3123*

ATTENTION!

DO YOU WANT TO CONTINUE TO RECEIVE THIS NEWSLETTER?

*XXX's on the mailing label indicate that you have not returned the above questionnaire. We require a response to indicate your interest. **If** you care enough to respond we feel you are reading the newsletter. Those that do not respond are either not reading it or don't care and, in any event, we don't need to waste. Please complete and return the above Questionnaire ASAP.*

STAHL

#1 QUALITY HEADERS FOR OVER 25 YEARS
#1 QUALITY CAMS FOR 3 YEARS

STUSKA OWNERS

Many Stuska dyno owners have discovered it is difficult or impossible to control most engines below 5000 rpm on a Stuska. There is no simple solution. However, experimentation by several people indicates the biggest trick is to really increase the size of the pump. The best recommendations appear to be using a 7-l/2 to 10 hp pump. Apparently this increases the pressure drop across the load control valves as it appears brake response is proportional to pressure drop. The larger pump also permits larger outlet restrrctors to reduce sensitivity and the combination reduces the "over correcting" it seems we always get into below 5000. Many dynos have been installed without regard for the outlet water requirement. It is necessary that water not build up in the outlet lines after the restrictors. All outlet control must be by the restrictors and not. by buildup in the lines etc. In fact, putting 3/4" to 1" hose on the outlet tor fittings, no more than 12" long, and dumping into a tank or sump built into the floor will help considerably. If the water can back up in the outlet hoses at all, it creates control problems. As with engines on the race track, the greater the driveabilty, the easier it is to control. The better control, the easier and more precise the job can be accomplished.

ALTITUDE

We were asked to discuss the concept of correcting weather to a relative altitude. It appears the power output of an internal combustion engine will vary with changes in any of the following three: air inlet temperature (I prefer to call it carb air temp), humidity, and barometric pressure. It has been my experience that most American made carbs have the ability to self compensate for reasonable barometric pressure changes. This says that if the other weather factors stay approximately the same, that you will find it optimum to run the same carb jets at sea level and at 4000 feet. (Thanks Carol1 Caudle!) If the humidity increases, it is normal to find the engine will prefer slightly more timing as the humidity increases-probably l/2 deg for every 20% increase in humidity. If we see a corresponding increase in carb air temp, it may be desirable to lean the carb(s) a little bit. The best explanation of air quality (air density for our purposes here) I have seen is in the Dwyer Instrument catalog. A careful study of it will also reveal that it is very unlikely anyone can build a mechanical air density gauge that is reasonably accurate to sell for less than several thousand dollars. There is no absolute correlation between a relative altitude value and the desirable tuning changes. Relative altitude would be meanmgful if you had the ability to change compression ratio for different altitudes.

TUBING AND PIPE

Tubing is always measured on the OD. Pipe is measured on the ID. To measure the tube lengths of a set of headers we suggest you only measure in 6" to 8" increments. Visualizing a 180 degree U bend on the bench, measure down the middle of the U bend. When measuring a header, rotate the header so the section you are measuring is always horizontal. Write down the dimension for each section and then total them up. You should be able to repeat your measurements within 3/8". The Stahl standard is no more than 2-l/2" variation. Most other big name race car headers we've measured vary 4" or more.

We appreciate your comments on any of these articles. Please call or write!

WEATHER MEASURING TOOLS

For 15 years we have experimented at different times with barometers, humidity measuring devices and other such things to the extent that some people would perceive as self abuse. As a result we found most barometers are not accurate enough for engine dynamometer work. Sling psychrometers are not repeatable. If you are satisfied with a tire pressure gauge that produces 3 different values in 5 repeated applications, or a dial indicator that reads a different cam lift each time you rotate the engine, then you'll probably be satisfied with most barometers and using a sling psychrometer. We have found that most wall-mounted round dial type barometers will only track accurately over about a l/2" pressure change and thus the use of a laboratory type wall-mounted absolute mercury barometer is dictated. (Yes Bill, you must use the chart that came with the barometer to correct it for latitude and temperature if you want to do things right. Some people don't.) We made some tests a few years ago using wet-dry bulbs, sling psychrometers, and fans. We found it almost impossible to duplicate readings with a sling psychrometer. Wet bulbs need a certain amount of air to be blown over them in order to get relative evaporation at the wet bulb sock. Once the minimum amount of air was passed over the bulb, it appeared to make little difference if more air was passed over it.

VALVE SPRING LIFE

We'd like to brag a little about our cams. One of our customers ran the same valve springs for years for a total of 80 races in a sprint car and they were only down 15 lbs.

YOTHER TIP

Cecil Yother says rings must be cleaned in lacquer thinner to remove all traces of the identification paints on the ring surfaces.

This issue was due to be mailed on Dec. 1. Needless to say we are late. Perhaps we will be able to get back on schedule with the next issue which is due to be mailed on July 1. Thanks for the kind words we've received.

WET SUMP OIL PANS

Yes, there are still racers who have to run wet sump oil pans. Since we don't have an artist handy or a way to get drawings or pictures into our newsletter yet, we'll leave wet sump pan design alone for this month. However, wet sump oil pans and spark scatter are another subject. Then too, you can have spark scatter with certain ignition distributors. Some years ago we were testing ignition systems on a Winston Cup engine. (What will we call them after Winston quits sponsoring auto racing?) Every time we changed to a super trick unit that required an old 340 hp 327 Corvette distributor with a magnetic pole trigger arrangement, over the GM transistor system that was required by NASCAR, we would pick up 5 to 10 hp depending upon the transistor distributor. As we began to check spark scatter under load on the dyno we found the amount of power change was relative to the amount of spark scatter. Eventually the transistor distributor was fixed and viola, there was no hp difference between the old GM Corvette transistor and our super trick one. Then we checked an MSD and it too made no difference. Wet sump oil pumps cause all kinds of spark scatter. They all have a built-in pressure relief valve. When the oil pressure overcomes the spring pressure, the by-pass valve opens and dumps oil back into the inlet passage. That breaks the siphon on the pickup and interrupts the inlet oil flow. Now the pump is momentarily starved which changes the loading on the gears and the pump driveshaft. The end result is driving the distributor in a jerky fashion. The right way is to check the tnning under load at high rpm. The safe way is to mark the front of the pulley/balancer and lay the timing light on a box/table/bench and watch the timing from the dyno console. Years ago we discovered cam walk on a 331 Pro Stock engine. #6 cyl had 37deg at 4000 rpm, no load, and retarded to 26deg at 7500 full throttle, full load. Needless to say, that discovery resulted in a nice power improvement. If you try to think about the basics that you are trying to accomplish and check to make sure everything is functioning as it is intended, you'll find many so called power increases are really only making the part do what it is intended. I prefer to view it as fixing and not really developing power.

DRIVER FEEL

As with magic, we are all susceptible to illusions. Many drivers relate to how well an engine runs by how big a kick in the back they get after they floor the accelerator pedal. This "kick" is perceived to be power. If an engine comes up on 50 ft lbs of torque l-1/2 sets after the throttle is floored, it feels impressive. The fact that it was not making 50 ft lbs it should have for 1 set is overlooked. 180" headers give the driver more feel of power than conventional headers. In every case we know of, where back to back testing has been done on the same day at the same race track, proper conventional headers put the car around the race track quicker than 180's, although the drivers report "the engine does not feel as good" with the conventional headers. Motorcycle racers talk about the engine "coming on the cam or coming on the pipe", and in spite of all the advances in dynamometer testing and people putting sincere effort into good test procedures we still cannot measure what I call "throttle recovery power" of an engine. Several years ago (1985, before Stahl Cams) a driver, who now a full time Winston Cup driver, was driving a NASCAR modified for one team and a NASCAR Busch Grand National for another. All season the engines in the Busch car were from the same engine builder, who was one of the first two people to use high intake ports. The modified car owner had just switched engine builders to the second of the above two people to use high intake ports. The driver commented that neither engine felt really impressive as they were terribly smooth and that you really didn't realize how much power they had until you realized the power advantage. (He won the Pocono modified race that year.) Most drivers cannot feel the difference between two engines that peak at 7000 with one having 575 hp and the other 625 hp. They can feel the difference between 450 ft lbs and 475 ft lbs at 5500 however. They can tell where the engine starts to pull and where it falls off. This fall off point is usually 800 to 1000 rpm past peak power. For some reason Stahl Cams seem to pull strong from 1250 to 1750 past peak power.

Let us assist you in choosing your camshaft and headers. Call us today!