

[■] TECH STOP

RACING & HIGHWAY FUELS: REALITIES AND POLITICS

SAFETY: Racing fuels by design are flammable. Fuel suppliers, the Fire Department, OSHA, and Highway Patrol are examples of agencies that provide recommended safety practices for handling and storage of fuels. In any of the fuel handling or usage cases discussed in this publication, safe practices from reputable safety information sources must be followed.

by Robert Szabo

To most people, all of the pizzazz in an IHRA drag race operation is the car, the driver, owner and crew. We take for granted the physical science of that liquid in the fuel tank. My current project is a book about methanol. It has become all-consuming and I am learning more about the pizzazz that is locked in many fuel tanks as a result.

NEW METHANOL / ETHANOL ENGINE TECHNOLOGY: (A) Engine design technology exists with methanol and ethanol fuels that provide the kind or mileage that diesels provide. The engines use exhaust gas recirculation and have very high compression. (B) Engine technology also exists with methanol and ethanol that may provide power levels approaching that from nitromethane. These combinations also have high static compression with forced induction, aftercooling and special fuel control.

FUEL REALITIES

UNDER THE RULES: The current racing rules limit some of this advanced technology in most classes. For example, aftercooling is not used in Funnycar, Pro Mod or Top Fuel. Exhaust gas recirculation is invariably disconnected from any drag race Stocker that was originally equipped with it. The modification increases the performance with conventional tuning practices and engine designs.

Current racing rules do limit technological advances in some cases. However, just regarding methanol and my book research, I am developing information for performance improvement within existing rules also. Much of that is tuning with accurate air to fuel ratios and improved combustion. Fuel mapping will be discussed in the book. Some other advances are in the ignition method. Several top methanol performers have already discovered advances. Most were through a lot of experience, hard work, and good decisions made for engine components selection. Written references such as a methanol book can help increase the information base for other competitors as well.

BACKGROUND EXPERIENCE AND INFORMATION: As a drag racer, I have an experience base with methanol. As a technical writer, I have also spent months researching technical information about the fuel. The ethanol alternative keeps showing up in much of the methanol informational sources that were encountered.

FUEL POLITICS

TECHNOLOGICAL COMFORT: My methanol book research so far reveals to me that the world does not have a technological problem of alternative fuels. The methods for supplementing our oil-based economy with these alternatives are well developed. The methods for replacement of oil-based fuels in some applications are also well-developed.

MOMENTUM PROBLEM: We do have problems of industry and consumer momentums. That is a nice way of saying politics. We are set up for doing most everything with oil-based fuels. Consumers are accustomed to the attributes of that setup. For example, most of us own vehicles designed for unleaded pump gasoline or diesel. We are accustomed to the good mileage that a gasoline or diesel engine produces which is outstanding with current engine designs for the power output and weight of vehicles. Many alternative fuels in current engine designs cannot compare to that mileage. Yet, special engine designs with very high compression and special fuel control, for example, can yield economical methanol or ethanol fuel engines with comparable efficiency.

SUPPLEMENT AND REPLACEMENT: If a crisis was to occur and oil based fuel supplies became limited, we could switch to alternative based supplements with little technical difficulty. Alternative fuels could replace oil-based fuels completely in some cases, in the short run, and many more cases in the long-run where fuel suppliers were established and engine designs were optimized.

IHRA MODEL

THE DRAG RACING PROVEN STANDARD: Here is where IHRA drag racing pops up as a model. Already engine designs for alternative fuels are established and optimized. Methanol, ethanol, and nitromethane are alternative fuels used in many IHRA drag race classes. While leaded gasoline and unleaded gasoline are the baselines in most of the classes, unleaded gasoline will also remain the baseline in much of our economy.

IHRA drag racing is establishing a benchmark for success with alternative fuels. We rely on the standby, gasoline or diesel, to get us there. Some of us race with gasoline. Some of us race with alternative fuels. Drag racing is one successful model for alternative fuels as supplements. In a typical IHRA event, drag race cars all total a couple hundred miles of quarter or eighth mile racing. Of that total drag race car mileage, I estimate 10% or more is done with alternative fuels.

As racers who are entrenched in this successful and working model, we have a fuel politics advantage. We know it works. Sharing that experience with neighbors and friends can take the edge out of the news media hype that we have an energy crisis with no known cure. Drag racing is an unrecognized model of success for the world energy crisis. What would Congress discuss at the next energy conference if

several congressional people and cabinet members went to an IHRA event the week-end before? They would see alternative fuel supplements in a successful model. While engine designs for highway use would change, the model would not.

FUEL REALITIES

METHANOL: Back to the methanol book project. It has become all-consuming because of the disagreement between references. I select a physical property such as octane to write about, and I find different ratings from different sources. For a racer, that is usually ignored as long as a pre-ignition or detonation problem does not occur. For successful tuning of methanol, the disagreement probable can be ignored as long as the methanol supplier is a known reliable source like TORCO.

Methanol is a mono-liquid. Methanol readily absorbs moisture. Superior handling and storage practices from fuel suppliers to avoid moisture contamination are vital. If it passes IHRA's fuel check, there is not much that can differ from one batch to another. Purity is the key with methanol. There is no blend with different liquids with different properties such as there is with gasoline.

However, for a book writer, disagreement between reputable sources may not be good for the information base that goes into a technical publication. For example, some of the technical information from US government agencies about methanol fuel differs from information from industrial sources. Some industrial source information differs from other industrial sources. As an author, I have the responsibility to investigate differences in references. If I am lucky, I can figure out the truth and report it where it has bearing on racing performance, reliability, or safety. Racing readers will learn the truth from a technical publication, incorporate that part of the knowledge that is valuable to their racing operation, race, and be more successful. An understanding of octane rating and the ways to avoid problems from pre-ignition or detonation will help provide a performance edge. Racers do not have to pull their hair out deciphering the disagreement in various references.

Methanol burns at 6.5 parts of air to one part of methanol. Racing setups use a lot richer amount of methanol than that for pre-ignition and detonation control.

NITROMETHANE: Nitromethane has a similar advantage as methanol. It is a mono-liquid. If it passes the IHRA fuel check and is from a reputable fuel supplier, there is not much that can be wrong with it. A fuel drum of nitromethane is also not a blend of different liquids.

NITROMETHANE METHANOL BLEND: Nitromethane is blended with methanol in proportions of 90% in Top Fuel with 60 GPM fuel pumps; or 85% in Top Fuel with 90+ GPM fuel pumps. Note that the blend with methanol dictates fuel system components in the setup. Most racers have figured this out. They contributed to the world knowledge base from their racing experience. Bigger fuel pumps are needed with 85% for peak TORQUE air to fuel ratio.

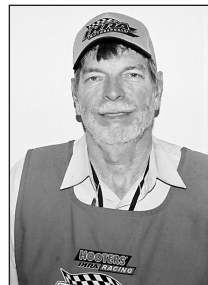
Nitromethane 85% methanol 15% burns at about 1.9 parts of air to one part of fuel. Racing setups for this application also use a lot richer amount of fuel for cooling, pre-ignition, and detonation control.

GASOLINE: Gasoline is significantly different than methanol or nitromethane as far as simplicity of liquid. Gasoline is a blend of several petroleum industry liquids. That fact provides both advantages and disadvantages to the fuel.

Racing gasoline blends include liquids with good properties for starting as well as good properties for control over pre-ignition and detonation. Blends at the pump are modified for the season of the year. Regions with colder seasons are supplied with appropriate gasoline blends for better cold weather starting. Regions with hotter seasons are supplied with appropriate gasoline blends for better resistance to vapor lock.

The big variable with gasoline is octane characteristic. Off highway applications in the USA use lead additives to meet high-octane requirements for racing high compression engines. In highway applications, unleaded gasoline blends are necessary. For high-octane highway applications, ethanol and other non-leaded additives are often used in proportions of up to 10% with 90% gasoline.

Gasoline burns at about 15 parts of air to one part of fuel. And it is also run a lot richer in racing setups as the other fuels.



Bob Szabo is a racecar book author and drag racecar driver / owner. His current book "Fuel Injection Racing Secrets" is all about mechanical fuel injection used throughout IHRA drag racing. Fuels discussed in this article are covered as well. Bob is currently working on a new publication about racing with METHANOL. For book ordering information, check the DRM Yellow Pages for his Fuel Injection Racing Secrets listing under S's (for Szabo) or look on the Internet at <http://www.racecar-book.com> or call (707) 446 2917.

**SCHEDULE C
(Form 1040)**

Profit or Loss From Business

(Sole Proprietorship)

OMB No. 1545-0045

2005

Attachment
Sequence No. **09**

Department of the Treasury
Internal Revenue Service (IRS)

Partnerships, joint ventures, etc., must file Form 1065 or 1065-B.

Attach to Form 1040 or 1041. See instructions for Schedule C (Form 1040).

Name of proprietor		Social security number (SSN)
A Principal business or profession, including product or service (see page C-2 of the instructions)		B Enter code from pages C-8, 9, & 10
C Business name. If no separate business name, leave blank.		D Employer ID number (EIN), if any
E Business address (including suite or room no.) City, town or post office, state, and ZIP code		
F Accounting method: (1) <input type="checkbox"/> Cash (2) <input type="checkbox"/> Accrual (3) <input type="checkbox"/> Other (specify)		
G Did you "materially participate" in the operation of this business during 2005? If "No," see page C-3 for limit on losses <input type="checkbox"/> Yes <input type="checkbox"/> No		
H If you started or acquired this business during 2005, check here <input type="checkbox"/>		

Part I Income

1 Gross receipts or sales. Caution: If this income was reported to you on Form W-2 and the "Statutory employee" box on that form was checked, see page C-3 and check here <input type="checkbox"/>	1		
2 Returns and allowances	2		
3 Subtract line 2 from line 1	3		
4 Cost of goods sold (from line 42 on page 2)	4		
5 Gross profit. Subtract line 4 from line 3.	5		
6 Other income, including Federal and state gasoline or fuel tax credit or refund (see page C-3)	6		
7 Gross income. Add lines 5 and 6	7		

Part II Expenses. Enter expenses for business use of your home **only** on line 30.

8 Advertising	8			18 Office expense	18		
9 Car and truck expenses (see page C-3)	9			19 Pension and profit-sharing plans	19		
10 Commissions and fees	10			20 Rent or lease (see page C-6):			
11 Contract labor (see page C-4)	11			a Vehicles, machinery, and equipment	20a		
12 Depletion	12			b Other business property	20b		
13 Depreciation and section 179 expense deduction (not included in Part III) (see page C-4)	13			21 Repairs and maintenance	21		
14 Employee benefit programs (other than on line 16)	14			22 Supplies (not included in Part III)	22		
15 Insurance (other than health)	15			23 Taxes and licenses	23		
16 Interest:				24 Travel, meals, and entertainment:			
a Mortgage (paid to banks, etc.)	16a			a Travel	24a		
b Other	16b			b Deductible meals and entertainment (see page C-6)	24b		
17 Legal and professional services	17			25 Utilities	25		
				26 Wages (less employment credits)	26		
				27 Other expenses (from line 40 on page 2)	27		
28 Total expenses before expenses for business use of home. Add lines 8 through 27 in columns					28		
29 Tentative profit (loss). Subtract line 28 from line 7					29		
30 Expenses for business use of your home. Attach Form 8829					30		
31 Net profit or (loss). Subtract line 30 from line 29.					31		
• If a profit, enter on Form 1040, line 12, and also on Schedule SE, line 2 (statutory employees, see page C-6). Estates and trusts, enter on Form 1041, line 3.							
• If a loss, you must go to line 32.							
32 If you have a loss, check the box that describes your investment in this activity (see page C-6).							
• If you checked 32a, enter the loss on Form 1040, line 12, and also on Schedule SE, line 2 (statutory employees, see page C-6). Estates and trusts, enter on Form 1041, line 3.						32a <input type="checkbox"/> All investment is at risk.	
• If you checked 32b, you must attach Form 8198. Your loss may be limited.						32b <input type="checkbox"/> Some investment is not at risk.	