

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

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September 1990

STAHL HEADERS/CAMS NEWSLETTER

ISSUE #8

APOLOGIES

This is issue #8. The last issue was produced in March 1989. Numerous people have inquired into "what happened". Hey gang...a whole bunch of things as in "stuff" happened, ya know! The after shock of favorably settling a 8 year old court case with some ex-employees. Then I went to a 14 week long course (1 evening p/week) to try to become more of a human being to talk and get along with..(poor results, you can't make silk out of a sows ear). Then I bought a used radar gun, took it to some 1/2 mile races...found out what kind of turn speeds cars are going... went to the dyno and started testing at the respective RPM's and found out that we've been dyno testing 1/2 mile race engines wrong for the past 15 years... that we don't know anything about headers... or what really contributes to make engines run well on 1/2 mile tracks and neither does anyone we've met or talked with. The amount of verbal diarrhea that is spread daily as to what is going on with exhaust systems and engines is a bigger joke than the nation's budget with the Graham/Rudman deficit spending law. It's taken me 9 months to figure out how to handle the knowledge we've gained because it's come

primarily from 1 engine builder who has run over 400 header tests in the past 12 months, with approximately 40 tests contributed by 1 other engine builder and I feel compelled to protect those doing the work. So, I am looking for several others who want to participate. Anyway, we've decided to say this much... if you care to know more, then you'll have to get in a position to send me dyno data on a computer disk. I just can't spend the time looking at a bunch of dyno sheets any more. It's getting too hard to work more than 65 hours a week. After I get the disk, we can discuss what happened and what you have observed. Then, I can make suggestions as to what to do about it and maybe we can both learn more. I'm looking for 3 more engine builders who want to participate in this program. It requires, #1 an open mind, #2 the ability to say "I don't know", #3 a flow bench, and #4 a dyno in a cell that is capable of producing relative testing that can get the test data on a disk in 100 rpm increments. Relative testing does not mean running the engine through 4" truck mufflers, or using outside air that produces 50 degree or colder air temps in February.

STAHL CAMS (717) 846-3123

STAHL HEADERS (717) 846-1632

STAHL HEADERS/CAMS NEWSLETTER QUESTIONNAIRE

Your Name: _____	Specialty: _____
Company _____	Drag Race: _____
Address: _____	Oval Track: _____
_____	Road Race: _____
_____	Other: _____
Phone: _____	Cams Used Most:
_____	Flat Tappet : _____
Flow Bench: _____	Roller : _____
Brand _____ Model _____	<i>Please complete & return to:</i>
Dyno: _____	STAHL HEADERS/CAMS
Brand _____ Model _____	1515 Mt. Rose Ave.
Computer: _____	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***

COMPUTER SOFTWARE

Since the last newsletter we've finished a really neat compression ratio program that does a few other things and sells for \$45.00. We call it COMP2. There is a COMP 1 version available for \$25.00. We have just finished a program using Richard Howell's algorithms from his Monograph on instantaneous torque.... which means it produces torque and power from bore, stroke, rod length, pin offset, # cyls, relative to cyl pressure at tdc. We need to talk with Richard before offering this one for sale. Our rod program is being expanded to include frictional power based on a SAE paper published in 1989. The old version of the Rod angle program sold for \$25.00 and the new version will sell for \$45.00 after it is completed and verified. We still offer our original 1980 flow bench program for \$195 and a dyno program for the same

pride. A programmer we have extensive experience with is working on a program to use with the Cam Doctor. Many Cam Doctor owners have complained to us about the included software and failed promises of delivery of new software. This new program will use data files created by the original Cam Doctor software and will permit displaying on the screen in both EGA and VGA modes, compares up to 20 lobes at the same time on the screen, as well as various reports that make the information relative. At long last you'll be able get the necessary information quickly and painlessly from your Cam Doctor. For the present time, send us your name and address and the programmer will contact you when its ready. I anticipate it to be ready by the end of October.

DYNO DATA

It was 22 years ago that I received my first dyno sheet. Mark Donahue gave me a copy of a dyno sheet for one of the Penske Donahue Trans Am Camaro engines that Traco built. My first live experience with chassis dyno engine testing a high performance engine was in college in 1958. Engine dyno testing started in 1971 and did I ever screw that one up. Fortunately for me, Dick Roberts, ex-Datsun competition director got me headed in the right direction after that first initial fiasco. His initial instructions/direction initiated a search for the truth in dyno testing. If you can visualize yourself as a manufacturer of oil pans, then you should be able to understand that if your product is going to be compared to oil pans made by other people, then all you can ask for is a fair test. In 1980 we wrote our first dyno computer program to assist in making it possible to analyze dyno test results by arranging the data in a fashion that I could work with. My observation during the past 9 years is that very few other people either care enough or are able to analyze data in numerical format. In any event, for the past 11 months I have worked with a Depac data acquisition system attached to a Stuska dyno owned by Kevin Enders from Cazenovia, NY. Kevin has run over 900 tests on 7 different big block Chev 467 engines and 18 different small blocks. Since it only takes 20 seconds to create 2 pages of data, that figures out to 4.44 hrs to create 1600 pieces of paper. It appears that it takes an average of 5 minutes per test to figure out what happened power wise with good computer software. All tests are repeated at least twice and most are repeated 3 times. Thus 900 tests really means approximately 320 different combinations. Of course, warm up time, and labor to change pieces is another subject.

VALVE SPRING COIL BIND

It appears there is some confusion as to how to determine valve spring coil bind. Our suggestion is to measure the widest gap between any two coils. **DO NOT ADD UP THE CLEARANCE BETWEEN COILS.** Some people have a habit of putting springs in a vise and compressing the spring to absolute coil bind under the perception they

are reducing the initial spring load capability. We suggest you **DO NOT UNDER ANY CONDITIONS COMPRESS THE SPRING TO ABSOLUTE COIL BIND.** I am not a metallurgist but I can guarantee such a practice is asking for breakage.

ADVICE

Has anyone ever asked your advice? Did they follow it? You say "not too often." Welcome to the club. All too often when people ask for advice they are really only looking for someone to agree with them. When we offer advice most of us will pick words we think the listener will understand and thus be capable of following the advice. The act of giving advice is passing on conclusive information. This information is the result of all the experiences and thinking the advisor has done relative to the specific subject. The key is "PASSING ON CONCLUSIVE KNOWLEDGE" which is passing on the CONCLUSIONS and not all the reasons behind making the conclusions. Unfortunately, very few of us will do something we do not understand the WHY or the NEED for following the advice. I am beginning to think the first question to ask, when asked for advice, is, "Will you give me your word that you will follow the advice even if you do not understand the need for doing it?" For example, suppose a person asks you "What compression ratio should my street driven 1980 small block pick up truck have?" You ask, "carburetor or injection, do you tow anything?" The answer is carburetor and a 3000 lb house trailer sometimes. You tell him, 8.7 to 1 for 87 octane fuel. So the guy reads someplace about a street engine with a compression ratio of 10.5 and he decides to set his at 10.7. We both know what his results will be. In Sept. of 1978 I spent several hours trying to convince a well known funny car racer to build a fuel flow test bench. He finally got around to having someone do fuel flow work for him in 1986. He did not do it in 1978 because he did not understand the need for doing it.

Advice is seldom welcome and those who need it the most, like it the least.

Lord Chesterfield

ROCKER ARM RATIO

Danny Jessel leaned on me last year to look at rocker arm ratios. Now that we've got computer software to let us see what happens when and where... we can only say Danny is correct and his rocker arm business should increase because of the incredible tuning you can achieve with rocker arms ratios **IF YOU START OUT WITH THE RIGHT CAM** and a cylinder head with a proper flow curve shape. A rocker arm ratio change will increase the effective valve area in a fashion that is not possible to achieve with cam design in a push rod engine. However, don't lose sight that what really counts is the airflow the cylinder sees at relative piston positions. Today that control of air flow is more a result of the flow characteristics of a cylinder head than camshaft. In 1974 we did a study of 6 different lobes with advertised 1.5, 1.6, 1.65 ratio rockers. Although we know that study was not accurate, we could see pictures when we graphed the results on 20 square p/inch paper using 1 square p/degree of duration and 1 square p/.002 lift. We have recently completed what is probably the most complete and comprehensive computer program of its type in existence. It permits us to analyze absolutely every aspect from area under the curve or part of the curve, duration, and timing. It permits the use of any rocker arm ratio with valve lash for multiplication purposes, to change lobe centers, combine with air flow data as produced from a flow bench, put all the data in perspective relative to piston position and change the factors that control piston position. We can predict the valve notch depth and see the requirements change when we change lobe centers. Because we can now see what is happening, it appears that a great deal of the effort that has been put into cylinder head development **HAS NOT BEEN FOCUSED** on the **RELATIVE VALVE LIFT AREAS** where things are happening. Many cams will not tolerate use of higher ratio rockers without causing valve train reliability problems. Most Stahl cams will live fine in oval track and road racing applications with 1.7 rockers to over 8400 and 7900 w/1.8 rockers. Just make sure you have sufficient coil clearance in the valve springs. We suggest a minimum of .100 clearance to coil bind and no less than .060.

NEW DYNO MODEL

We recently learned that Superflow has come out with a less expensive model called a SF-1. A Superflow sales rep explained to us the intent was to provide a stripped down SF1 to permit people to get into a dynamometer for less initial start-up expense and be able to expand into a fully equipped system with data acquisition etc. as the budget permits. We feel that anyone building oval track engines should seriously consider purchasing one of these brakes if you are prepared to add a separate data acquisition system, and make up a bell housing extension to permit use of vehicle headers.

ANTI DETONATION DETECTOR

Jerry Dorman Racing Engines offers a detonation sensing device and meter that we urge all engine builders to purchase. We have first hand experience with the device and find it really works well on the engines we have tried it on. Available from Jerry Dorman 805-238-6461 or Diamond Racing Engines.

DYNO - CAR HEADERS

If you build race engines in a competitive environment then we cannot emphasize strongly enough the necessity of using the vehicle headers installed on the engine in the normal direction using collector extensions or tailpipes and/or mufflers in exactly the same length and location dimensions as on the race car. We have over 400 header tests done over the past year on my computer and you would not believe what we have learned. The engine exhaust system must exit into a dyno exhaust system which must have at least five (5) times the cross sectional area of the collector/tailpipe and cannot be sealed. I continually am confronted by people running engines with the headers installed backwards, the headers on the dyno having no similarity to the race car headers, the engine exhaust sealed to the dyno exhaust and in the majority of cases the dyno exhaust is far too small.

There is hardly anything in the world that some man cannot make a little worse and sell a little cheaper. *John Ruskin*