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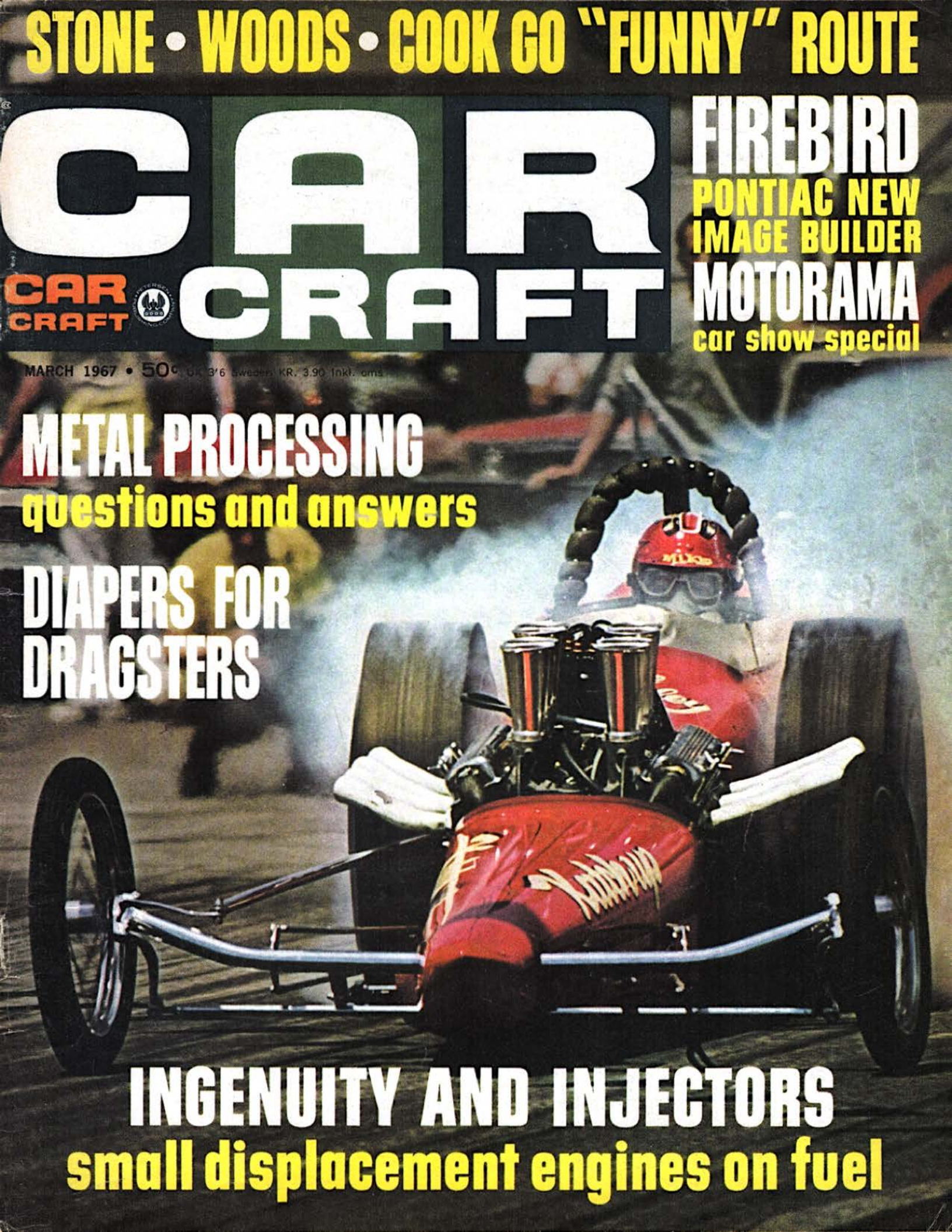
DIAPERS FOR
DRAGSTERS



INGENUITY AND INJECTORS
small displacement engines on fuel

'66 NHRA Winternationals, Pomona, Calif.—Shirley "Drag-On Lady" Shahan, in her specially prepared Hemi-Belvedere, shut down all stocks to become the first "Mrs. Stock Eliminator."

'66 NHRA Springnationals, Bristol, Tenn.—Jere Stahl, in a specially prepared Hemi-Belvedere, blew off everybody in A/S, then went on to take Top Stock Eliminator.

We'd like to thank our competition. For showing up.

Let's just say 1966 was a very good year. For Plymouth, that is. And if you don't believe us, ask the man who didn't own one; he finished second a lot. Which, in a drag race, is about as low as you can get. Too bad, fella. But thanks for showing up.

Moral: Buy The Boss—Belvedere GTX. 440 cubes, standard; 426 Hemi, optional. For street or strip. You'll never love another. Hear us: Plymouth is out to win.

Plymouth

'66 NHRA Summernationals, Indy.—Jere Stahl and said Plymouth did it again, walking away with Top Stock Eliminator (i.e., if you can call an 11.73 ET walking.)

'66 NHRA World Championship Finals, Tulsa—Make that three in a row for ol' Jere, as he and his Plymouth took Top Stock for the third time in one season!

PLYMOUTH DIVISION CHRYSLER MOTORS CORPORATION

In 1966, Fram Filter equipped cars were first at: Daytona 500, Sebring, Trenton, Phoenix, Firecracker 400, Atlanta 400, Darlington, St. Jovite, Bridgehampton, Mosport, Charlotte, Riverside, Rockingham, Las Vegas, and Nassau... and on top of all that, Fram filters were on all 33 starters at the Indianapolis 500.

The same precision engineered filters that protect these championship cars are available wherever Fram filters are sold. Your car deserves the same protection... Fram performance proven filters. They work on the track. They work on the road.

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CAR CRAFT

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THE AUTOMOTIVE GO & SHOW MAGAZINE

FEATURES

DEPARTMENTS

COST OF FOREIGN SUBSCRIPTIONS

Country	One Year
Great Britain	2.2.9
Australia-$	5.342
New Zealand	2.2.11
Denmark-krone	41.27
Sweden-krona	30.93
Holland-guild	21.68
Mexico-peso	74.72
Japan-yen	2,166.06
So. Africa-rand	4.268

COVER

An exciting new class of drag racing competition is developing around the country — small displacement engines running injectors and heavy loads of nitro. Mike Quigley's "Ketch-up" is our cover car as we introduce you to this new International Fuel Formula.

CAR CRAFT ACTION SHOWCASE

Night fuel racing at Lion's Drag Strip.
Photo by Pat Brollier

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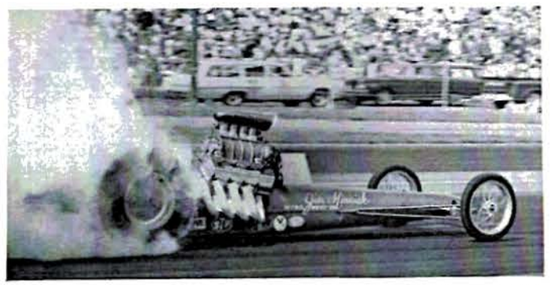
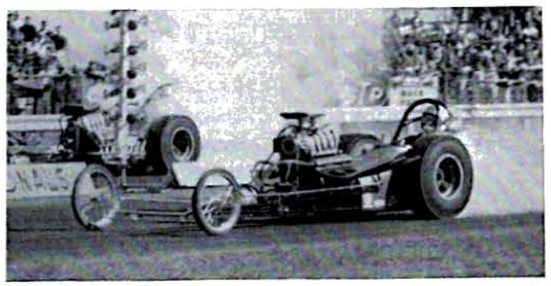
The cars sparked by Champion <u>again</u> rule the Nationals—with a 7 out of 7 sweep!

Year after year, Champion-sparked cars have dominated the NHRA Nationals — biggest drag meet of all! This year that record got a "banzai" backup when every Eliminator title went to a car wearing the red and black "bow tie" decal that says it's equipped with Champions!



TOP GAS: Final run brings 1965 World Points Champion Jim Minnick, in his Dodge-powered, Champion-sparked rail, up against the AA/D class winner, John Reed, in a Champion-fired Chrysler. Reed rolls early, catching the big red eye, and Minnick, who had earlier turned an 8.246 E.T. at 186.72 mph, coasts to victory.

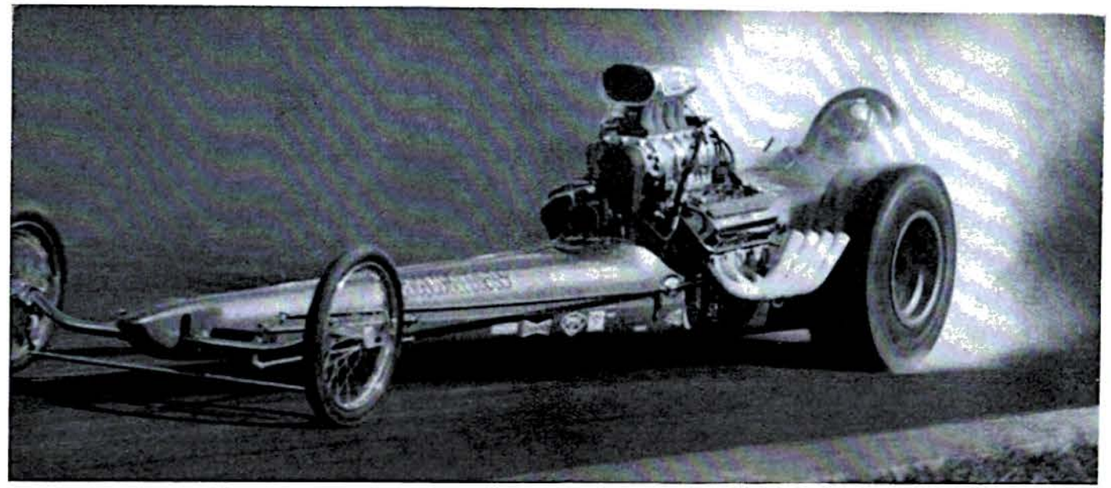
TOP STOCK: History repeats itself as Bristol finalists Jere Stahl and Bill Jenkins stage for Top Stock honors. It's close all the way! Jenkins' Champion-sparked Chevy II charges to 118.11 mph in 11.76 seconds, with Stahl's Champion-sparked Plymouth blasting out a 119.68-mph run in 11.73 seconds for the win!



SUPER ELIMINATOR: Victory in the tough "Blower Bracket" is won by Jim Mehalik, in a Champion-sparked, Chevrolet-powered BB/Gas Dragster. Mehalik's winning numbers are 9.236 seconds and 154.63 mph.

COMPETITION ELIMINATOR: Funny car fans cheer loudly as Competition bracket is dominated by Gene Snow's Champion-sparked, injected Dodge, "Rambunctious." Snow's dynamic Dodge wins the title at 153.06 mph in 9.043!

TOP SPEED—LOW E.T. Champion-sparked cars also took these two major marks. The Chrysler-powered rail of Marshall & Vermillia hit 218.46 mph, and the Ramchargers' Dodge blasts off a run of 7.31 seconds!



TOP FUEL: It's the second straight Nationals' win for the Hawaiian! Roland Leong's Chrysler-powered blue bomb, tuned by Keith Black and driven by Mike Snively, won AA/FD class, and then lined up against the Champion-sparked rail of Danny Ongais in a run that will long be remembered. Both cars made banzai blasts, with Snively bringing the Hawaiian to victory in 7.321 seconds at 215.83 mph!

STREET ELIMINATOR: It's a pair of Champion-sparked, Chevy-powered sportsters for the final go in Street. Richard Moroso, winner of D/MSp, faces 1964 Street Eliminator Joe Lunati, winner of A/MSp. Lunati's "Trouble Maker" overcomes the handicap and scores the win with a charge clocked at 10.244 and 133.53 mph!

JUNIOR STOCK: This popular bracket brings yet another pair of Champion-sparked runners to the line for the final. Ernie Musser, winner of D/S in a Corvette, faces Dave Kempton's C/SA-winning Plymouth. In one of the closest handicap races of the whole meet, Kempton and his Plymouth take the win in 13.08 seconds at 108.17 mph!

CHAMPION-SPARKED CLASS WINNERS AT 1966 NHRA NATIONALS

CLASS	NAME	ENGINE	CLASS	NAME	ENGINE
AA/FD	Mike Snively	Chrysler	A/S	Arlen Vanke	Plymouth
CC/FD	Joe Davis	Chevrolet	B/S	Tom Kerr	Chevrolet
A/FD	Mike Bennett	Chevrolet	C/S	Loyed Woodland	Oldsmobile
B/FD	Dick Kalivoda	DeSoto	D/S	Ernie Musser	Chevrolet
C/FD	Gene Snow	Dodge	E/S	David Hughes	Chevrolet
D/FD	Stan Lomelino	Ford	F/S	Tom Rambo	Chevrolet
AA/D	John Reed	Chrysler	G/S	Pete Preston	Chevrolet
BB/D	Jim Mehalik	Chevrolet	H/S	Ogles-Cox	Chevrolet
A/D	Walt Weney	Chevrolet	I/S	William Osborn	Chevrolet
C/D	Joseph Tomaso	Chevrolet	K/S	Cox-Jenkins	Chevrolet
D/D	Stanton-Freeman	Chevrolet	L/S	Wayne Wellhousen	Chevrolet
A/G	Richard Weinle	Anglia	M/S	Ken Wilkerson	Willys
B/G	Ron Hassel	Chevrolet	N/S	Ted Harbit	Plymouth
C/G	Taylor-Carroll	Chevrolet	O/S	Sam Stockwell	Oldsmobile
D/G	Harry Luzader	Chevrolet	S/SA	Joe Smith—Fenner Tubbs	Plymouth
E/G	Gene Schwartz	Chevrolet	B/SA	Abraham-Vanke	Plymouth
F/G	Gene Moody	Chevrolet	C/SA	Dave Kempton	Plymouth
H/G	Ehrmann-Overholt	Chevrolet	E/SA	Ralph Hardt	Pontiac
AA/C	Al Bergler	Chrysler	G/SA	Arlen Vanke	Plymouth
A/C	Dale Funk	Plymouth	H/SA	Douglas Clark	Chevrolet
B/C	J. Leo Collins	Chevrolet	J/SA	Dick Lawrence	Chevrolet
AA/A	Stan Bowman	Chrysler	A/MP	Fred Shallcross	Chevrolet
BB/A	Glen Gregory	Chevrolet	B/MP	Ozoroski-Mosteller-Smoyer	Chevrolet
A/A	Orner Brothers	Chevrolet	D/MP	Hass-Westphal	Chevrolet
D/A	Charles Seabrook II	Buick	E/MP	James Tackett	Chevrolet
AA/SR	Hugh Tucker	Chrysler	F/MP	Pete McNicholl	Dodge
A/SR	Jim Parsons	Dodge	B/Sp	Jim Ryan	Corvette
B/SR	Howie Nye	Chevrolet	D/Sp	Judy Lilly	Corvette
C/SR	Jan Riedel	Chevrolet	AAM/Sp	Guzman-Ward	Chevrolet
B/XS	Buckeye-Vernon	Plymouth	B/MSp	Bob Schaefer	Corvette
C/XS	Thomas Tignanelli	Plymouth	C/MSp	Sterling-Thropp	Corvette
D/XS	Dick Hankinson	Dodge	D/MSp	Richard Moroso	Chevrolet
S/S	Ed Miller	Plymouth			

1966 marked the eighth straight year that Champion-sparked cars have dominated the annual Big Go—the NHRA Nationals. And this year the Champion-sparked victory was greater than ever, with 65 class wins and all 7 Eliminators! It's more proof that Champions deliver super-good performance—in <u>every</u> make of engine! So next time it's spark plug time—get the plugs the winners use. Get Champion spark plugs.

DEPENDABLE CHAMPION SPARK PLUGS
CHAMPION
SPARK PLUG COMPANY
TOLEDO, OHIO 43601

Hid's Funny Fuelers

The other day I picked up your magazine at a drug store and began looking through it. At first I noticed your coverage on the NHRA Nationals. I noticed this because I had attended them. Your coverage on the event was great, especially for me since it brought back many pleasant memories. But this is not the reason for my writing you. On Page 36-37 "Would you believe... These Funny Fuelers?" photos by Hid Takano is what I am interested in. I took photos at the Nationals but they were nothing like his. His shots in black and white make my color slides, which are quite good, look like I had better give up. The only question I have is how did he do it? Was it the lens, film or what? I would very much appreciate it if you would tell me how he did it. In March, I plan to go to the Bakersfield fuel meet. The trip would be doubly enjoyable if I could get shots like Hid did.

Phillip Kalinowski
Chicago, Illinois

We hate to disillusion you, Phil, but Hid did it all in his magic darkroom by distorting the printing paper. We agree, he does a terrific job and there's more in this issue on pages 34-35. And just wait until you see what's coming in the future.

Old Man River

I recently saw a photograph of the Hurst "Hemi-Under-Glass" and it was a '66 Barracuda. Then I noticed the advertisement for Hurst products. This was the same Hemi but it was different. The picture showed a '65 'Cuda. What gives? Did Hurst make a new front end or a new car?

Your mag is a gas. It has the best features and centerspreads I've ever seen. Keep 'em coming.

HOWARD LEVINE
Newton, Mass.

Not only did the Hurst crew up-date their original Barracuda to '65 specifications, this amazing car now has a '67 appearance. Like Old Man River, it seems to just keep rolling along — or should we say wheelstanding along. In fact, we understand the "Hemi-Under-Glass" is booked solid for the '67 season, in addition to numerous special appearances scheduled for military installations and hospitals. If you like really wild centerspreads, feast your eyes on Lou Baney's sensational Brand Motors Ford AA/FD in this issue. — Ed.

Lots of Luck

I am on my way to Viet Nam with the U.S. Army, but hope to keep reading your fine magazine. Will be looking forward to the "Build A Hot Rod Series." Would like to see some articles on Modified Production class cars. I have an A/MP Pontiac in the making. Keep up the good work.

STEVE FARRINGTON
Viet Nam

Best of luck on your Viet Nam tour, Steve, and we certainly hope you can put your hands on CC each month, and that our "Build A Rod Series" will give you a few hours of off-duty enjoyment. — Ed.

Problem — East Coast

I want to tell you that I think your magazine is great. I've been reading it for several years. I love your center folds, great photography. The main reason I am writing is to ask if there is anything the NHRA or anybody can do about the situation in Mass. As far as I know the only strip in the state is Orange Drag Strip, which is a full time air strip and is opened up for drags once a month. The strip is rather rough, so none of the big boys show up.

The nearest strips in this area are New York National (90 miles), Connecticut Dragway (100 miles) or Rhode Island. Don't worry, there are plenty of rigs in this area but we have a long way to travel to go to a decent strip. I hope you can give me some information on how to get someone on the ball here.

GARY CLARK
Northfield, Mass.

Back in 1954, NHRA sent a Safety Safari around the country explaining the benefits of organized drag racing to civic clubs and law enforcement agencies in dozens of cities. One of the first meets they held was at Orange, Mass. Perhaps there is still need for a Safety Safari 1967-style. — Ed.

Problem — West Coast

I've read your magazine steadily for quite some time and enjoy every issue. There's a problem here in our valley that we thought you or some of your readers might be interested in.

We have a brand new drag strip — Palmdale International Raceway — in our valley that was used for one season then closed down. It's a great strip with ideal conditions and a giant size padlock on the closed gates. There are many, many people in this large valley that love drag racing but have no close strip to run on since they closed Palmdale Raceway.

Personally, I find this closed strip an injustice to drag racing. I wish I could find someone to do something about it. It almost makes a fellow sick to see only the wind running the quarter-mile when us drag nuts could be putting this great strip to good use. Can anyone do anything about this? Let's put the rubber back on the strip and not on the street.

MIKE WORTHINGTON
Lancaster, Calif.

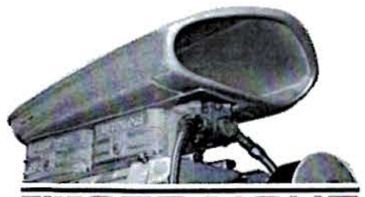
It looks like there are still drag racing problems from coast to coast, Mike. It's a shame you can't pick up the Palmdale strip and ship it back to Gary Clark and the guys in Northfield, Mass. Obviously, the Palmdale situation revolves around a commercial operation with its subsequent money problems. I agree, it's a shame that some civic organization or group couldn't take it over and run it strictly for "kicks" type drag racing like we had back in the good old days — a minimum of production and a maximum of racing. — Ed.

Dream Come True

I have a body of a 1923 Ford "T-bucket" that I found in the woods of New Hampshire. It has been there since 1935 and is in solid form. It has a little rot on the under part where it was sitting in the dirt. It also is covered with surface rust but is still solid. Do you think I should use it or would I be wasting my time trying to fix it? If you think it is useful, how would I remove the rust? Another problem is this, what would I use as a chassis to make it into a rod? This is my first attempt at building a rod, but I am determined. Do you think I am doing the right thing?

DAVE PARSONS
Danvers, Mass.

Don't make too much noise, Dave, you'll be invaded by car nuts. Every hot rodder yearns to have a '23 "T," so if you found one consider yourself in favor with the gods. There are numerous chemical solutions available that will remove the rust. For a chassis, try any of the commercial builders, or even try your hand at a tube frame. You'll find all the answers in our forthcoming series on "How to Build a Street Rod." Lots of luck and when it's finished send us a photograph. — Ed.



THE STRAIGHT SCOOP

ONE OF THE WILDEST rumors to hit Detroit in some time is that Chevrolet is planning to bring out a hemi head engine sometime during 1967. Wild as it is, the word from Motor City insiders is that this rumor is not a rumor, but for real. Word also is that Pontiac is all tooled up and ready to break loose with an overhead cam 428 cubic inch power plant. The Pontiac people are said to be just waiting for Chevrolet to turn loose the hemi head. Then, if the folks at Chevy aren't struck by lightning bolts hurled from the Executive Suite of the General Motors building, Pontiac will go with its hot new mill. It could happen.

WILL DON PRUDHOMME become the latest dragster driver to get behind a big overhead cam Ford engine? That's the latest rumor, and there may be quite a bit to back it up. Word is that Prudhomme, winner of the NHRA Winternationals and Nationals in 1965, will replace Tom McEwen at the helm of Lou Baney's Brand Motors Ford AA/FD. McEwen recently split with Baney, and is no longer driving the car, which just recently got Ford power. About the same time, Prudhomme put his own rail up for sale.

IF THERE ARE ANY Buick fans around, here is some good news for them. You're going to have a hot funny car to cheer for. Ron Pelligrini is going to campaign a Buick Gran Sport tube frame, glass bodied car complete with supercharged engine. Major building of the car is being done by Jay Howell's Automotive Engineering. The Howell shop, incidentally, is one of the busiest of the busy funny car builders. Jay has just completed a '67 tube frame fiberglass Barracuda for "Kingfish" Bill Taylor. Other recent cars being built by Howell's Automotive Engineering include an altered wheelbase, glass bodied GTO with a 428 injected Pontiac engine, for Tom Dempsey of Chicago, and a glass bodied, tube chassis Camaro with a 427 injected Chevy engine for Bud Richter, of Algonquin, Illinois.

HOUSTON PLATT will campaign this year with an ultra light, tube frame fiberglass Camaro powered by a 427 cubic inch injected Chevrolet engine. This car will have some surprising features on it. Look for a full story on it in CAR CRAFT in the near future.

THE GROWING popularity of funny cars has reached even to that haven of the fuel dragsters, the big meet at Bakersfield. This coming Bakersfield event will have a big field of funnies in competition in addition to the fleet of fuel dragsters that has made the Bakersfield meet famous. There will be five funny car classes and one overall "Funny Eliminator" decided, in addition, of course, to the big Top Fuel Eliminator win. Total cash prizes for the meet are expected to top the $25,000 mark this year.

CHEVROLET ENGINES ARE getting quite popular for the "competition class" drag cars, especially the new 396 and 427 engines. That's the report from Jim Cavallero of Detroit's Dynamic Engine, one of the country's top race engine builders. Cavallero reports that he is going to retire his own Chevy powered A/F dragster, class winner at the Nationals this year, because of a lack of time due to both growing family and growing engine business. He says the injected Chevy engine from the dragster may go into a new AA/F Altered, being built by Gary Koehler for the new NHRA Fuel Altered classes. Mike Bennett, who drove the Cavallero dragster, would do the driving on the new fuel altered, which is aimed at breaking the "8.50 barrier," according to Cavallero.

A COUPLE OF THE nation's top gas class racers are reported building new cars for the 1967 season. "Ohio George" Montgomery, perennial winner of A/GS class at the Nationals, is said to be building a fiberglass Mustang for the supercharged gas classes. One of his biggest long time rivals, "Big John" Mazmanian, is also said to be building a new car.

WORD OF A REALLY WILD new car has leaked out of Detroit despite efforts of the folks at Ford to keep it super-hushed. Depending on who you talk to, it's either a super-light funny car, or a rail dragster with a transmission. If it ends up a funny car, it will carry a Mustang body. Piecing together several reports, this much has been learned. It has an injected, supercharged Ford OHC engine. It weighs about 1500 pounds. The body, if there is one, will scale at about 100 pounds. In tests it has already gone 200 mph and in the seven-second bracket. Possible drivers for the car are said to be either Connie Kalitta or Hubert Platt. Kalitta and Pete Robinson are said to have been the test drivers. One report said that fantastic ET's were recorded even without the blower, just using injection. The transmission, incidentally, is an automatic. STRAIGHT SCOOP will keep you posted as more is learned about this wild new machine.

DRAGSTER DRIVER Tom Hoover is the latest to get an overhead cam Ford engine for his fuel dragster. This raises the total of "Powered by Ford" rails to five. A source at Ford reports that there may be a Ford-powered AA/Gas Dragster hitting the strips before long.

ANY REPORTS that Plymouth is going to put the hemi engine in the Barracuda are just not true, according to a factory official who knows. At least, not at this time. There are quite a few dealers who will be building hemi Barracuda's, however. One of these is Sites Brothers, of Kansas City.

DRAG RACING RULES have been changing right and left lately, which is one reason the factories have been slow to finalize their plans for 1967. But Chrysler Corporation now has its plans made and its goals set. They are going to forget the funnies and concentrate their attention on racing the kind of cars they can sell. The street hemi's will get the most attention, but Dodges and Plymouths with the 440 engine will also be featured, as will Darts and Barracudas with the 383-4-barrel engines. As one factory spokesman said recently, "The funny cars are getting too far away from what we sell. The guys pile into their GTO's and drive out to the strip to watch the Ford and Mercury funny cars battle the MoPar funny cars. We want more of that GTO type business." But if you are a funny car fan, don't worry. There will be plenty of non-factory funny cars around this year.

BUTCH LEAL, the "California Flash," will be campaigning in a new Barracuda funny car with a new Logghe chassis out of Detroit. No other details are available on the car at this time.

DETROIT'S LOGGHE Stamping Company has one of the busiest automobile divisions of any company in the funny car field. Several jobs are going through the Logghe shop, including the three new Mercury cars that the factory will sponsor during 1967. According to the grapevine, these are "new and improved" models of the cars that dominated funny car racing last year. They will have modified NASCAR roll cages, and a better quality fiberglass. Interior panels will be made of a combination of magnesium and aluminum, instead of fiberglass and plywood, as was the case in 1966. They will also have improved seating and improved steering. They will still be "flip top," but reportedly will be easier to work on. The belly-pan will be incorporated into the interior panels for greater strength. Logghe is said to be building the "coil over shock" suspension units, which they refer to as "total suspension."

MOTORCYCLE DRAG racing is getting more and more popular. Latest to turn to the bikes is Maynard Rupp, 1965 Top Fuel World Champion and driver of the Chevoom funny car. Rupp has teamed up with motorcycle expert Ace Nowak to build a fuel drag bike, powered by a Triumph motorcycle engine, that they hope will break 160 mph in the quarter. First public display for the clean new machine is at the Detroit Autorama. You can look for a story on this new fuel drag bike in CAR CRAFT before too long.

ROYAL PONTIAC is going to build Super Firebirds, according to Royal performance manager Milt Schornack. Actually, they will call them Royal Firebirds, but they will be super-super cars. Royal will customize the Firebird for performance-minded customers, giving them just about anything they want in the line of extra goodies and more performance, ranging from an overhead cam six with tri-power to a dual quad 428 full racing engine. If you want fiberglass, you can get that too, says Schornack. Royal will keep a stock of Firebirds on hand, and be able to customize them just about any way a buyer wants. The combination of tri-power (three two-barrel carbs) on the overhead cam six has produced some surprising performance, says Schornack, and is just the thing for the guy who doesn't want to put too many bucks into hotting up his car. Royal has long been famed for a succession of hot cars, including their famed Bobcat tune up, and these new light Firebirds should be real haulers.

OUR POINT OF VIEW

FUEL DRAGSTER POT BOILING

Dale Ham is the NHRA Division Director for the South Central area encompassing Texas, Oklahoma, New Mexico, Arkansas and Louisiana. He is also a pioneer in organized drag racing, having been a class winner at the first NHRA Nationals in 1955. With these highly respected qualifications, we are turning over a portion of our editorial space to him for his Point of View on a very timely subject. His comments were originally published as part of his regular column in "National Dragster." — *Dan Roulston.*

When you hear rumors that name drivers are splitting prize money — each willing to settle for an assured half rather than go all out for the win or loss — and other racers argue the merits of the decision — it gives you reason to wonder if the "no-win" policy of our federal government has infected other areas of our life.

It occurs to me that a decision to accept a tie is much more acceptable today than it would have been in the early days of our sport. The idea of accepting a split when there remained even the slightest chance for a victory would have been unthinkable at the time drag racing began.

In that era, the thought of settling for less than victory was as foreign to our make-up as burning draft cards, demonstrations for and against any and everything, smut T-shirts, the "weirdo" image, funny folks and cars built to do anything but win a race.

What's happened nationally in recent years? We fought a war in Korea to a "split" and we're apparently willing to try to settle for another "draw" in Viet Nam. At a price too horrible to contemplate, we have shown we're willing to accept a substitute for victory.

I shudder to think of ever seeing my beloved Texas settle for a football tie against Oklahoma when there was still time running on the clock. Can you imagine what "The Gipper" thought about fabled Notre Dame playing for a tie?

I wonder if we are too concerned with the world-wide popularity polls? And, I wonder if this new concept policy of recent years has caused drag racers to place the sport's popularity polls ahead of total commitment to victory?

The racer can smile and say taking a split or flipping a coin is like kissing his sister, but if there is a trend making this more fashionable and if he is contributing to it, there is no cause for even the slightest element of humor.

There is, instead, cause for us to look around to see what's happening. There is cause to ponder seriously the question of how much our national policy can change us from being the kind of people we think we are.

While we play for global "splits" too many would-be racers are advocating something even worse — total defeat!

Competitors today are more learned, have a better technical education and are more skillful in every respect than they were in the early days of drag racing, yet they have lost one thing. The celebrated "weekend warrior" has just about vanished.

The aspiring racer today is apt to quit if he doesn't take home a trophy his first time out — whether he's raced anybody to get it or not. In the top classes, the tendency is not to try at all unless you start out with a full sponsorship. (Now don't yell at me about the cost, baby, income per expense was the same deal for the early day racers.)

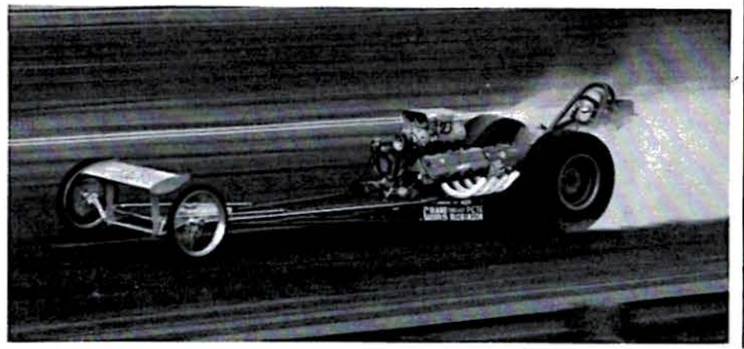
Still, drag racing offers the best opportunity to reverse the trend, if the trend is there. We've never been followers and we've certainly reversed trends before. I remember well when it was the trend for folks to run inside and bar the door when the word hot rodder was mentioned.

Drag racers, simply by being drag racers, are adventurous, they seek the new and the unknown, they're optimists and they're nonconformists. Let's hang on to this heritage. To a real racer the taste of victory is delicious and the bitterness of defeat is sweetened by the knowledge that there'll be another race.

Success simply consists of getting back up one more time than you fall down. — *Dale Ham*

After reading Dale Ham's guest editorial, Car Craft's feature editor Terry Cook contacted several fuel dragster crews for their side of the discussion. He reflects their comments and opinions in his Point of View. At presstime, the fuel dragster situation was continuing to boil with unanswered questions. — *Dan Roulston*

Dale Ham's flag waving outlook on splitting the money before the final round has all the smackings of mom's apple pie, but let's look at it from the fuel racer's point of view. Varying estimates have been made concerning the costs of making a single AA/Fuel dragster run; they have ranged from $65 to $80 per trip. Figuring the bare essentials; tires, fuel, spark plugs and oil, we come out with a base cost of about $40 per pass. Now, assuming we don't break parts, where do the other "hidden" expenses come from? Let's start at home with garage rent, the cost of building a new trailer every two years, minus the amount received when it's sold (all broken up after that period), motel rooms at $10 per night per person while on the road, entry fees, gas for the tow car while on the road, tires for the tow car, and on and on. What about paying the help, be he a pro engine builder or simply buying dinner for the guys on the pit crew? And a tow car really depreciates when it pulls a heavy trailer all those miles. What about replacing all those tools that seem to disappear? Another point which is overlooked completely are those air mail special freight charges that add up like crazy over a year's time. What about those many long distance phone calls for parts or information, or chats with strip managers and the like? I could go on and on naming the incidental things that are easily overlooked, but that nickle and dime you to death financially. And I said excluding the cost of broken parts. Burn a piston on a fueler and it'll set you back $15 a copy, plus another $7 or so for trick rings. Perhaps that's considered as breakage, but name me one fuel dragster racer who doesn't burn pistons? Every time an engine is torn down for inspection, there are certain parts that are examined, discarded and replaced simply because of wear. And what about gaskets? So you get the point. After the initial $8000 investment, it costs big money to go racing. California's hottest team, the Beebe Brothers, spent more than $30,000 last year for fuel, tires and engine parts for their AA/FD. Pete Robinson, who rarely breaks parts, keeps close books on his expenses and figures, including everything, it costs him about $175 per run. Now with this expense in mind, please tell me how a racer can exist when he gets paid $50 per round win, but it costs him much more than that to make the run? And how often do racer's get paid for those many qualifying runs they make? Now perhaps you can begin to see why two racers will agree to split the bucks when it comes down to the final run. This way both will be assured of having enough money to pay their bills and come out and race again next weekend. And after they have agreed to split the money, try and tell me they don't go out there and race in that final round. No, the high cost of drag racing is getting to the guys who run the big fuel cars and when you consider that only about two dozen fuel dragsters in the nation are bringing in enough money to support their racing, their future looks grim. When the tracks start paying enough money to the AA/FD guys so they don't have to keep pouring their pay checks into their cars to support their racing, then you won't see guys agreeing to split the money. Until that day, however, they'll split. They like racing too much to quit. — *Terry Cook*



Firebird

BY DICK SCRITCHFIELD ☐ An opportunity to cruise around the high speed circle at the General Motors Proving Grounds near Mesa, Arizona, at speeds of 100 mph is always greeted with enthusiasm. Very few people are extended an invitation to even visit this vast testing facility, so when the chance came our way we headed for the wide open desert country. What made it even more enticing was the announcement that not only were we going to get a shot at the circular high rim, but we were going to do it in the wildest and newest vehicle from the House of DeLorean — Pontiac's sensational Firebird. ☐ This half-year model introduction is certain to add additional fuel to the Mustang-Camaro-Barracuda-Cougar sales controversy. ☐ Naturally, the Arizona weather was perfect for the test with temperatures in the 80's and not a cloud in the blue sky. Pontiac engineering had brought three Firebirds to Mesa for final development where every day could be utilized for driving tests. With Michigan's generally poor winter weather, much of the driving and chassis tests are performed in Arizona. (This also makes it real handy for us to slip in from Southern California.) ☐ Our test team was comprised of four young men who have a wealth of rodding experience and are currently quite active in the sport. Wally Lassila is the owner of a swingin' little '23 "T" roadster pickup and an Associate Member of the Los Angeles Roadster Club; Lyle Cunningham, an extremely active member in the Cactus Corvair Club, often enters his '63 Corvair in slaloms and rallys; Bill Turney, automotive photographer and currently engaged in building a fuel dragster; and Chauvin Emmons, car builder extraordinaire whose custom street roadster was chosen as one of CAR CRAFT's "10 Best" of 1965. With this group of experts, it was easy to put the Firebird to some real testing. ☐ The air was filled with excitement at the team's first encounter with the Firebird. The three cars were ready and waiting. A cream convertible equipped with the standard six cylinder overhead cam engine and optional hood mounted tachometer; a silver coupe, the hardtop model in the Firebird line which was powered by a 250 horsepower, 326 cubic inch V8; and the top runner of them all, a red convertible designated the "Firebird 400" because of its 400 cubic inch, 318 horsepower screamer. The biggest engine (so far) in any of the "fun" cars. ☐ Bill Turney, whose name has been associated with many photos in Car Craft exclaimed, **"Wow this new one from Pontiac really comes on! Look how the one piece bumper replaces the grille frame but has the Pontiac nose and deep-set black grille. It has the 'no bumper' racy European look with the square parking lights mounted in the lower air scoops which really gives a clean appearance. The only change in the front, really different from other Pontiac models, is the quad headlights mounted horizontal rather than vertical. I like the taillight arrangement in the rear much better than the Camaro. The four horizontal taillights again carry out the Pontiac design so it's easy to tell from either end it's definitely Pontiac. The "400" numerals on the deck lid lets everyone know that you've got the good engine under the hood as you move off from 'em. Another give-away is the sharp looking four chrome exhaust tips that slope down near the rear corners of the fenders. The spoke wheel covers are very tastefully done and are hard to tell from the real thing. Too bad they're 14-inch as a lot would probably find their way onto some of the street rods. ☐ "I feel that for the Cougar-Camaro-Mustang-Barracuda market that they are trying to enter, Pontiac probably has the most competitive car and is the best one of 'em all. The solid sound of the door closing is very impressive. If the production models come through as tight sounding as these prototypes, they will certainly be ahead of the other production cars. This is one of the things that I don't like about the**

(continued on page 16)

1

This new Pontiac brand is destined to burn quite a trail through the ranks of "fun" car owners with five exciting engines climaxed by the top of the line "Firebird 400" thriller.

2

1
The Firebird is the first of the fun cars to combine grille and bumper into one unit providing an uncluttered look. Headlights mount horizontal rather than vertical as on the other 1967 Pontiac models.

2
Team member Wally Lassila tries his hand at running the quarter mile but found that the E 70x14 Wide-Ovals couldn't hold the 325 horsepower of the big GTO type engine. The best time any of the team could muster was 15.47 sec.

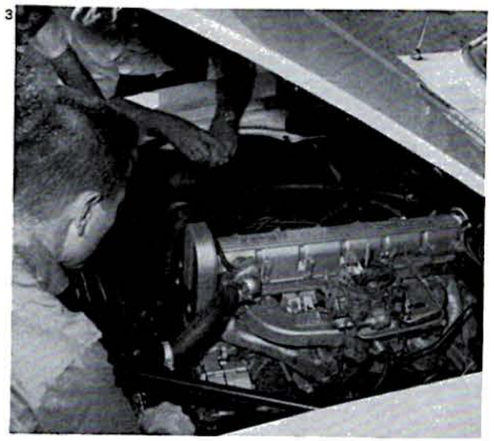
3
Standard for the Firebird is the single overhead camshaft, 230 cu. in., 6 cylinder engine which produced 165 horsepower. A sprint OHC 6, equipped with a 4-barrel Quadrajet pushes the horsepower to a very respectable 215 at 5200.

4
Largest of the fun car engines, the Firebird's 400 cubic inch, 318 hp screamer is basically the same as the GTO mill. With the GTO producing 360 hp, there's 42 hp laying around somewhere just waiting to be located and used in competition.

5
Our test team had a chance to look over and drive three combinations of Firebirds at GM's Mesa, Arizona providing grounds; six cylinder OHC convertible, a hardtop coupe equipped with a 326 c.i. V8 and the Firebird "400" convertible.

6
Allowed to drive the high speed oval at the proving grounds, the team had a chance to find out exactly how the prototypes would handle at speed. All were amazed at the smoothness and excellent handling of the three new models.

7
Bubble on the hood is the new outside position of the optional tachometer. Available for either inside or outside mounting, hood installation puts the tach face in perfect location for driver.



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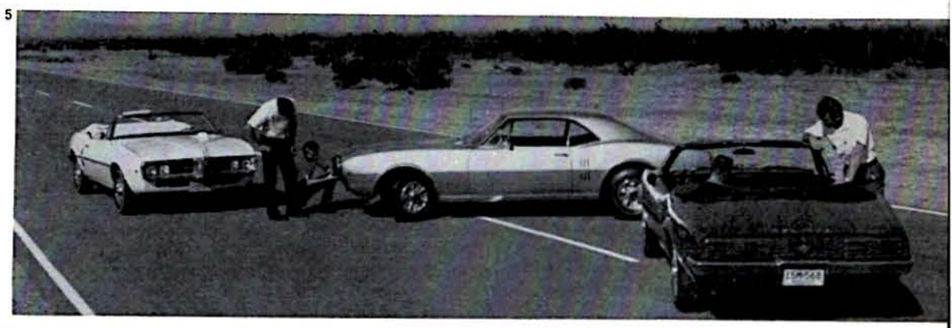

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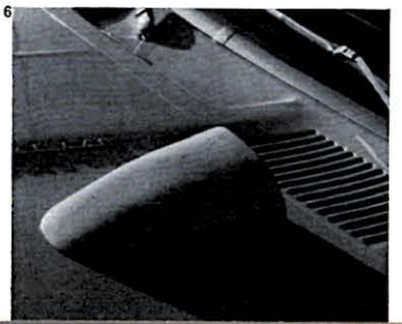

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other cars of this type, when you slam the door they have a tinny, hollow sound. It's not a very secure feeling as you're wrapping yourself into that type to drive down the road. ☐ "The two air scoops on the hood look good and, for a change, these can be made operable. I don't know why the other cars don't come with scoops that can be used rather than something just hung on for appearance. And, how about that Tach on the hood? Talk about something boss! Leave it to Pontiac to come up with another first." The hood scoops are functional, as Turney mentioned, when the special Ram Air Induction package is ordered. This is the way to make the 400 cubic incher move even quicker. It's quite a package, combining the functional air scooped hood with special air cleaner, high rev camshaft, heavier valve springs and racing designed exhaust manifolds. The factory people say it produces 318 horsepower at 5200 rpm and 388 pounds-feet of torque at 3600. Considering Firebird's standard 400 cubic inch engine produces 318 horsepower at 4800 rpm and 388 foot pounds of torque at 3400 rpm means the extra rpm would be worth a few additional miles per hour and get you a quicker elapsed time. ☐ The engine is basically the GTO-400-inch goer with the GTO's 4.12 x 3.75-inch bore and stroke and tight 10.75:1 compression ratio. With the intakes opening at 31 degrees BTC and closing at 77 degrees ABC, the exhausts opening at 90 degrees BBC and closing at 32 degrees ATC, intake duration lasts 288 degrees and exhaust, 302-degrees. Lift is equal at .414 of an inch. Now if the GTO can pump out 345 horsepower, it seems reasonable that the Firebird's engine could just as easily do the same. Maybe the carburetor you say. Not so! Both come with single Quadrajet, however, this may be the clue to the reduced power readings of the Firebird 400. Add the Ram Air package and give it the super tune and 360 plus would more nearly be your horsepower output. Undoubtedly, the Firebird 400 is a detuned street version. ☐ But don't forget the six. Now there's a swinger! I wasn't involved in this phase last year when it came time to test the six so I really hadn't paid too much attention. After all, it was a *six*. Boy, hang on when you give a *Pontiac* six the shoe. If you haven't had a chance to see or drive one then you'd better take time to give it a try. It's really amazing. The engine pulls just as smooth and effortless as a V8 from zero tight on up past 100. It's an unusually quiet engine with its Gilmer-type cam drive and hydraulic lifters. Pontiac has proven what many of us considered would be a weak spot in the OHV-6, that the belt is entirely capable of doing its job in an extremely quiet and highly competent manner. The engine has the quick, high rev sound of a European sports car without the usual accompaniment of the clattering solid lifters and timing chain. The "Sprint" engine, which is the strongest of the two overhead cam sixes, puts 215 horsepower at 5200 rpm with a right creditable 240 pounds-feet of torque at 3800 rpm, all coming from 230 cubic inches. Its compression, close to the big eight, measures 10.5:1 and it too receives fuel from a four barrel Quadrajet. The standard six gets 165 horsepower at 4700 rpm. ☐ It didn't take Wally Lasilla long to get his head under the hood of the "400" to see what was going on. Wally recently completed his street "T" roadster pickup after three years of painstaking labor. Wally's red roadster was considered so outstanding that he was accepted for associate membership by the Los Angeles Roadster Club. **"The 400 cubic incher seems to be just the**

right combination in the Firebird. Whether the car is equipped with the 4-speed or automatic it moves fast and positive. Surprising enough, the engine fits easily into the compartment and doesn't have that shoe-horned look about it. Although this engine didn't have the Ram Air package, you can see it wouldn't be too difficult to make it fit with the carburetor intake only a few inches away from the bottom of the hood. ☐ "The chassis seems well fitted together; the engine, the braking, the steering. It handled real well and with the power assisted disc brakes up front, it gave good even stops every time. Handling at 100 mph was fantastic. I have never driven a car that handled so well at that speed. Inside, the front seats are very comfortable and well located. One thing that made a good impression on me was the door handle location. For once in my life I got in, put my knee against the door and didn't get jammed by the lousy handle! The recessed handle is a terrific idea. So many times you'll get into a car and if you don't position your knee just right, it gets bashed. The seat height gives you plenty of leg room, in fact, it also gives you plenty of head room. I tried to lean forward, with the seat back where I was comfortable, and still I could barely strike my head on the dashboard. If you were in an accident, it's possible you might bump your nose or loosen a few teeth but there would be no way to strike the windshield unless you were out of your seat belt. Another item I liked was the seat back safety latch which keeps the back from going forward. If you had a child in a car seat, you wouldn't worry about him being catapulted forward into the windshield in an emergency stop. ☐ "Although the back seat is reasonably comfortable, it isn't designed for extra long trips with a passenger in the front and the seat moved all the way back. There isn't near enough room for a person near my 6'1" height, although I was surprised my head didn't hit the top of the coupe." With the standard Morrokide bucket seats in the front and the twin passenger rear bench there is barely an inch difference in head room between the two. With Firebird's compact design, you would expect much less space, but it actually measures more than the GTO. ☐ Instruments are recessed into two round bezels, a speedometer in the left and fuel gauge and warning lights in the right. Still there is no oil pressure gauge or ammeter, just lights. An optional tachometer is available which can be mounted either on the hood or on the dash. On the hood, it has its own weather proof cover and is positioned straight ahead and just below the driver's line of drag strip vision. For the guy who wants a console it's available, however, none of our test cars were equipped with one. ☐ There are three transmissions to give the owner his choice of a 3-speed, 4-speed, or neat Turbo-Hydro automatic with shifts on column or console. The 3-speed is fully synchronized with gearing of 2.54:1, 1.50:1 and 1.00:1. If the 4-speed is the one for you, the ratios are 2.52:1, 1.88:1, 1.46:1 and 1.00:1. If you want to get there first then it would be worth your while to seriously consider the super heavy-duty 3-speed torque converter Turbo Hydra-matic with its 2.48:1, 1.48:1 and 1.00:1 ratios. No lag, no missed shifts, just consistent times. Automatics have sure come a long way! ☐ In the rearend department, Pontiac has completely solved the wheel hop problem so prevalent with the Camaro type mono-leaf suspension. Where a radius rod or traction bar is necessary, depending on the engine-transmission combination, either one or two are installed. Certain six-cylinder combinations receive one traction bar on the right while all V8's are equipped with two. Unlike the traction bar kits that are sold in speed shops and fasten only to the spring, the factory units are attached to welded brackets on the bottom of the axle housing and bolt to a reinforced section of the body floor pan at the front. ☐ Everyone received a chance to drive the three different models on the proving ground's varied highway and road conditions, from the high speed circle to the drag strip and farm type gravel washboard roads. ☐ Test Team member Chauvin Emmons, has been building hot rods for at least 10 years and builds everything from street rods to Indy cars. Presently he's working on a rear engine street roadster incorporating four wheel independent suspension with inboard mounted front springs and a basic "T" body. A Ford engine will drive directly into a solid mounted Halibrand quick change and then have half shafts go out to the independent wheels. Chauvin remarked, **"This is really my first chance to get a new car**

and really thrash it around and not worry about breaking something. The car is very smooth under hard acceleration and doesn't produce an ounce of wheel hop. It's great at speed around the oval, allowing you to drive at 100 mph without touching the steering wheel to make any correction. The stability was just too much! Considering the speeds we were traveling, the noise level was about as low as you could get, and much less than many cars I've driven. ☐ One thing that really amazes me is the

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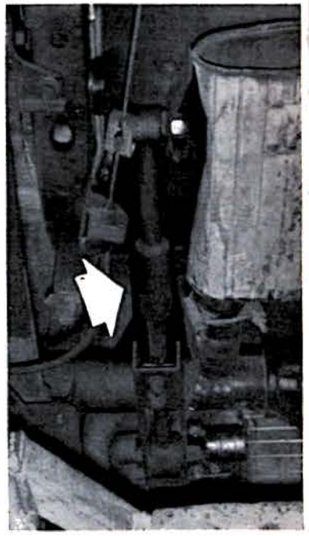

8 Probably hottest innovation is the Goodrich "Space Saver" spare tire. By attaching can of Freon to valve stem, tire inflates to normal size. Opening the valve, the tire immediately shrinks to it's original size for storage.

9 Full size tire greatly limits trunk space displaying a definite need for the "Space Saver." "Saver" is designed merely as a spare to get you to a service station but may be driven at moderate speeds to 2000 miles.

10 This is the extent of the forward frame as seen from below. Coil springs fit into dark ovals with frame extending left under the firewall and body. Engine, transmission and front suspension mount as a complete unit.

11 Firebird solved the wheel hop problem of the mono-leaf spring by installing two traction rods (arrow) on all V8 powered cars. Prototypes resonator made rod a tight fit but engineering know-how solved it with a big hammer.

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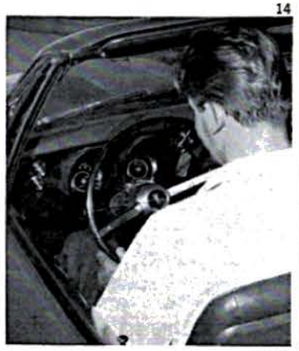
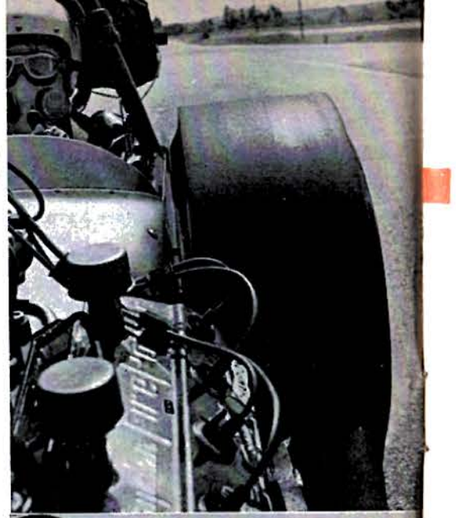
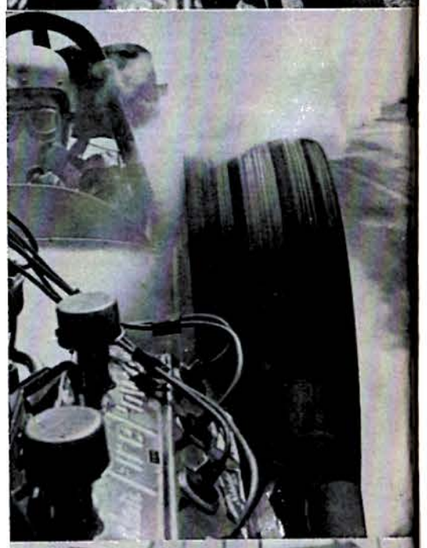


12 Bill Turney and Chauvin Emmons inspect hood scoops which indicates a 400 incher is below. A Ram Air package is available to make the hood scoops functional and increase the rpm peaks from 318 hp at 4800 to 318 hp at 5200.

13 Something new again! A front spoiler? Well, sorta. Actually, it blocks the air from passing out below the radiator with the vertical blade creating a low pressure area in order to draw air from the engine compartment.

14 Even the plush "400" still lacks complete instrumentation. Team felt fuel gauge area could have been better used than by having it match the large speedometer. Instrument package is the only way you can get what you want.





REVERSE LOC/OUT

George Hurst attained fame with a shifter that never missed. Now he's offering a unit that keeps you from making a shift.....under very special circumstances

It's hard to believe that George Hurst, the undisputed Shifter King, would be pushing a device that can keep his four-speed units from shifting, but that's just exactly what he's doing. The latest word from Hurst Performance Products is sure fire protection against shifting mistakes.

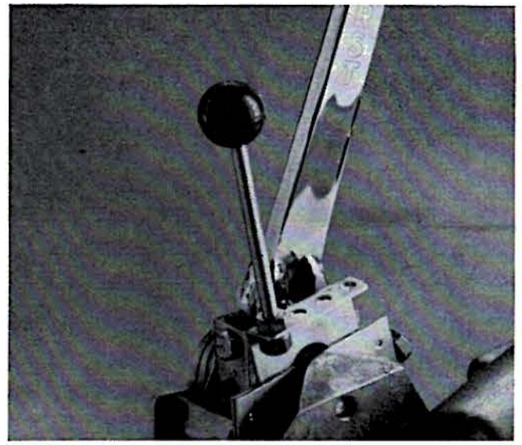
Like most Hurst products, this new Reverse Loc/Out has many applications, but will really find a home in drag racing. Designed to fit all Hurst Competition Plus four-speed shifters, the new unit prevents any possibility of accidentally hitting reverse gear during a fast shift.

Installed in minutes with simple hand tools, the Reverse Loc/Out control stick fits through the boot adjacent to the shifter. Simply pull the small knob up and reverse gear is covered, making it impossible to engage. When you are ready for reverse, however, a slight downward pressure on the Reverse Loc/Out handle uncovers the reverse slot and you are ready to back up.

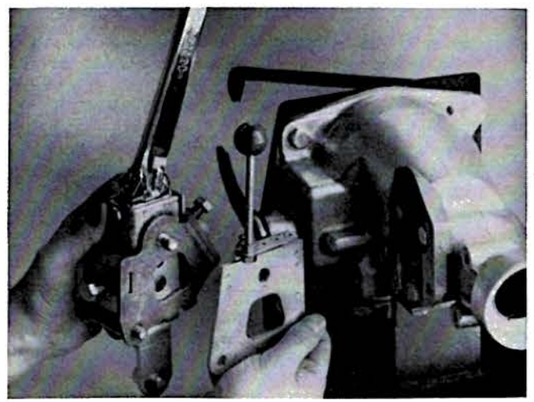
The design of the Reverse Loc/Out gives it a universal application as the small stick may be cut to any desired length. You also have a choice of four location positions for the smaller stick, giving you exactly the proximity to the shifter that you desire.

An engraved "R" and small arrow on the Reverse Loc/Out stick reminds you which way to go if you happen to forget. What you won't ever do, however, is forget and grab reverse with its accompanying production of broken transmission pieces if you have the Reverse Loc/Out engaged.

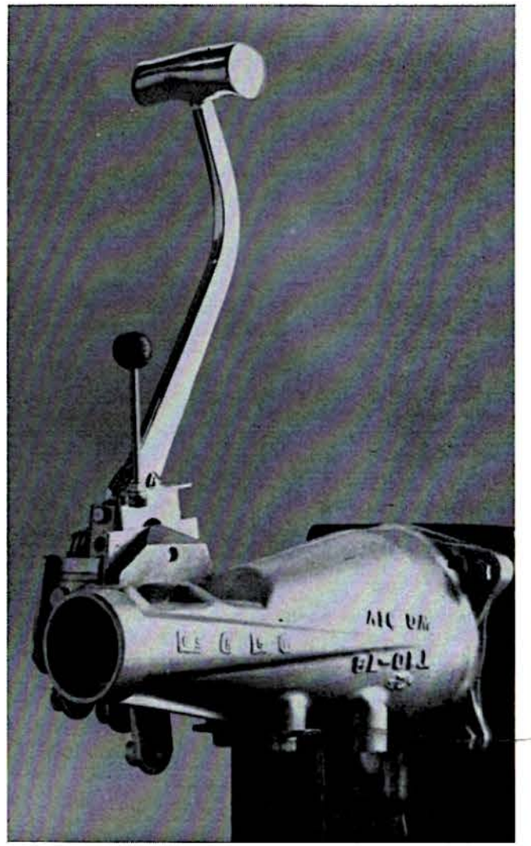
The new Hurst Reverse Loc/Out is available at leading speed shops throughout the country and promises to be an immediate hit with the drive-in crowd as well as the drag racing clan. Not only does the unit fit all Hurst Competition Plus four-speed shifters, but you will get change back from a ten dollar bill when you buy one.



ABOVE — Not only does the Reevrse Loc/Out feature a variety of positions for installation, you can also cut it to any desired length, giving custom appearance to installation.



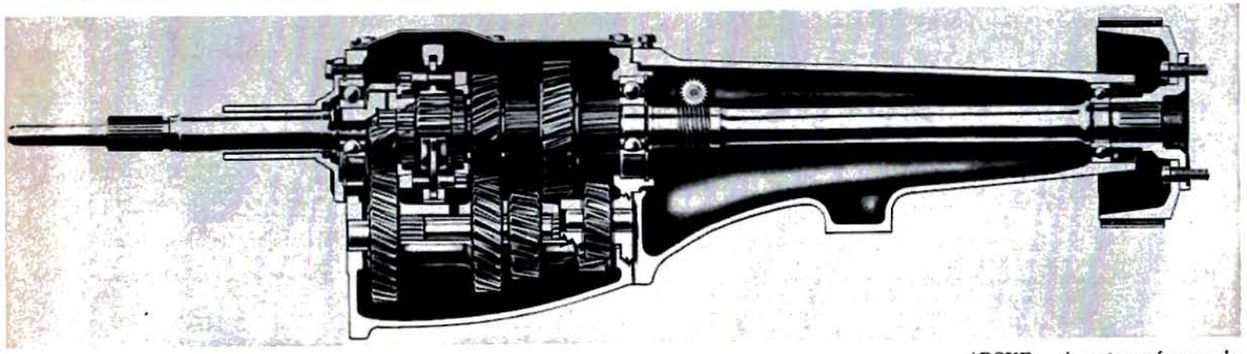
ABOVE — Hurst's new Reverse Loc/Out readily mounts to any Competition Plus four-speed shifter. Control stick for unit can be attached in four different situating holes.



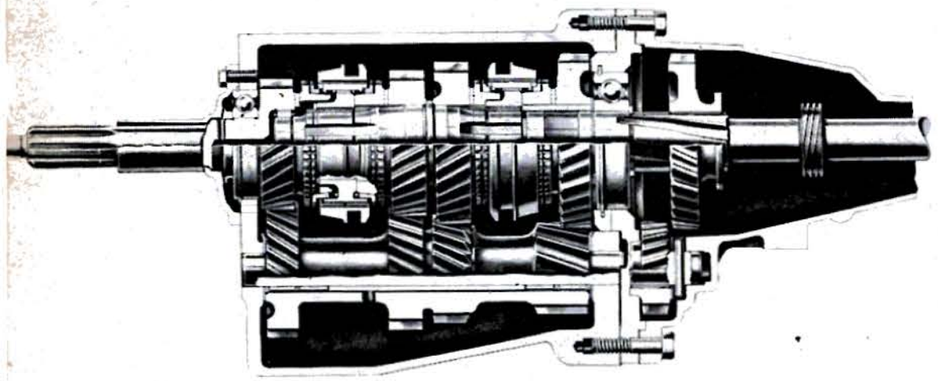
ABOVE—Accidental reverse shifts are not only embarrassing, but they are also expensive. With Hurst's new Reverse Loc/Out there is no more chance of missing on that big shift.

THE VITAL LINK

An internal combustion engine develops plenty of horsepower to fulfill its assigned mission as a means of propulsion down a race course or through our city streets, but in order to accomplish this end it must receive an important assist from the clutch-transmisison combination.

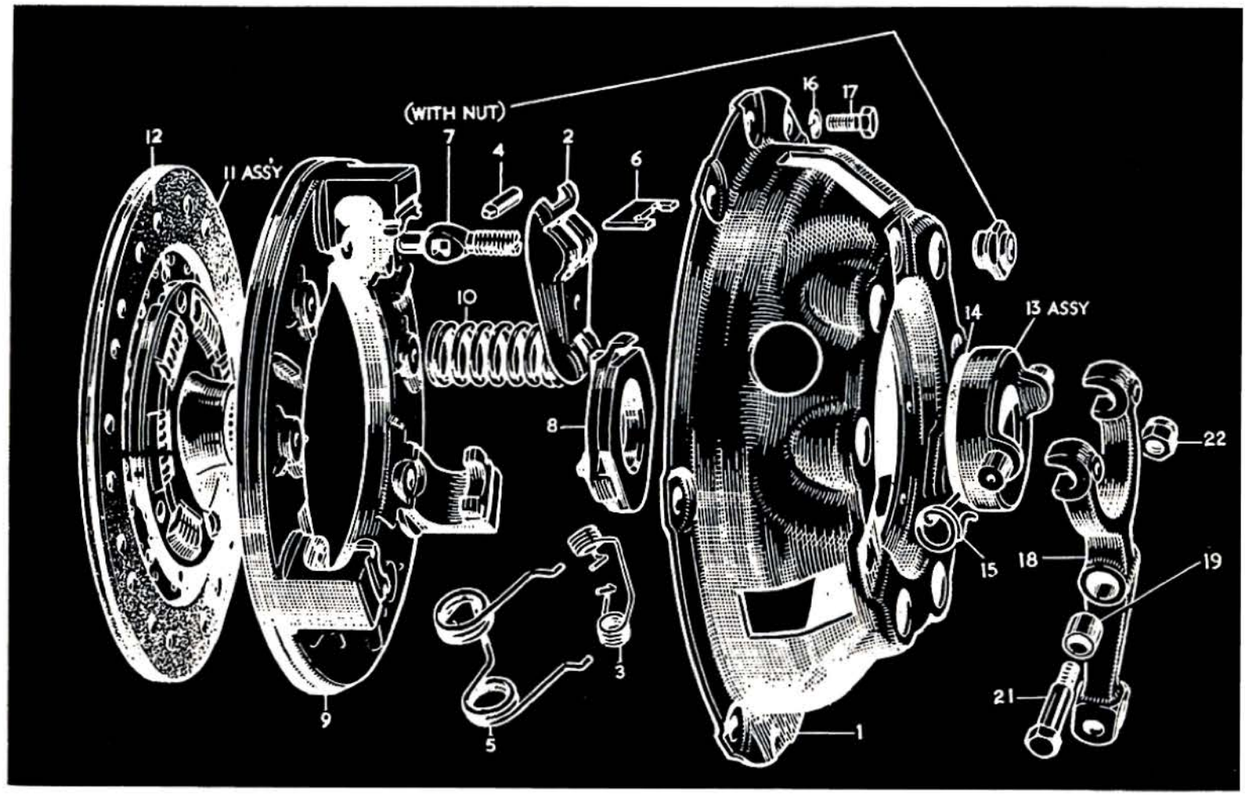


ABOVE — A system of gears in the transmission converts the engine speed into usable torque. Second and third in this Chrysler three-speed are equipped with synchromesh for easy gear changing operation without grinding.



RIGHT — The clutch is the all important connection between engine and transmission. It generally consists of disc (12) and pressure plate (9), plus fork (18), throwout bearing (13), and pivot fingers (2) in a case.

LEFT — Probably the most popular transmission now in use on the drag strips is the Muncie four-speed. Reverse is located in the tailshaft case, similar to the Warner T-10, permitting wider forward gears.



PART I BY ROGER HUNTINGTON CARS need CLUTCHES and transmissions because the age old internal combustion piston engine is basically *unsuitable* for the job it's doing! Reason: It can't develop any torque when the output shaft is stalled. It has to be spinning at a substantial speed to develop any useful torque. It can't pick up a load from stall. Conversely, certain other types of "prime movers" like gas turbines, electric motors and steam engines develop their maximum torque when the output shaft is stalled with torque dropping in a straight line at higher speeds. Something like this would be ideal for a car. You could take off without a clutch, and wouldn't need to shift gear ratios as car speed built up.

So now you can see why the clutch and transmission are needed with the conventional piston engine. The clutch is essentially a slipping coupling, that allows the engine to pick up the load gradually while spinning at a relatively high speed – with the clutch locking up solid when the slip rate drops to zero. The transmission is nothing more than a device for changing the ratio between the engine speed and the speed of the car's wheels. This permits the engine to turn at high speeds when the car speed is low, for climbing steep hills or getting quick acceleration – since maximum horsepower is developed at high speeds. Then, by shifting into a "higher" gear, you can slow the engine down for cruising on street or highway, with minimum engine vibration and fuel consumpton. If you want more acceleration, just down shift to a lower gear. You can have three or four gears forward, as most cars have – or some racing cars and motorcycles have five, six and even seven-speed gearboxes. It's all part of the same principle.

Automobile clutches are actually quite simple devices. They grip entirely by sliding friction – (that is, there is no positive lock-up to prevent slippage once the clutch is engaged). First, we have a main clutch disc with friction facing material (something like brake lining) on each side, splined to the transmission input shaft and free to move axially a small amount. This disc is squeezed by spring pressure between the engine flywheel and a heavy pressure plate, contained in a stamped cage assembly that is bolted to the flywheel and carries the springs and pressure plate. In other words the engine flywheel and pressure plate rotate as a unit. The disc is splined to the transmission shaft, and floats between them. When the spring pressure squeezes the disc between the flywheel and pressure plate, engine torque is transferred to car's wheels through the transmission.

The amount of slip in the clutch or complete disengagement is controlled by pulling the pressure plate back away from the disc, against the spring pressure. This is done by a release fork that is pivoted on the clutch housing, and levers the pressure plate back via a throwout bearing, and pivot fingers. Obviously, it takes a lot of force to withdraw the plate against a spring pressure of 1500 to 2500 pounds; but the plate only has to move a few thousanths of an inch to disengage completely – so we can get a lot of leverage with four to six inches of clutch pedal travel. Some cars have hydraulically-operated clutches to reduce this work further. Modern clutches have very stable slip characteristics, due to highly-developed friction facing materials and efficient, precise pedal linkages – so the slip can be closely controlled for smooth start-ups and shifts. Clutches aren't "grabby" like they were in the old days.

So now what can we do to beef up clutches for high-output street and competition engines? First there's the problem of torque capacity, or the amount of torque a clutch can transmit without slipping. The most logical move here would be to increase the spring pressure against the disc. Total spring pressure on passenger car clutches generally runs between 1500 and 2000 pounds. For high-output engines this is generally increased to the 2200 to 3000 pound range. This is about all we can handle and still be able to disengage the clutch quickly with the foot pedal linkage. Very high pedal pressures retard fast clutch action. Then there's the matter of disc diameter. Theoretically clutch torque capacity increases as the cube of disc diameter – so an increase of only one inch, from 10 to 11 inches, would theoretically give us roughly 30% more capacity. Most of today's big-inch high performance engines use 11-inch clutches. But there's a sharp limit on practical disc diameter. Big discs have to withstand very high centrifugal forces at high rpm that try to tear the facing material apart. Also big discs have more rotating inertia, or flywheel effect. Since the disc is splined to the transmission input shaft, this means the transmission synchronizers have to slow the mass of the disc down when you shift gears. You just can't shift gears as

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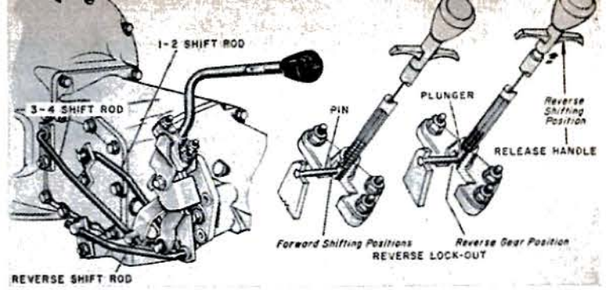
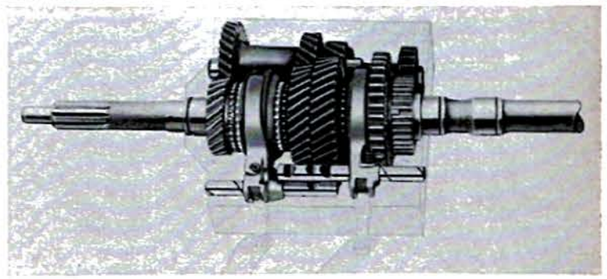
THE VITAL LINK

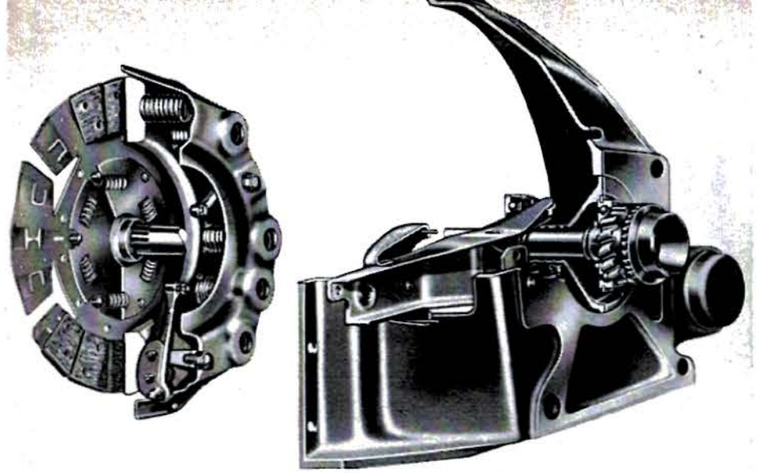




LEFT — In drag racing competition the proper adjustment of the clutch is extremely important as all-out runs demand maximum performance of the unit. Carl Schiefer provides in the field service to a racer.

TOP ABOVE—Typical factory four-speed floor shifting linkage (Dodge). Mechanism must be made very beefy for strength on hard shifts if special conversion unit is not used. Pull-up lockout prevents accidental reverse.

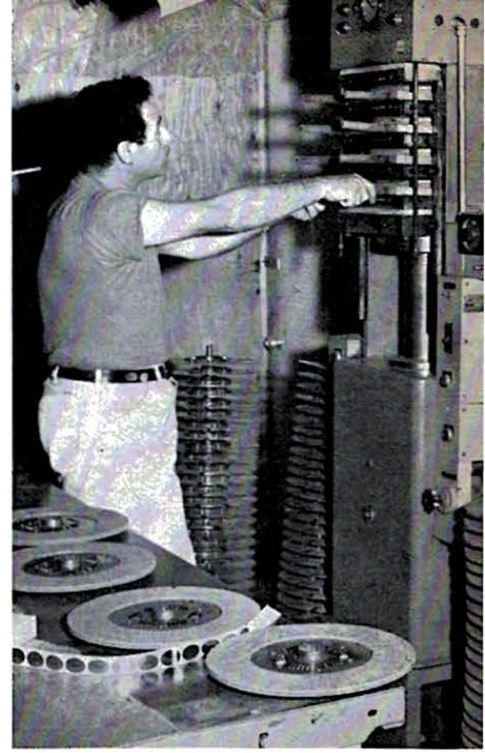
ABOVE — All three forward gears in Ford's three-speed are in constant mesh (no sliding low), and baulk-ring synchromesh is used on all three. Note location of shifter forks and rails inside gearbox that move dogs.



ABOVE — Ford's clutch assembly unit provides the ruggedness necessary for the reliability and service necessary for all types of driving. Included are the conventional disc, pressure plate, springs and fingers. Throwout arm extends through the housing.

RIGHT — Just the right amount of pressure is mandatory in the production of nonriveted disc facings. Continuous inspection throughout the process gives the manufacturer the quality control he must maintain for the high-winding engine components used in racing.

BELOW — The most important part of the vital link between engine and rearend — the clutch disc. If this fails, you don't go. Special facing adheres to flywheel when clutch is engaged. Improper adjustment causes facing to slip, drastically reducing unit's life.



fast with an 11-inch disc as with a 10-incher. This is especially critical with shift points in the 8,000 to 10,000 rpm range. Small inch engines are better off with 9 and 10-inch clutches.

Perhaps the best way to boost the torque capacity of a clutch is to simply use *two discs*. We just spline twin discs to the trans input, and introduce a special "floater" plate between the two that is driven by the main pressure plate, but free to float axially a small distance. This acts as a friction surface between the discs, transferring engine torque along with the flywheel and main pressure plate. This arrangement *doubles* the torque capacity. Another advantage is that we have more friction area in action, so there is more efficient dissipation of heat generated by clutch slip. A double-disc clutch can withstand a lot of slip. They are widely used on the big direct-drive fuel dragsters. The main disadvantage, of course, is that there's a lot of mass and inertia, so they're not much good for fast gear-shifting on cars with four-speed transmissions.

Another good way to increase the heat capacity of a clutch – where operation requires quite a lot of clutch slip – is to use metallic friction material. Clutches will "fade" from heat just like brakes. Metallic facing material can get red hot without losing much friction, where the usual asbestos base facing starts to fade at 500 or 600 degrees F. All makers of high-performance clutches offer various types of metallic lining.

And then there's the problem of safeguarding the clutch against blow-ups on hard speed-shifts at 9000 rpm. This is rough on a clutch. Most special heavy-duty clutches for high-performance cars are rebuilt from standard clutch units. But they frequently use special forged steel or aluminum pressure plates (with forged flywheels), pressure plate housings are reinforced, high-strength bolts are used to retain the housing, and the whole clutch and flywheel assembly is very carefully balanced. This last is vital for high-speed safety. But no more vital than a good, healthy flywheel shield between you and the clutch – just in case theory doesn't equal practice!

Now let's talk about transmissions . . .

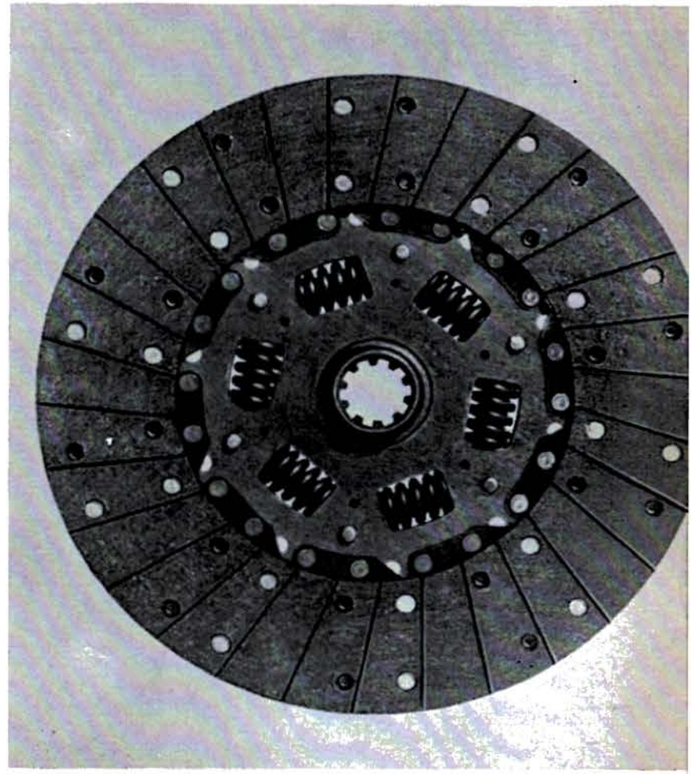
I think you're all familiar with the general operating principles of a simple manual gearbox. We have several sets of gears on two shafts, and the ratios are changed by bringing various combinations of gear sets into mesh (or bypassing them all to get direct drive straight through the transmission). In the early days of the automobile the gear ratio was changed by sliding gears themselves back and forth, in and out of mesh. The sliding gears were splined to the main shaft, and these were brought in and out of mesh with the fixed cluster gears below them. It was a very simple, reliable system; but it took an expert to shift gears without clashing or grinding. Women didn't like the old sliding gears at all.

General Motors introduced synchromesh in the late 1920's. With this deal the main gears are kept in constant mesh all the time, and engagement of different gearsets is accomplished by sliding small toothed "dogs" back and forth – with synchronizer mechanisms to smooth the engagement. The function of the synchronizer is to speed up or slow down the gear being engaged, to match the speed of the input gear. In the old sliding-gear transmissions you were jamming gears together that were turning at widely different speeds. The only way you could keep from clashing them was to double-clutch or just feel them into mesh very slowly – with or without the clutch. Some of the hot dogs used to do a little speed-shifting in those days, but they were more brutal than we are today. You didn't touch the clutch – just ram it into the next gear, with just a momentary release of the gas pedal. The British used to call them "crash" boxes with good reason.

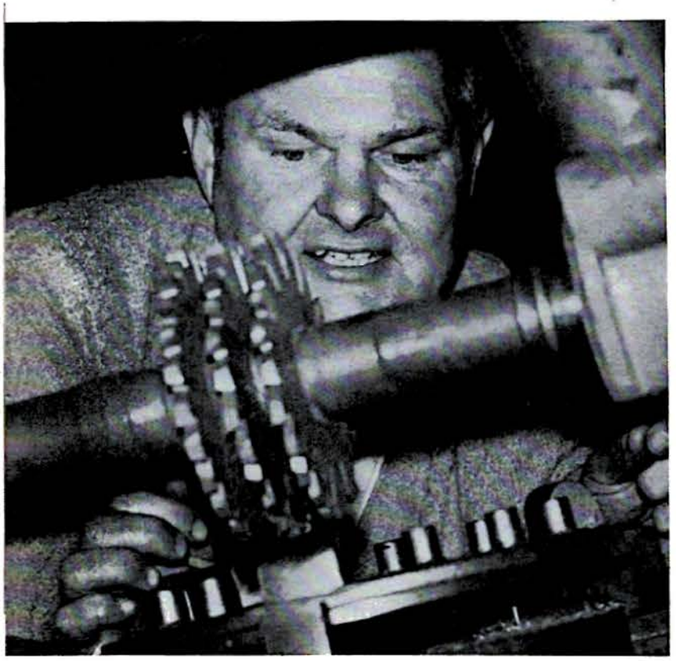
Up until a few years ago most passenger car three-speed transmissions had synchromesh only between second and high gears. Low gear was still a sliding gear change. But the new Ford and GM three-speed manual transmissions feature synchromesh on all three ratios, with all the gears except reverse in constant mesh. This permits shifting into low when the car is rolling at low speed without clashing gears, which adds a new dimension to the gearbox. And, of course, all our modern four-speeds have synchromesh on all ratios. This is the only way to go for the fast, sure shifting needed in a high-performance machine. It's not just a matter of the gear-clashing; you have inertia problems when you try to slide heavy gears back and forth that prevent quick gear changes. This is why the old three-speed manual transmissions never made good drag racing boxes. The new all-synchro designs are much better.

Modern transmissions use three general types of synchromesh mechanisms. All three are based on the principle of the cone clutch. This has male and female cone-shaped members that are engaged by the wedging action when they are pressed together. A cone-type clutch has high torque capacity in relation to the axial force pressing the two members together – which is just what we're after in a synchromesh mechanism. The idea is to connect one of the cone members on the gear to be engaged, and one to the sliding synchro clutch sleeve that rotates with the transmission main shaft. When the two members are pressed together the speed of the two gears is brought together for smooth engagement.

But there's a lot more to it than this. The problem is to put the clutch into action just a little *before* the teeth of the "dogs" go into mesh to lock the two gears positively together. This is the key to the efficiency of the whole mechanism. The simplest way to do this is to put a small spring load against the synchro clutch sleeve that will retard its motion a little when the cones first start to engage. Then additional force on the shift lever overcomes the spring force and rams the dogs home. But by this time the speeds of the two gears are pretty well equalized. Maybe. If you don't shift too fast. It's easy to "beat" this simple spring-loaded synchromesh. The system is not widely used today – only on some of the older transmission designs. *(continued on following page)*



THE VITAL LINK



All of our late American four-speed transmissions, and the new three-speed Ford and GM all-synchros – plus many European transmissions – use what is known as a baulk-ring synchromesh mechanism. This doesn't use any direct spring load to retard the motion of the synchro ring. Instead the synchro rings are slotted, to engage special keys on the synchro clutch gear. The slot is wider than the key, so slip torque on the synchro cone clutch rotates the slot as far as possible – which moves the synchro teeth out of alignment with the clutch gear teeth. Then when the gear speed is synchronized, and the cone clutch torque drops to zero, the teeth will slip easily into mesh. Obviously this is a much more sophisticated synchro design, and one that's hard to "beat" on a fast shift. Excessive wear of the clutch surfaces is the worst enemy. Late trans designs use very large cone clutches, with lots of surface area, that will withstand a lot of abuse without much wear or deflection.

Late Chrysler three-speed transmissions use a unique "pin-type" synchro. This works on somewhat the same principle as the baulk rig, in that you don't work against a spring load when engaging gears. The clutch gear drives the outer baulk rings through three pins with beveled shoulders that ride in hole in the clutch gear sleeve. When torque on the synchro clutch drops to zero, the pins shift sideways, the shoulders can move into the hole, and the dogs come into mesh. It's a very efficient synchro design; but hard shifts on big-inch engines tend to break off the pins, so the design has never been popular for heavy-duty trans.

I should mention at this point Chrysler's modified "Slick Shift" four-speed that was used by some of the drag racers a year or so ago (December 1965 Car Craft). Here they were having trouble breaking and wearing synchro units in drag racing. So they just removed the trouble by pulling out the baulk rings, and clutch gear keys, and grinding off every other tooth in the shifting dogs. This entirely removed the synchro effect; but grinding off the teeth made the setup loose enough to jam into gear easily – if you did it quickly with a moderate amount of force. The transmissions were super-reliable, and very quick-shifting on the strip. But no deal for the street of course.

Some drag racing experts will modify standard four-speed transmissions by beveling off the synchro teeth at a steeper angle, so they will slip into mesh more easily. This somewhat reduces the true synchro effect, as the teeth will tend to mash a little before the cone clutches completely synchronize gear speeds. But the overall effect is quicker, surer shifting. Again, no answer for the street.

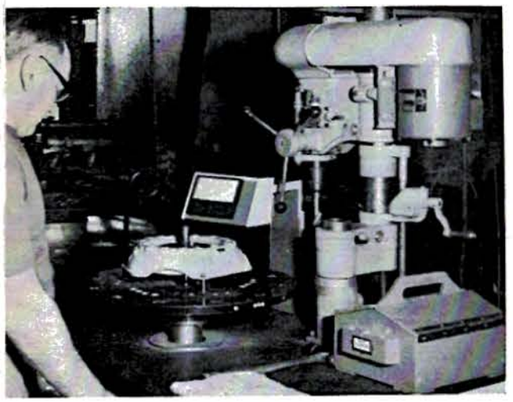
Unfortunately, there are few other promising ways that a given transmission can be easily beefed up for more reliability in hard, fast shifting. The capacity of a transmission depends primarily on such factors as the width and thickness of gear teeth, width between main shaft centers, area of synchro cone clutches, bearing sizes, etc. These factors cannot readily be changed. That's why the car companies eventually had to make their own four-speeds. The old Warner T-10 that everybody used in the early '60's had been adapted from an earlier heavy-duty three-speed, and the basic design just wasn't up to the job. Warner engineers had improved it a lot by using wider synchro teeth, aircraft quality steel for the gears, stronger shafts and bearings; but it wasn't enough. The design is actually suitable only for engines under 350 cubes. Whereas the new Ford, Chevy and Chrysler four-speeds have bigger gears, wider shaft spans, better materials, bigger synchros – and are generally suitable up to 500 hp or so. (Though Chevy Muncie is a quite close copy of the T-10.)

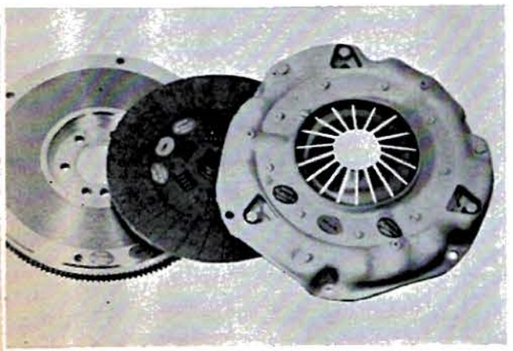
Speaking of the Muncie, it might be mentioned that Chevy engineers have adapted a special racing version of this transmission, with a relatively simple tooling change that has improved the reliability a lot. They merely used a shallower helix angle for the main gear teeth. With a helical gear, driving torque has an axial component that produces *thrust* against one end of the transmission. It literally tries to tear the transmission apart. By reducing the helix angle we can reduce this component of axial thrust. The ideal racing transmission would have straight spur gears, like the early cars, with no end thrust at all. But of course these gears would be very noisy. In fact even the slight helix angle reduction on the racing Muncie trans has greatly increased the gear whine. It's not recommended for the street. (The synchro action is a little softer by modifying synchro teeth.)

And finally a word about gear shifting linkages. As you know, the shifting synchro drums in the trans are moved back and forth to shift gears by forks, and a system of rods and levers. It's a straight forward linkage. No magic. The linkage is held in any one gear by spring-loaded ball-type detents in the linkage cam. When everything is adjusted right, and synchros are in good shape, there should be no shifting troubles in normal driving.

But under racing conditions, when shifts have to be made as fast as possible, standard column shift linkages are no good. There's too much deflection, bending and lost motion due to slop to get quick shifts. The standard procedure now is to replace the factory column linkage with a special floor shifter from one of the many hot rod suppliers. These things sold like crazy in the early '60's. But today the factories have gotten into the act – when they finally realized that their own stock linkages weren't adequate for even the mild enthusiast. Today all factory four-speeds carry floor shifters standard, and you can order an optional floor shifter for three-speeds on many cars. And these factory shifters do a pretty decent job, much better than the early ones three or four year ago. Not as strong and precise as the better specialty linkages, but they're OK for the street. If you want to go racing get a good specialty shifter.

And that about covers the clutch and transmission story, men. Next month: Automatic transmissions.



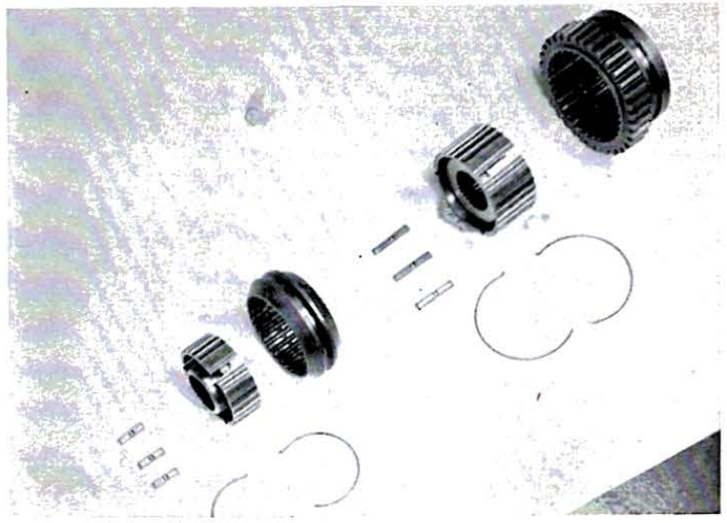


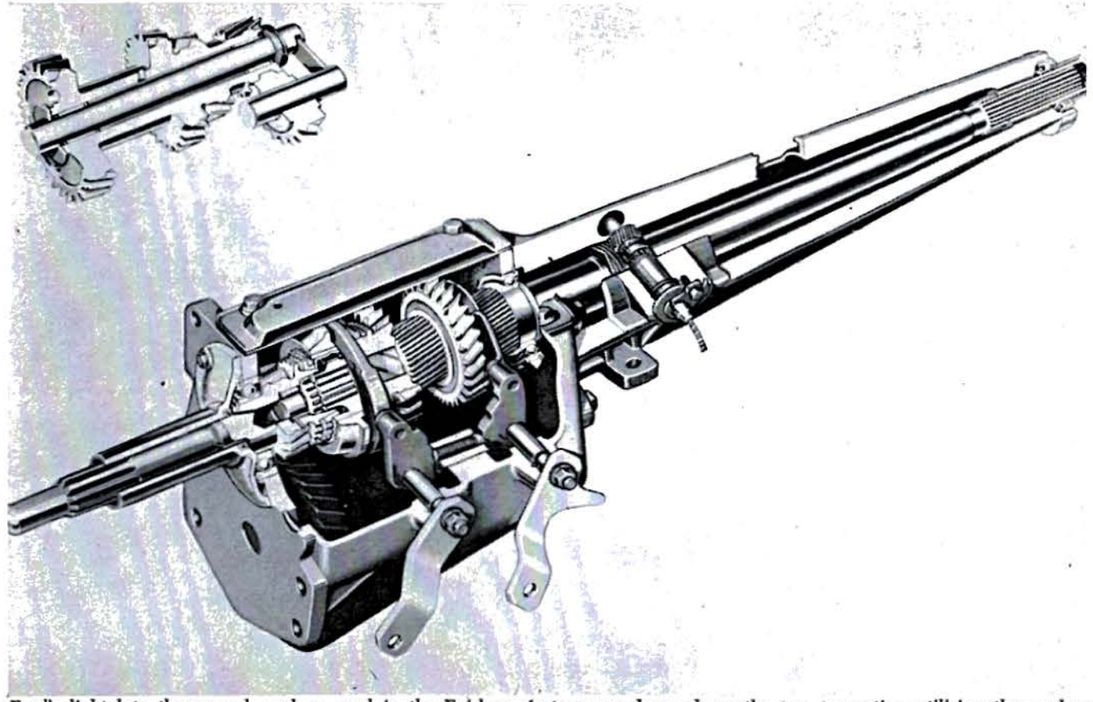
ABOVE — With things happening at a fantastically high rate of speed inside the clutch, every component must work in complete harmony with all the others. Clutch manufacturer Harry Weber demonstrates the precision machining required.

LEFT — After the clutch assembly is completed, the entire unit is carefully balanced to eliminate any possible failure because of unequal components. The lastest electronic testing equipment is employed for maximum reliability of product.

BELOW LEFT — A clutch, pressure plate and flywheel assembly from a single manufacturer is recommended for competition use since they have been designed and engineered to function together. Competition units are not for street use.

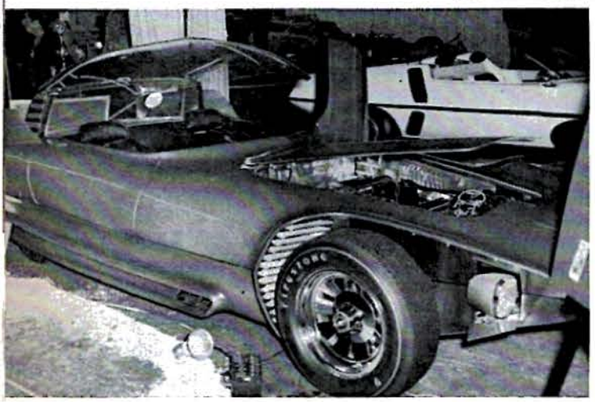
BELOW — In a modern baulk-ring synchromesh mechanism, small synchro clutch gears are splined to transmission mainshaft. Slots around the outside hold small keys that baulk the motion of the synchro baulk ring. Rings retain keys.



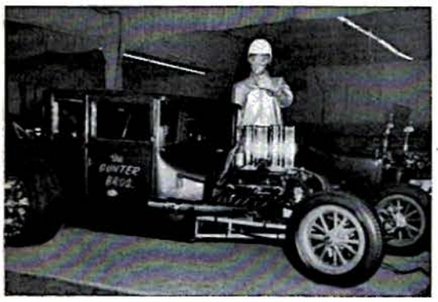


Ford's light-duty three-speed, such as used in the Fairlane, features synchromesh on the two top ratios, utilizing the modern baulk-rung synchro system. Low gear is a sliding unit. Unlike the heavy-duty units, this transmission has narrow, thin gear teeth. In the inset, note that reverse gear requires an idler gear. Selection of proper transmission is extremely important.

Classics, contemporaries and chrome revolved around space-age creations from way out at Robert E. Petersen's show car spectacular which featured the best in every class



MOTO RAMA

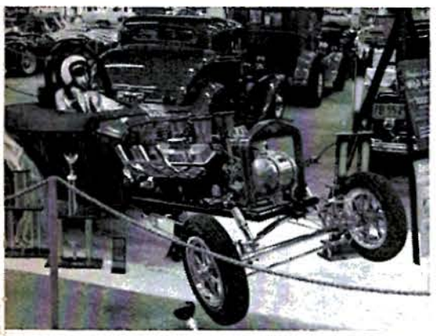


ABOVE — *Gene Winfield's "Reactor Mark II" was judged as Best Experimental with its front wheel drive, front mounted Corvair engine. Body is hand crafted aluminum. The canopy is electrically operated.*

LEFT — *Best Competition award was picked up by the Gunter Bros. without even firing up their '23 "T" coupe. Racing every week since July, coupe is still immaculate after turning 135 mph in 10.42.*

BELOW LEFT — *Boss wheel standing display was put on by Boyles and Aston's "Wild Hare" B/A roadster from Lancaster, Calif. Car was used in official Freeway dedication for "striping" of the pavement.*

BELOW — *Surfer Eddie Dishman showed the boys the best way to haul boards to the beach by building a rack on top of his blue Chevy powered '29 roadster pickup. Car is used for everyday transportation.*



Tom Chafin won Best Custom with his chopped Buick Riviera. Painted a metalflake blue with sapphire blue Islon upholstery, car is consistent winner.

Brought all the way from Denver, Al Coffern's '33 Ford pickup featured glass firewall and bed floor, plexiglass floor boards. Was flawlessly detailed.

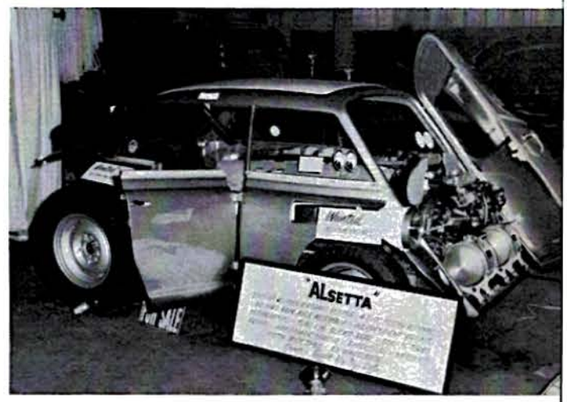
LEFT — *Wildest "car" to ever hit the show circuit was Ray Farhner's customized horse drawn hearse which now uses a 500 hp fuel injected Chrysler to pull the 100-year-old, gold bier.*

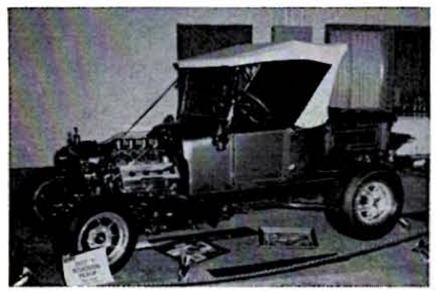
RIGHT — *U.D.R.A. members Jerry Bevins and Doug Fisher were on hand with their slick 210 mph AA/FD titled "Check Mate." Unique black and white paint is the artwork of George Cerny.*

BELOW LEFT — *No west coast show would be complete without something from Norman Grabowski on the scene. Corvair powered Indian motorcycle picked up Best Bike win for Norm.*

"Loaner" Tony Nancy brought out his latest creation sporting a blown Enderle injected Olds. Nancy uses a Race Car Engineering chassis with Tom Hanna body. Car will be CC feature soon.

Photos By Bob Swaim





ABOVE RIGHT — *If your Isetta sedan just doesn't go, do like Jim Lytle and stick a 2000 hp Allison in the front. Works every time! Understatement of year is the sign reading, "Extensively Modified Body."*

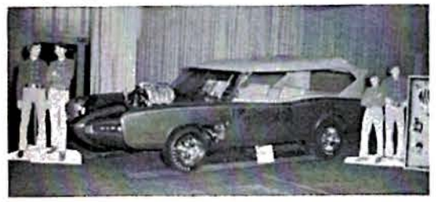
LEFT — *Bob Graff's "Teacher's 'T'" picked up Best Rod trophy with his '27 roadster pickup. From an original cost of $30, Graff's car has come a long way in six years. Dash is machine turned stainless.*

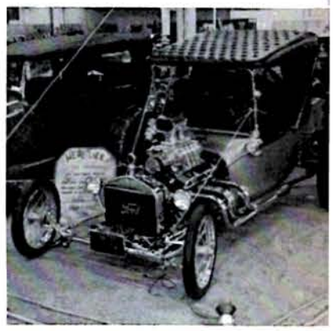
RIGHT — *You're seeing right, that IS a blower sitting in the back seat! It is mounted on a Herbert cammed 396 Chevy which chain drives VW. Tom Dalton swears that it's driven daily on the street.*

BELOW LEFT — *Dean Jeffries and Screen Gems brought out "Monkee's" fabulous '67 Pontiac GTO Phaeton which was designed and built by Jeffries and expert body man, Dick Dean. Was completed in 3½ weeks.*

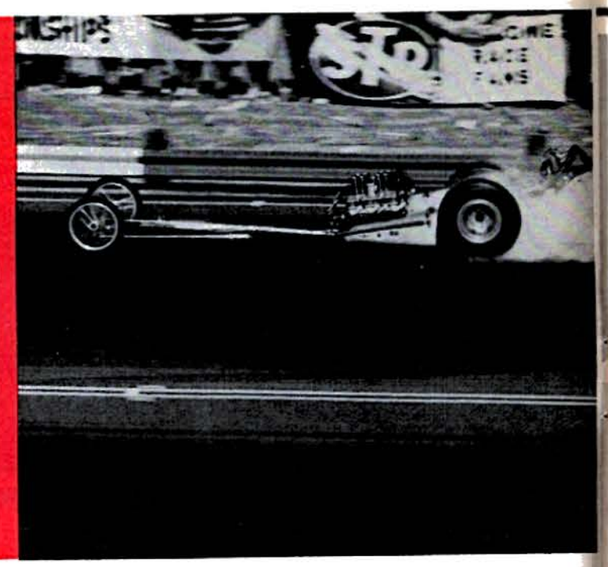
BELOW RIGHT — *Another famous movie car on display was George Barris' customized '66 Plymouth Barracuda. Car was driven by Frankie Avalon in "Fireball 500" to tow stock car to oval tracks around country.*

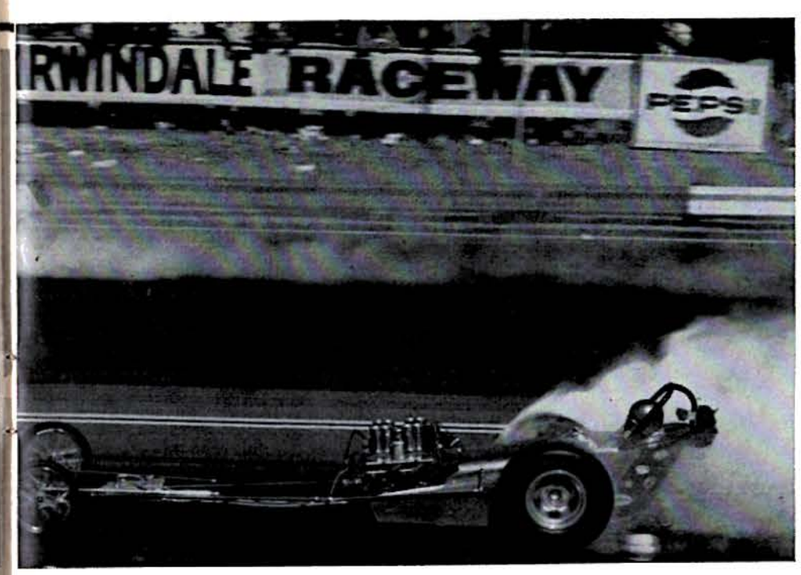
RIGHT — *Lime green 1915 "T" roadster pickup of Richard Knutson uses 6-71 blown 327 Chevy for power. Complete front and rearend is chromed. Black button tufted Naugahyde upholstering done by Gil's Custom.*



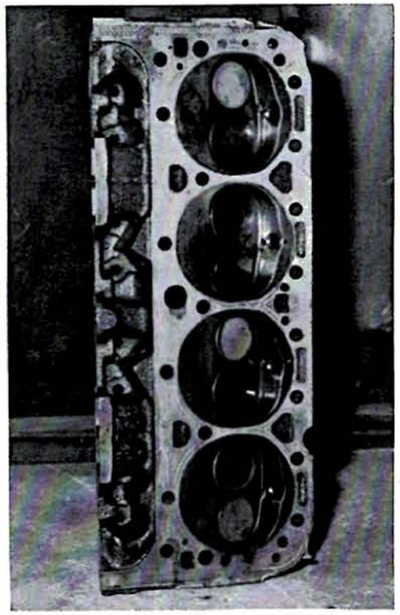


INJECTORS & INGENUITY

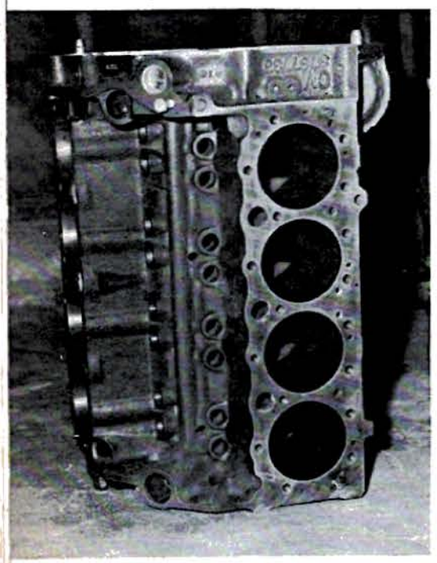




An exciting new bracket of fuel dragster competition is developing where you can go quick on a budget—or really flog with the big boys, but still not strain the finances beyond the safety limit. It might even mark the beginning of an International Fuel Formula



ABOVE — This photograph was taken right after the heads were pulled from our featured Chevy. The crew had some 50 runs on this engine, all with 85% nitro in the tank. No problems were encountered with Mondello heads.



ABOVE LEFT — Although stock components play an important part in Injected Fueler competition, the one area where you want to go the speed equipment route is the clutch and flywheel assembly. Schiefer is used here.

LEFT — At the present time, the leader is the readily available 283-327 Chevy block. A quick machining clean-up is all that is needed. With the 301 cubic inch displacement most of the crews are running, block is real strong.

BY DAN ROULSTON ■ To drag racing contestant and spectator alike, nitromethene fuel carries all of the mystic of the Far East plus the intrigue and speculation of space exploration. Racers call it everything from "pop" and nitro to "good stuff" and Texas kerosene, but everyone agrees that it's liquid horspower in a can – the more bounce you want the more you tip the jug.

Like the slingshot dragster, fuel is generally regarded as the top of the line in drag racing's aristocracy –the star performer in the center ring. Generally, however, the popular concept has been that if you wanted to go fuel racing with a dragster the only way to fly was the rough, rugged and apparently very expensive AA/Fuel Dragster route.

In recent months though more and more crews, especially in Southern California which generally previews the coming attractions for the rest of the nation, have been exploring the increasingly popular Junior Fuel type cars and are captivated by what they found.

Although there is no specific class or rules for the Injected Fuelers, the competitors themselves have more or less evolved their own and the result is not only a potential new hope for drag racing in this country but also carries far-reaching and increasingly interesting international aspects.

Basically, the dragsters are up-to-date chassis designs, powered by injected engines under 305 cubic inches on strong loads of nitromethene. No superchargers are permitted, but all conventional safety equipment is required. Not only are the Injected Fuelers an economical approach to fuel racing, they are also rapidly proving to strip promoter, spectator and competitor that they can and do produce an extremely exciting competition show for the spectators.

As the class develops, more and more of the crews are hanging full bodies onto their cars, further adding to their overall appeal. None of the cars currently running in the Southern California area, however, would be turned down at even the biggest car shows.

"I'm looking at the Injector or Junior Fuelers more and more as a money attraction because they are colorful, interesting and reliable," observed a leading strip promoter. "They make smoke, but don't wipe out the entire area. You can see them all the way down and very seldom do you see a run that is more than a car open on the top end."

Reliability and economical operation are two of the cars' biggest selling points. Most of the engines currently running are 301 cubic inch Chevrolets, but as more and more interest develops in the class additional makes are expected to appear on the scene. The most logical challenger to the current titleholder is the 289 Mustang. Just a touch of the boring bar would bring it above the 300 inch mark. Other entries are expected to appear with small displacement MoPar engines. Even American Motors has a 290" that could prove to be a threat.

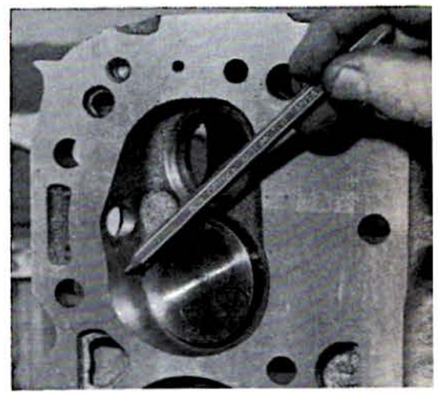
On the international scene, the Injected Fuelers take on a special appeal when F.I.A. engine sizes come into view. Since 305 cubic inches is a class break for international record purposes and adequate superchargers are not readily available in all countries, fuel dragsters in this bracket would be a natural starting point from some true world records with subsequent potential challengers from other drag racers in foreign countries where the sport is rapidly developing.

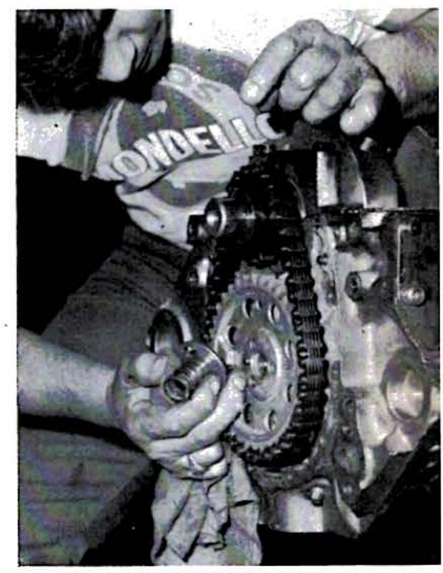
(continued on following page)

RIGHT — Very little machine work is needed in order to run stock heads on fuel. Opening up the area around the intake is an advantage, while a good valve job is a must. As engine develops, valves increase in size.

BELOW LEFT — Jim Ige is typical of the growing Injected Fueler clan. Owner of a service station, Jim finds class perfect spot to run a dragster without encountering all of the expenses faced by the supercharged fans.

BELOW RIGHT — Stock timing gear and chain worked so well Jim and Mike stayed with the set-up on their new "good" engine. Fuel injector pump drives off the front of the timing chain cover, presents no problems.





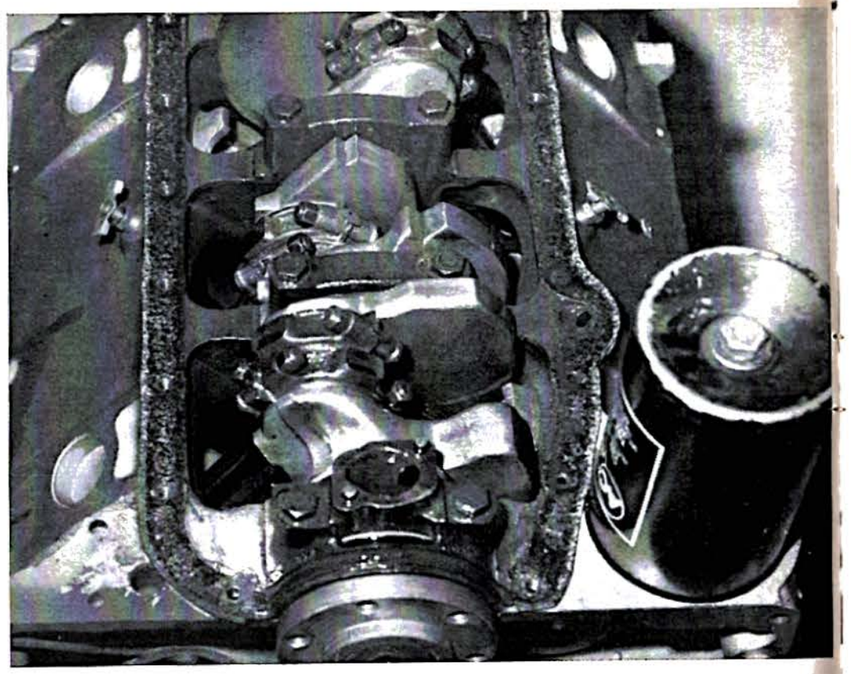
INJECTORS

Chevrolet's Z-28 Camaro option indicates a continuing supply of equipment for this size engine, if you don't go the do-it-yourself route. An equally interesting contender could develop with the availability of the Gurney-Weslake heads for the punched out 289 Ford.

Since Chevy is the pacesetter, however, let's introduce you to the thrill and excitement of Injected Fuelers, and how you can become a part of this rapidly expanding bracket of racing with a budget car. Typical of the growing number of cars is the entry of Jim Ige and Mike Sassa, a couple of average drag racers of the type that form the backbone of our exciting sport. Jim owns a Mobil station and grew up under the influence of an older brother, Fred Ige, who built and raced a variety of track roadsters and Bonneville machines. Mike works at a Union 76 station. A conflict arose as to which brand of gasoline they would use in their drag racing activities, so they solved the problem by deciding on fuel. Having neither the finances, time nor desire to enter the frantic world of AA/Fuelers, they decided to join the growing ranks of Injected Fuelers.

After exploring the various avenues of entry opened to them, they finally decided to travel the one probably best suited for any crew initially entering dragster competition – they bought a proven contender, a "last year's" model, from an owner who was moving up.

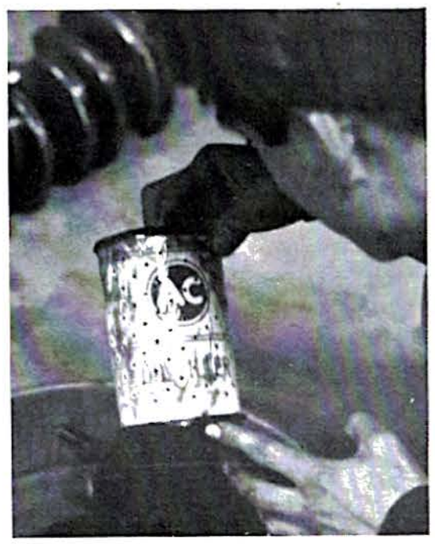
Before closing the deal, they doubled checked all the chassis and running gear (methods of discovering minute cracks and breaks, plus other potential component failure causes are explained in the Metal Processing story on page 36 of this issue of Car Craft). Having previously camapigned an altered Henry J Jim and Mike already had a small displacement Chevy engine, so this served as a basis for their Injected Fueler powerplant.

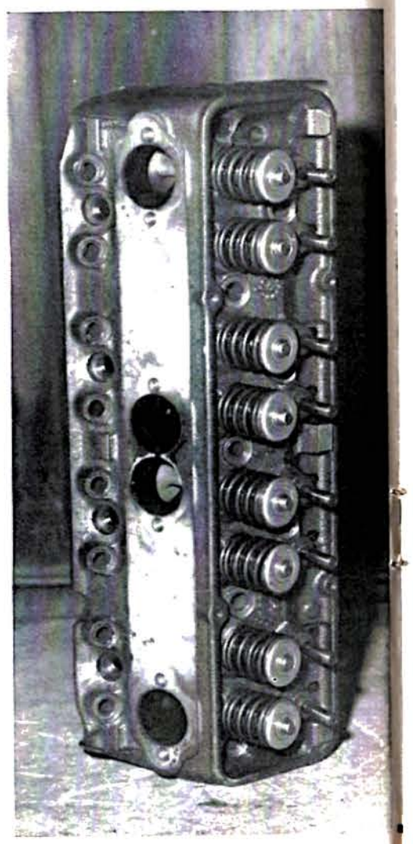


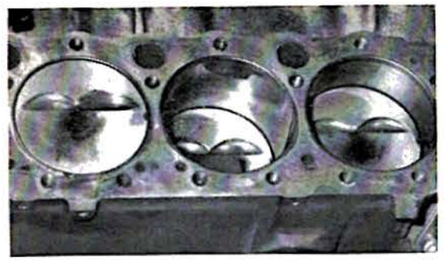
ABOVE — Another "clean as a whistle" shot of the Chevy stocker engine immediately after Jim and Mike pulled the pan. The stock rods held up amazingly well on the strong loads of 85% nitro. Pennzoil was credited with doing a terrific job.

BELOW — The only area that caused the crew any concern was the oil filter. Jim reports an AC oil filter solved all of their problems and is the only way to go in their estimation. Paint dissolving in nitro was problem with other filters.

RIGHT — Mondello heads were the only really expensive items on the original engine. Naturally, they went on the all-out powerplant. Mondello's detailed machine work really smooths out the flow of the fuel/air mixture, greatly boosting power.

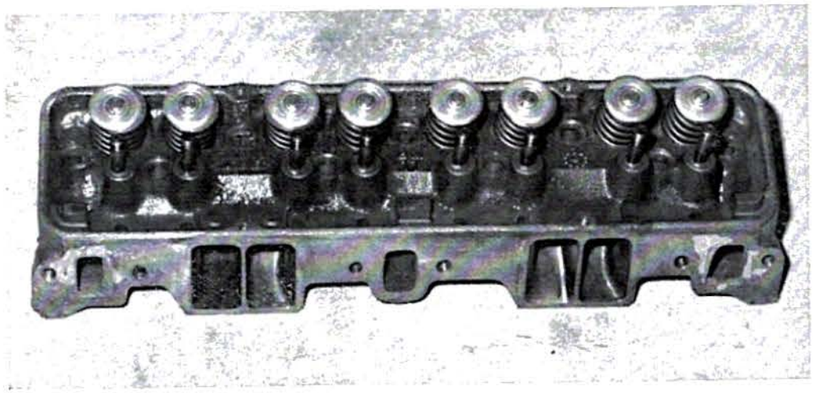


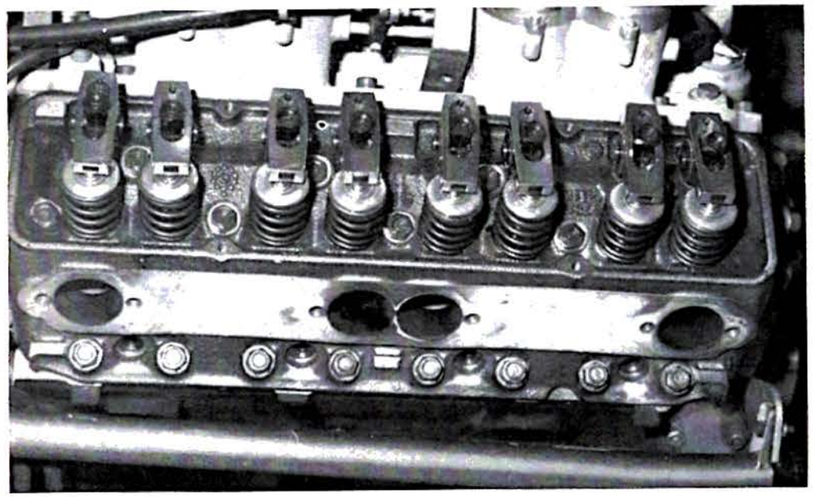


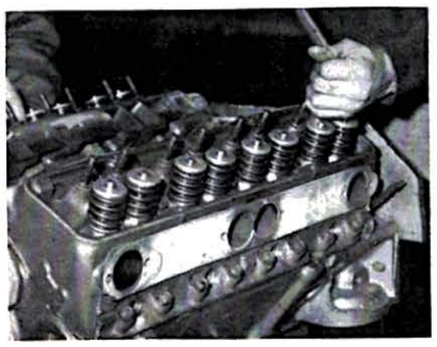


LEFT — Just a touch of heat was apparent when the heads were pulled from the parts book engine. Pistons were Jahns, pushing on Chevy rods. "Stocker" engine ran in good eights. With 50 runs on the engine, the crew had a perfect opportunity to give the stock components a very complete test.

BELOW — Intake ports received Joe Mondello's talented touch, opening up the passages to their maximum. Valve springs also came from Mondello's shop. Stock head bolts proved to be sufficient. A progressive development of the engine is the most logical route to follow.







ABOVE — Another budget expander, but one that Jim and Mike felt was a necessity, were the Mondello lightweight rocker arms. The Chevy really buzzes, even when using stock push rods. With the high-winding Chevys and other small displacement engines, some crews are investigating the possibilities of installing automatic transmissions for an even quicker starting line advantage.

LEFT — After previously racing an Altered, Jim was high in his praise of the easy access for engine work in the dragster. Engine was dismantled for photo session in less than an hour. The "good" engine went together with considerably more time spent to making sure everything was properly installed.

Because they were just starting out in the dragster ranks, they decided to stay with as many stock Chevy components as possible until Jim gained sufficient experience behind the butterfly steering wheel to make the change to the "good" engine.

Jim and Mike were very fortunate to acquire a 127 inch wheelbase Woody Gilmore chassis built in 1964. Although a few of the Injected Fuelers are running slightly longer chassis, this one has proven to be extremely stable and and "works" good. In fact, on the stocker engine Jim was well into the eight second bracket and was knocking at the 180 mph door. Even greater things are expected of the good engine outfitted with all of the latest trick stuff.

With the dragster already outfitted with an Olds rearend, Airheart spot disc brakes and parachute, the crew only had to concern themselves with the engine, although they did add an aluminum third member and a new "Rising Sun" designed Simpson chute to reflect their Japanese heritage.

When they rolled the revamped car onto the trailer for their first outing as a dragster crew they had approximately $1500 invested. Let's see what they did to the engine.

By matching a 283 crank to a 327 block, they arrived at the popular 301 cubic inch displacement with all Chevrolet stock parts. Stock rods were also used, but they did go to Jahns cast pistons. Although the engine was not blueprinted in the strict sense of the word, they did match things up as close as possible. Federal-Mogul bearings went around the stock crank, with the rod bolts torqued to 35 foot pounds.

Staying with the stock components as far as they could, Jim and Mike installed Chevy mains, torqued to 80 foot pounds. To their continuing surprise, the stock oil pump performed flawlessly, maintaining a constant supply of Pennzoil throughout the engine. Jim stressed one very important part during the teardown of the stocker and subsequent assembly of the good engine. They found the AC oil filter PF 141 was the only one adequate for their fuel engine.

"You have to be real careful that the paint or the element itself doesn't melt in the nitro and clog everything up," he explained.

Although they made a couple of small clearance changes, the stock Chevy oil pan was used, completing the bottom end.

Moving up through the engine, an Isky 550 cam and lifters actuate stock push rods. A preview of things to come –and their only deviation from the budget engine–was the installation of a set of Joe Mondello reworked heads.

(continued on following page)

INJECTORS

They felt this was the one area in which to spread the bread a little thicker. Mondello also supplied the chrome valves, springs and rocker arms. After installing Sterling rings on the Jahns pistons, the Mondello heads were nailed down with stock head bolts torqued progressively to 90 pounds. Fitzgerald head gaskets were used, after soaking them in water for about 15 minutes and being coated with K&W sealer.

On the front of the engine, a stock—but lightweight — timing gear and chain were used. The Enderle 180 injector pump mounts on the cover.

Champion VJ60P plugs fired by a Joe Hunt Magneto carrying 55 degrees lead went into the holes and the engine was topped off with the Enderle injectors, equipped with a 101 jet. A compression ratio of 11.5:1 completes the basic engine nomenclature.

An interesting sidelight to their Enderle injectors was the estimated 15 horsepower increase after the interior of the injector stacks were sprayed with a Sperex compound designed to smooth the flow of air.

At the back of the engine a balanced Schiefer clutch and flywheel assembly coupled the engine to the short shaft and rearend. They were wrapped up in a safety shield made by Henry's Machine Shop.

In its finished trim, the Injected Fueler weighs in at 910 pounds, producing a well balanced and safe race car. Running a mixture of 85% nitro, the engine will consume approximately one and one-half gallons of fuel per blast.

"Including hot dogs and Cokes, we spend about $25 each time we go racing," Jim guesstimated.

With their apprenticeship completed Jim and Mike decided they were ready for the next step up—installation of the trick stuff. Although these components almost doubled their initial investment, they feel they are still budget racing.

Having made almost 50 runs on the stock engine and with 8.20-15 M&H slicks they bought used, Jim and Mike encountered no additional expense except for fuel, oil and plugs.

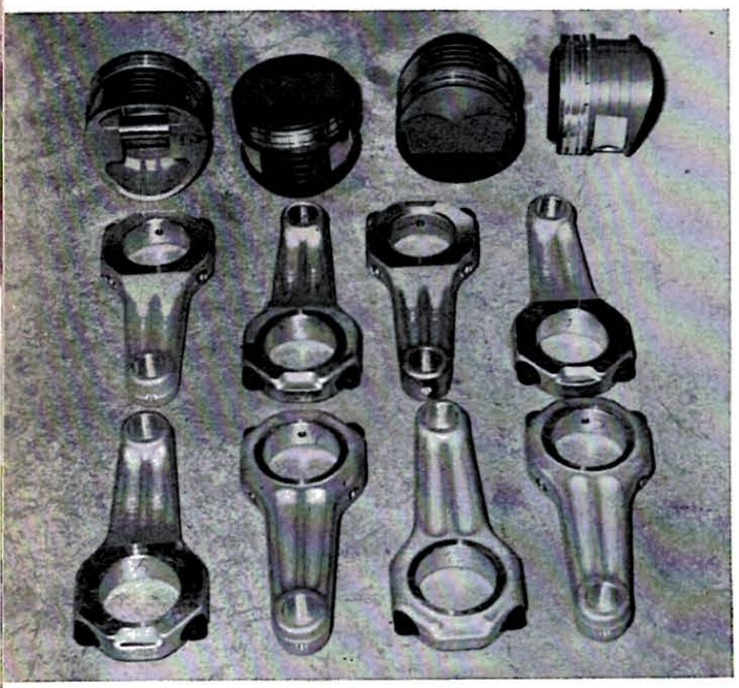
Pride of ownership, which was clearly reflected in Jim's extremely neat house and work garage, inspired him to build a new body for the car, plus applying epoxy to the painted chassis to protect it from fuel. Although he admitted to several problems with the body, the numerous compliments and queries as who handled the metal work and paint job—which Jim also did—made it well worthwhile.

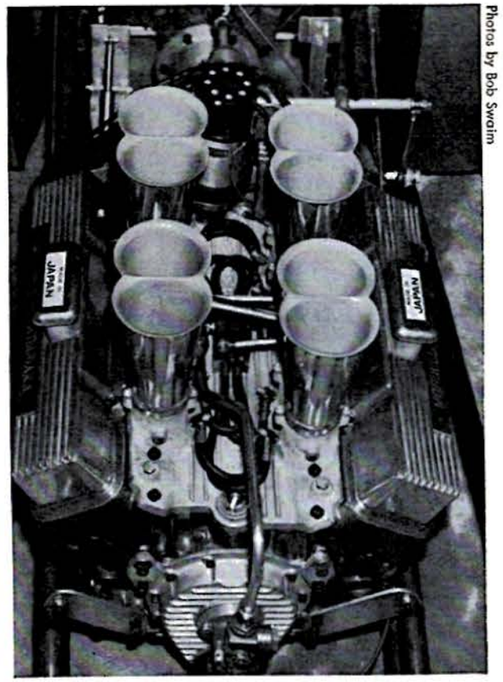
Although they hesitated to make any predictions, Jim and Mike gave indications of runs approaching the magic sevens with the good motor. An interesting aspect of all the Injected Fuel crews is the fact that very seldom does top end speed enter into their discussions. Apparently, they are mainly interested in winning races, not big numbers.

Staying with Enderle injectors and Mondello heads, the good engine was outfitted with a new Isky 550 cam and Crankshaft Co. crank. Expecting wilder things in the horsepower department, they installed a Milodon girdle. Mickey Thompson aluminum rods were matched to Venolia pistons. The rods were set up with .002 to .0025 clearances and the bolts were "snugged" up 25-45-60-70 pounds torque in rotation.

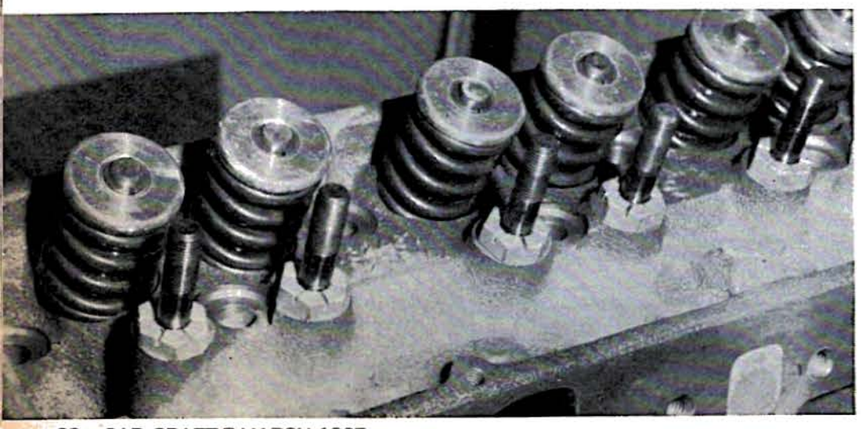
Before the high performance components went into the block, it was line-

(continued on page 72)





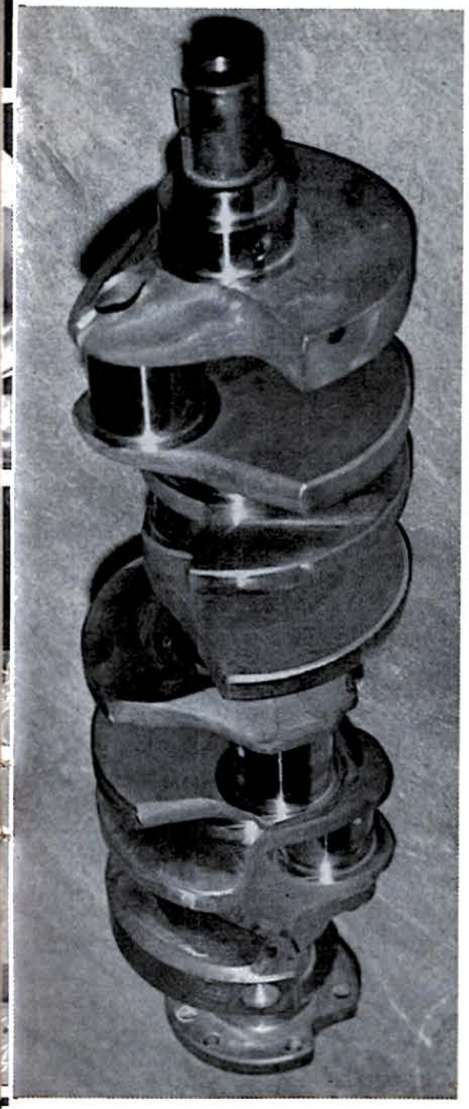
Photos by Bob Swaim

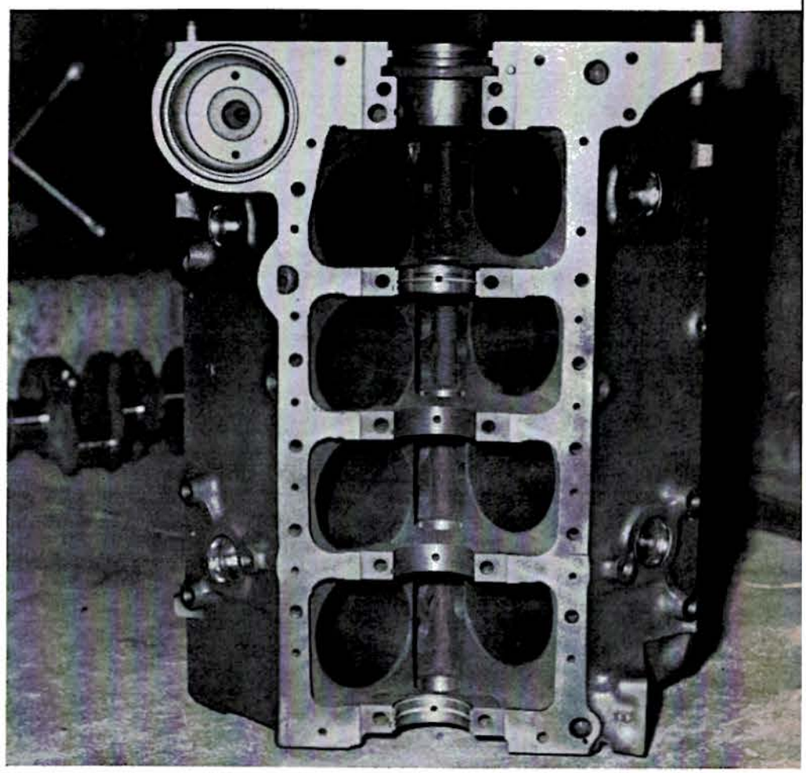


ABOVE LEFT — When the new engine was started, the first purchases were M/T rods and Venolia pistons. Pistons were coated with space-age chemical to withstand heat in case engine leans out.

ABOVE — Enderle injectors received an inside coating of special Sperex chemical for smoother fuel/air mixture entry. Magneto is by Joe Hunt. Engine produces very neat appearance.

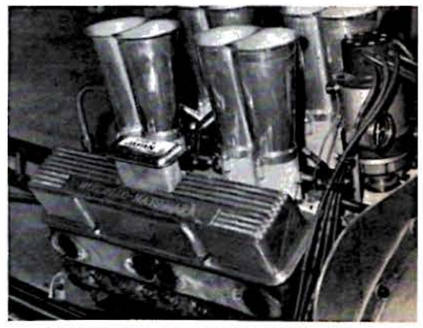
LEFT — Screw-in studs are gaining in popularity with many builders of Injected Fuel cars. Availability of all types of speed equipment for the smaller Chevy engines makes it a wise engine pick.





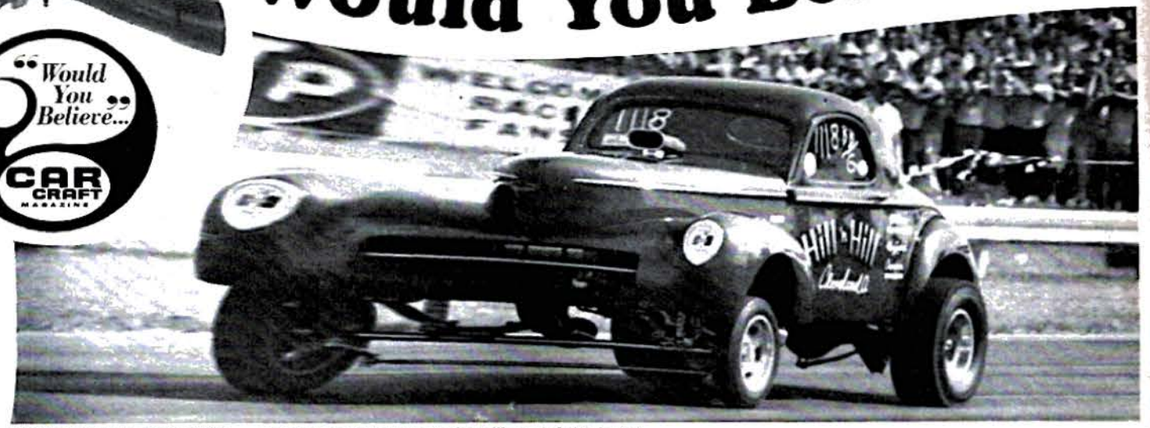
LEFT — Another "must" in the good engine was a Crankshaft Co. product, although 283" stocker unit worked very well in the first engine. Components can be added separately as you go along.

ABOVE — With the new engine, Jim and Mike went all the way with special machine work on the block before they started assembly. Milodon girdle was added for support in the "good" engine.



RIGHT — When the engine was all buttoned up again and almost ready to fire up, the crew added their "Made in Japan" trademark sticker with pride. At presstime, engine had not yet run.

Would You Believe...

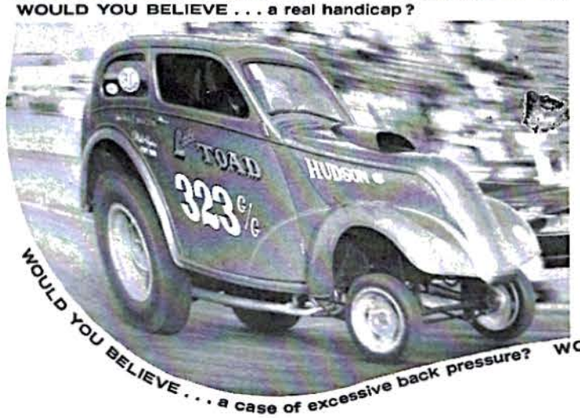


WOULD YOU BELIEVE . . . a woman drag racer signalling a right turn?

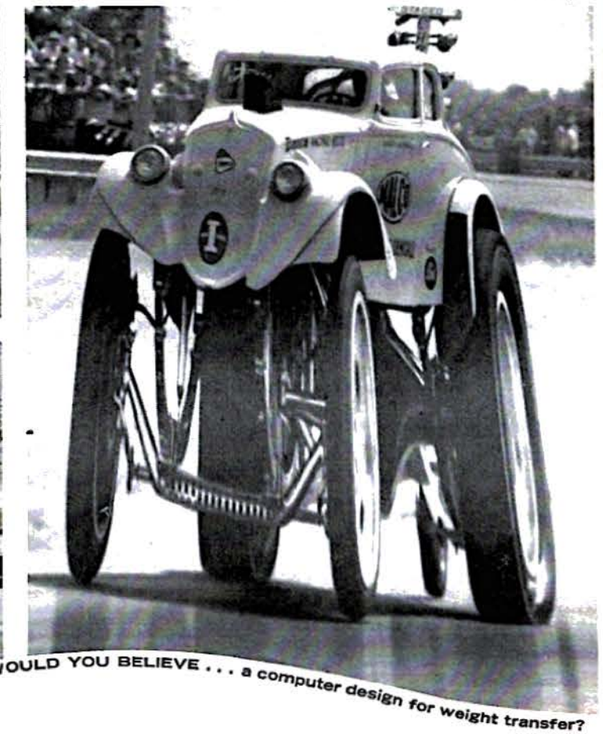
WOULD YOU BELIEVE . . . I call my Anglia Pinnochio?

WOULD YOU BELIEVE. . .an unreal handicap?

WOULD YOU BELIEVE . . . a real handicap ?



WOULD YOU BELIEVE . . . a case of excessive back pressure?

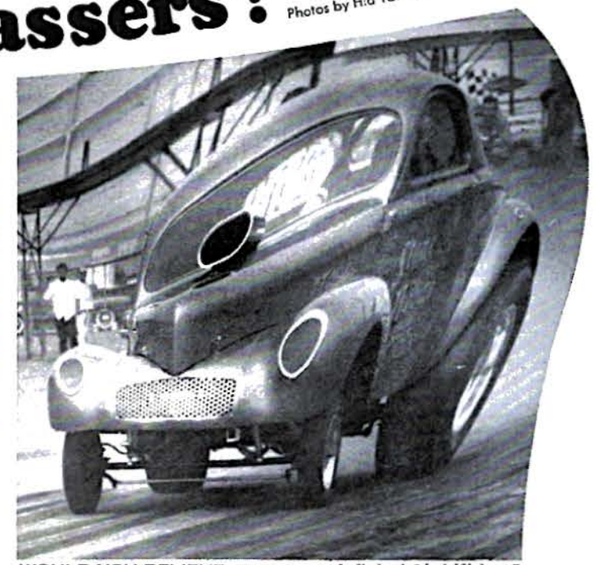


WOULD YOU BELIEVE . . . a computer design for weight transfer?

These Goofy Gassers?

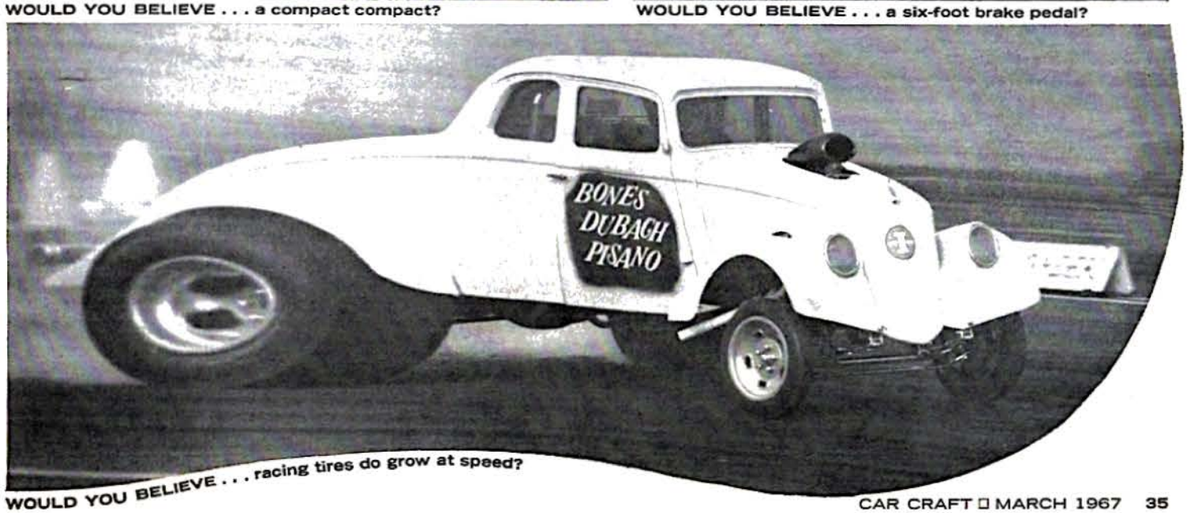
Photos by Hida Takano

WOULD YOU BELIEVE . . . a compact compact?



WOULD YOU BELIEVE . . . an over inflated Air Lift bag?

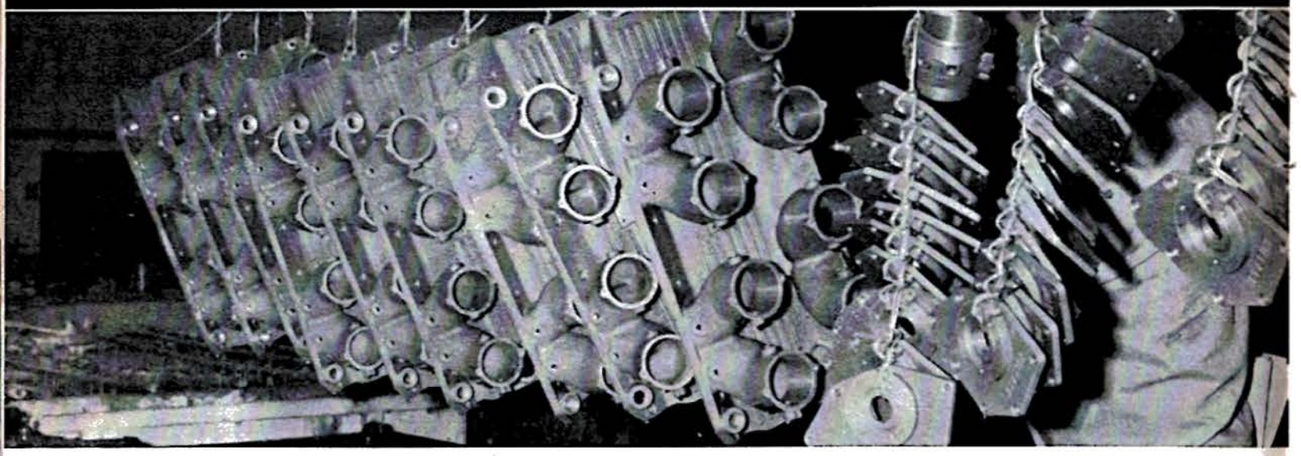
WOULD YOU BELIEVE . . . a six-foot brake pedal?



WOULD YOU BELIEVE . . . racing tires do grow at speed?

With many new space age procedures being applied to speed equipment, it's about time we went "back to school" for a quick class to find out...

WHAT'S IT ALL ABOUT



METAL PROCESSING

BY TERRY COOK ■ How often have you been breezing through a technical article and suddenly come across a phrase like "the 6061 T-6 billet was heat treated and hard anodized" which stops you cold? Perhaps you have a vague idea of the different concepts and processes which are mentioned, but without a full understanding you all too often lose a bit in the translation. One must realize that the hot rodding and drag racing worlds have broadened in scope in recent years and now involve many space-age technical processes which seemingly require a college degree to understand. Actually, however, these processes are each relatively simple and easy to understand when examined one by one. Here now is a technical glossary of metal processing and related subjects in layman's terms.

A.I.S.I. AND S.A.E. DESIGNATIONS

One of the first things we must do is identify the types of materials we are dealing with, and show how they are tagged and identified by those metallurgists who work with them. The American Iron and Steel Institute (A.I.S.I.) and another group, the Society of Automotive Engineers, Inc. (S.A.E.), have developed a set of combined lists for specifically identifying the various types of steels that are available. Initially one must understand that there are two basic types of steels, the plain carbon or "mild steel" series and alloys. The plain carbon steels contain only carbon, manganese, phosphorous, and sulpher while the alloys of steel contain chromium, molybdenum or vanadium. These additional elements are added to the steel to give it certain desirable properties, like added strength, ductility (ability to be drawn or hammered thin) or malleability (capable of being formed or shaped with a hammer).

Basically each type of steel is identified by a four digit series of numbers like 4130 steel. The first two numbers (41 in this case) tell us that the metal is a type of steel which contains the element molybdenum, while the last two numbers (30) indicate that the steel is 30 percent carbon. If we were concerned with 4147, we would know that it was a molybdenum steel which was 47 percent carbon. Perhaps this chart will help clarify matters.

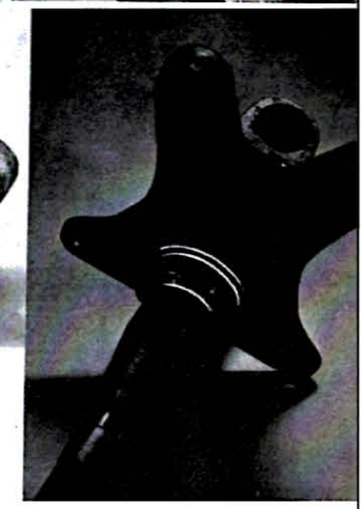
Plain Carbon Steel (contains no alloys)		
1000		
Nickel-Chromium Steels		
3100	3300	
Molybdenum Steels		
4000	4100	4300
4400	4500	4600
4700	4800	
Chromium Steels		
5000	5100	5200
Chromium-Vanadium Steels		
6100	8100	

ABOVE — The magnetic inspection process, often referred to as Magnafluxing, aids in the detection of minute surface flaws, which lead to cracks. After part is magnetized, a mixture of iron oxide and kerosene is used to find any flaws.

ABOVE CENTER — Those "harmless" little surface cracks work their way down into the part, resulting in failure. The area on the top half of the end of this broken spindle is from the cracking; the rough grain shows areas where it snapped.

ABOVE RIGHT — A new process which is being used is electric arc metal spraying, shown here. A Schiefer pressure plate face receives a coat of molten copper and steel while it revolves at 200 rpm, which produces a longer lasting product.

RIGHT — With the penetrant inspection process, flourescent dye is used and detected with an ultraviolet light. The spindle shown here appears normal in the daylight, but under the "black light" all those white lines mean dangerous cracks.



So we can see by the first two numbers what general classification or series the steel is a member of, and interpret the last two digits as the percentage of carbon contained in that particular steel. The common terminology "chrome-moly," which is often used when referring to 4130 steel, indicates that it is a molybdenum steel which also contains some chromium. In addition, different numbers are used to identify other types of alloys. The classification 6061 stands for an aluminum alloy, rather than steel. Numbers and letters which are tacked onto the end of the designations such as 6061 T-6 indicate the type of heat treating process to which the alloy has been subjected.

CLEANING PROCESSES

Before any metals undergo a high number of processes they must be totally cleaned so as to rid them of scale, dirt, grease, rust, or other foreign matter. The reasoning behind this is quite simple; a coat of grease clinging to a certain portion of a metal part could prevent a planned chemical reaction from taking place when that part is submerged in a tank of liquid. Since there are a number of different forms of material to be removed from the parts to be treated, there are understandably a number of different processes to clean the parts. The parts may be subjected to a soap and lather to remove dirt, or a special degreaser, which is a solvent that may be sprayed over the part in question. Often the metal will be dipped in a tank of dilute acid to remove scale or rust. The term pickling refers to dipping a metal part in an acid solution for cleaning purposes. Another method of cleaning a part is by sandblasting or spraying the part with a mixture of pressurized air and fine grit sand. If minute glass beads are used, the process becomes vapor honing, and if small steel balls are used the process is known as shot peening. These are just a few of the various cleaning processes which are used. The important thing to remember is that clean parts are important in metal processing.

ELECTROPLATING

One process which is very popular with drag racers and hot rodders alike is chrome plating of accessory parts for appearance. In addition, cadmium, nickel and copper plating utilize similar conditions. In general, the process is called electroplating, where the part is dipped in a metal solution after it has been cleaned, and an electric current is passed through the part into the solution.

In the cadmium plating process after cleaning with acid solution and a degreaser, a thin coat (.0002 to .0005 inches thick) of cadmium is electroplated onto the part, providing a good corrosive protection at a price cheaper than chrome plating. The reason chrome plating costs more is quite simple – more steps are involved in that process. First, the part is dipped in acid and degreased; then polished and copper plated. Next the part is buffed, then re-cleaned and finally bright nickel plated. After another cleaning a thin coat of chromium is plated on. This coating is between 10 and 50 millionths of an inch thick, and is so thin it is

(continued on following page)

METAL PROCESSING

actually transparent. The sparkle you see is really the nickel plating, as the chrome is only a protective coating to keep the nickel from tarnishing. When looking at a part that has been plated with a silver colored coating, if the silver has a blue tint to it in the light it's chrome plated, while if the tint is yellow, the plating is nickel.

ANODIZING

While it is impossible to electroplate aluminum, there is another process which has become very popular with these parts. The process is called anodizing and it boils down to a controlled oxidation of the surface, producing a corrosion resistant finish. Oxidation is nothing more than combining oxygen with the material, as the oxidation of iron is called rust. Because anodizing is a CONTROLLED oxidation process, the surface of the parts have a smooth and uniform finish. The process is basically simple. After the cleaning steps, the part is dipped in a 15% sulfuric acid-85% water solution. A current is passed through the part and solution (with reverse polarity to that used in the electroplating process), and as a result the oxygen in the sulfuric acid is freed and joined onto the aluminum. An average anodized layer of oxidized aluminum is about eight ten thousandths of an inch thick. Hard anodizing is simply a variation of the normal anodizing process, except the sulfuric acid solution is colder and more electrical current is used, thus producing a thicker coat. This is for wear resistance rather than just corrosion resistance; a hard anodized layer may be .0003 of an inch thick. A good use for hard anodizing is salvaging parts, such as a badly worn blower which is too loose. By hard anodizing the rotors or case, the tolerances may be closed back up, producing a good airtight fit. Color anodizing simply involves dunking the anodized part in a colored dye and then in the sealer, resulting in a colored finish. Do not confuse electroplating, where a layer of a different metal is added on top of the surface of the metal, with anodizing, where oxygen combines with the surface of an aluminum part.

CHEMICAL CONVERSION COATING

Here is another process for working with aluminum with a better known common name of iriditing. In essence, after the aluminum has been thoroughly cleaned, it undergoes a chemical dip process which leaves a thin (25 to 50 millionths of an inch) coat of chromate on the surface. This coat offers good corrosion protection to the aluminum, and can be detected by a light yellow to bronze coloring on the surface. The longer the part is dipped in the chromate, the darker the yellow color will result. This process, usually called iriditing, can also be done to cadmium plated steel.

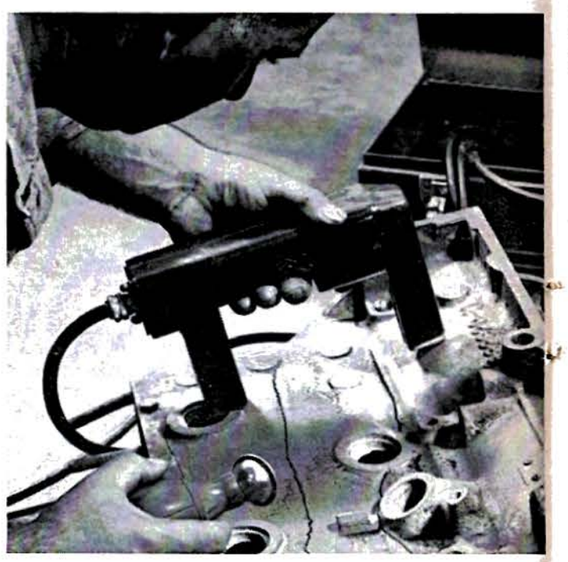
HEAT TREATING

Here's a term that's heard often around drag racers, yet how many of them really understand what goes on in this process? The object is to produce a certain hardness in the metal part for various reasons, and with this controlled process, the correct results can be obtained with precision. To start things off, the part to be heat treated is placed in a furnace and heated to a temperature from 1500 to 1700 degrees Fahrenheit. The oven is kept at that temprature until the part is of uniform temperature throughout. It is then dropped into a vat of liquid. This step is known as quenching. The heated part is rapidly cooled in the liquid which may either be oil, a liquid chemical salt, or water. The cooled part is then removed from the quenching tank and placed in another smaller oven known as a draw furnace. Here the part is re-heated to a specific temperature, lower than 1500 degrees Fahrenheit, and kept there for a specific amount of time. This step is referred to as tempering. Then the part is cooled in the air. The process might not seem to make sense: first heating the part, then the rapid cooling, then re-heating and finally air cooling, but the important thing is that the process works perfectly. The crucial thing is that final temperature the metal is raised to, as this gives the metal certain properties, such as a specific hardness which is what we desired.

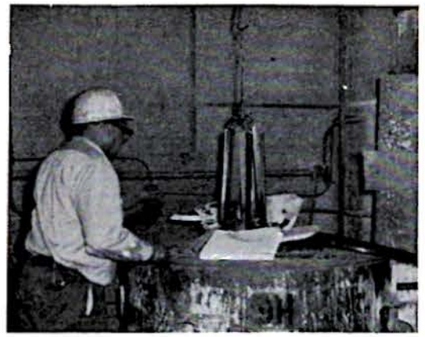
CASE HARDENING

In many cases, rather than wanting the entire part hardened throughout, a hardness is only desired on the surface, or certain portions of the surface. In this case, we utilize the case hardening process to obtain the desired results. This general classification of case hardening is often referred to as surface hardening or carborizing. The process itself is not too complicated and begins by placing the part to be carborized in a special furnace which is lined with coke (a coal like substance which is pure carbon). The part is heated to 1500 degrees Fahrenheit and the surface of the metal absorbs the carbon from the surrounding coke which has a hardening effect on it. The part is then air cooled and heat treated. There is an alternative method of case hardening where the furnace is filled with liquid cyanide rather than coke, but it has the same effect as the

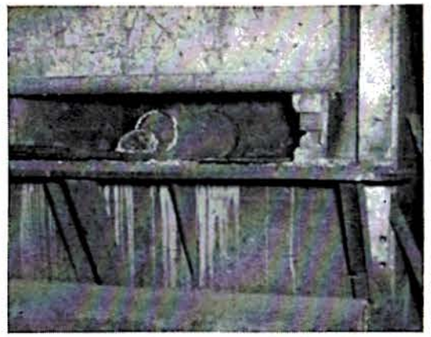
(continued on page 74)



Some objects which we may desire to subject to the magnetic inspection process are simply too big to fit in the machine. This small hand held Magnafluxing gun solves the problem, is a small portable unit which can be conveniently carried anywhere.

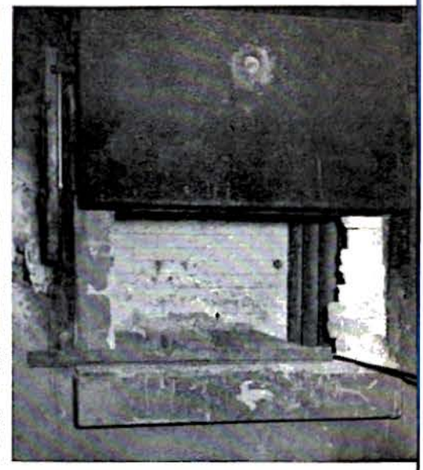


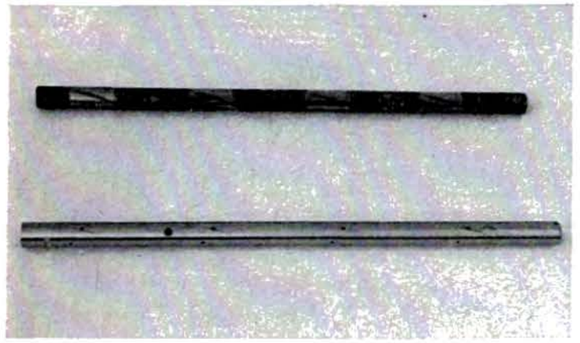
A few camshafts, along with some metal rods are about to receive the case hardening at E&J Heat Treating in L.A. That furnace is filled with a liquid cyanide, and carbon from the cyanide is absorbed by the surface of the heated camshafts, resulting in a harder surface for better wear. Copper plating certain areas prevents hardening.



After the camshaft surfaces absorb carbon from the cyanide, a furnace heats them to specified temperature starting the heat treating process.

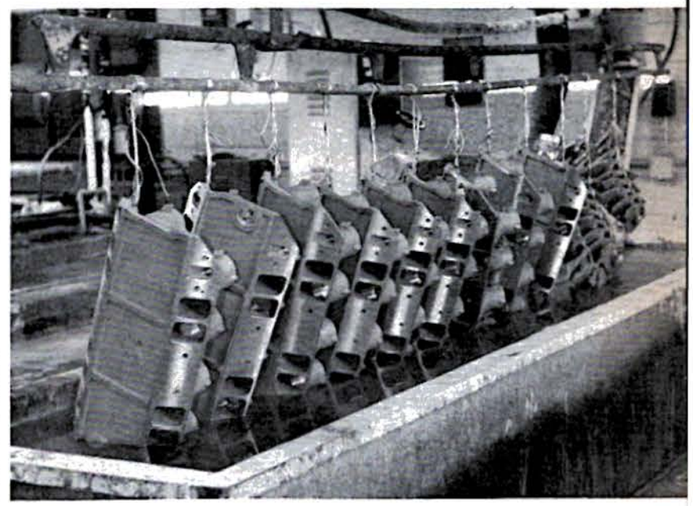
RIGHT — The cams are then quenched, and put in a draw furnace, completing the desired surface case hardening of carborizing process.

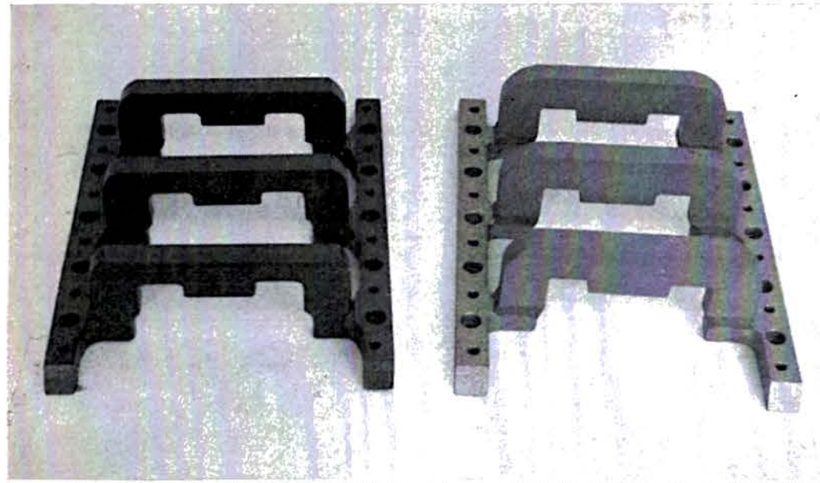




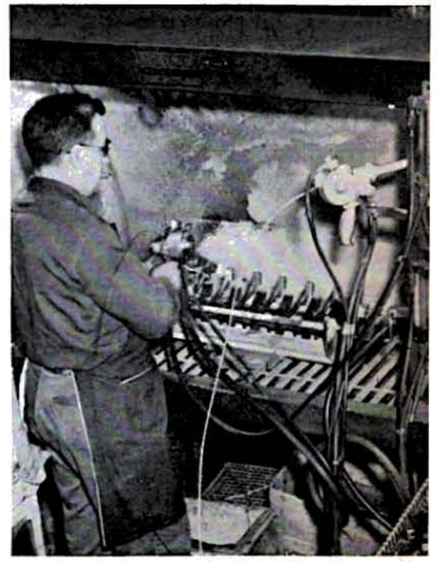
A pair of early Chrysler rocker arm shafts are shown before and after the hard chroming process. The plating increases durability and wear. Milodon Engineering in Van Nuys, California, uses many metal processing techniques to produce quality products like this.

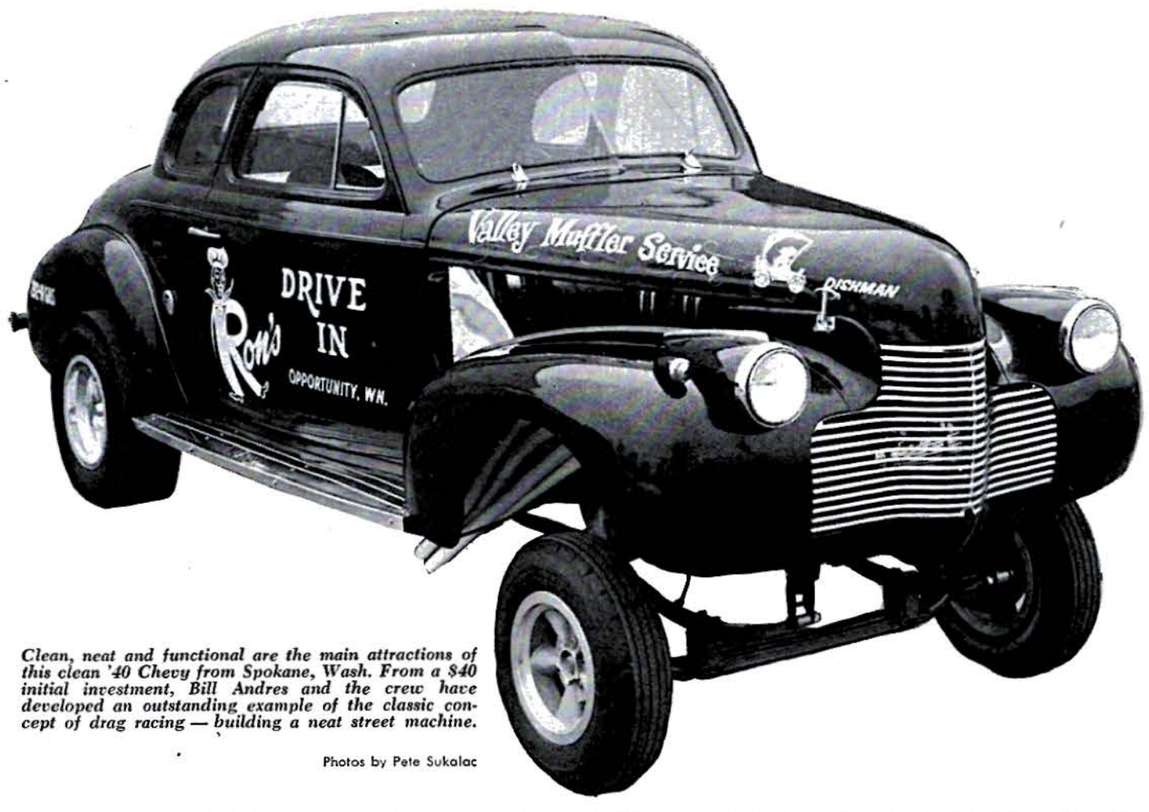
RIGHT — Another speed equipment manufacturer using metal processing is Fuel Injection Engineering. These Hilborn injector castings are anodized at Orange County Metal Processing, thus producing a wear resistant finish. Organic dyes are available for color anodizing.





Another before and after, this time two Milodon main supports. The girdle on the right has been sandblasted; the one on the left was black oxided. Lye bath provides color coat preventing rust.
RIGHT — Another example of metal spraying, in this case using a hand held gun. In early days of rodding, metal spraying was used in the manufacture of stroker cranks, method is now outdated.





Clean, neat and functional are the main attractions of this clean '40 Chevy from Spokane, Wash. From a $40 initial investment, Bill Andres and the crew have developed an outstanding example of the classic concept of drag racing — building a neat street machine.

Photos by Pete Sukalac

COUPE BY COMMITTEE

Getting a group of seven car enthusiasts to agree on anything is usually quite a task, but when the gang at Ron's Drive-In decided to build up a drag racing vehicle, a '40 Chevy coupe was the unamimous choice of everyone involved. It also turned out to be a winner . . .

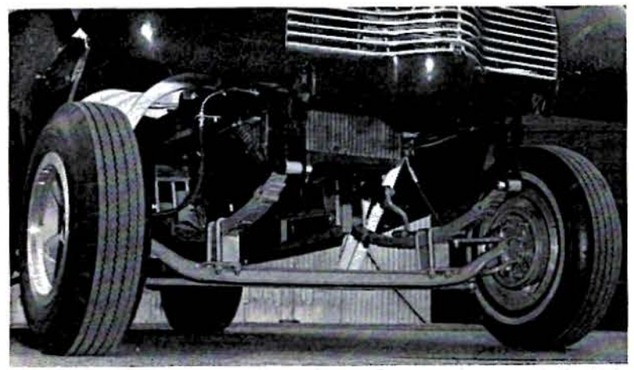
TRADITION HAS IT that the camel was designed by a committee which couldn't agree on what they wanted to build. The exact opposite situation preceded the construction of Bill Andres' super-sanitary '40 Chevy coupe. Although there were eight people involved in the building of the Gasser, they all agreed as to exactly what they wanted and the end result was a "blueprint" of their original idea.

Down through the customizing years, the '40 Chevy coupe has enjoyed periods of acceptance with the show circuit clan, but the Ron's Drive-In crew proved it was also a good year for racing. Joining with Bill in building the car were his brothers Dutch and Karl, Bill and Larry Schierman, Jim Poston, Bob Hodge and Gene Kicha. They also received major support from sponsor Joe Genova of Opportunity, Wash., in converting the car from a $40 bargain to a championship trophy winner.

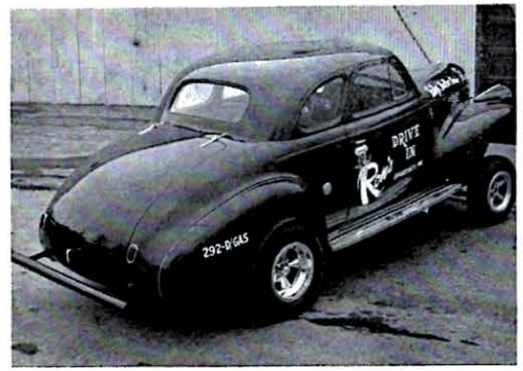
The process took almost three years, but everyone agrees it was well worth the time and effort.

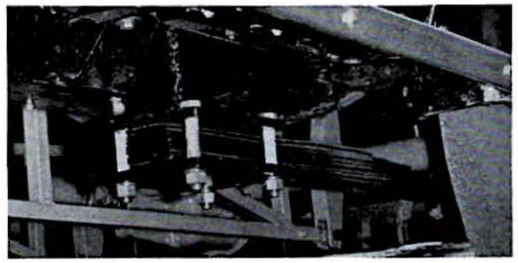
In the engine compartment, the Committee agreed upon a 283 cubic inch Chevy bored out to 292 cubic inches. A Chet Herbert roller cam and M/T rods and pistons were the main internal changes. On top, they installed a Hilborn port injector unit.

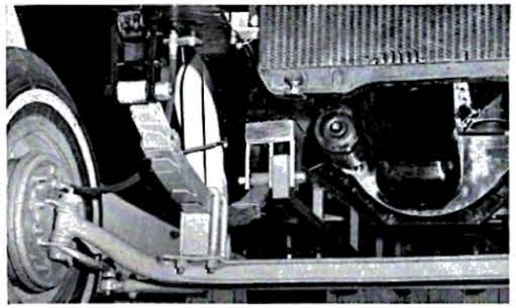
Weber flywheel and clutch assemblies tie the engine to the Chevy four-speed Muncie transmission, which was outfitted with a Hurst Competition Plus shifter. The stock '40 Chevy frame was retained, but extensively modified for maximum efficiency. Monroe shocks went on front and rear. A '40 Willys contributed the spindles and front brakes, while the rear brakes are of '50 Mercury vintage. The entire front suspension is from the '40 Willys, giving the car very favorable weight transfer characteristics. *(continued on page 42)*

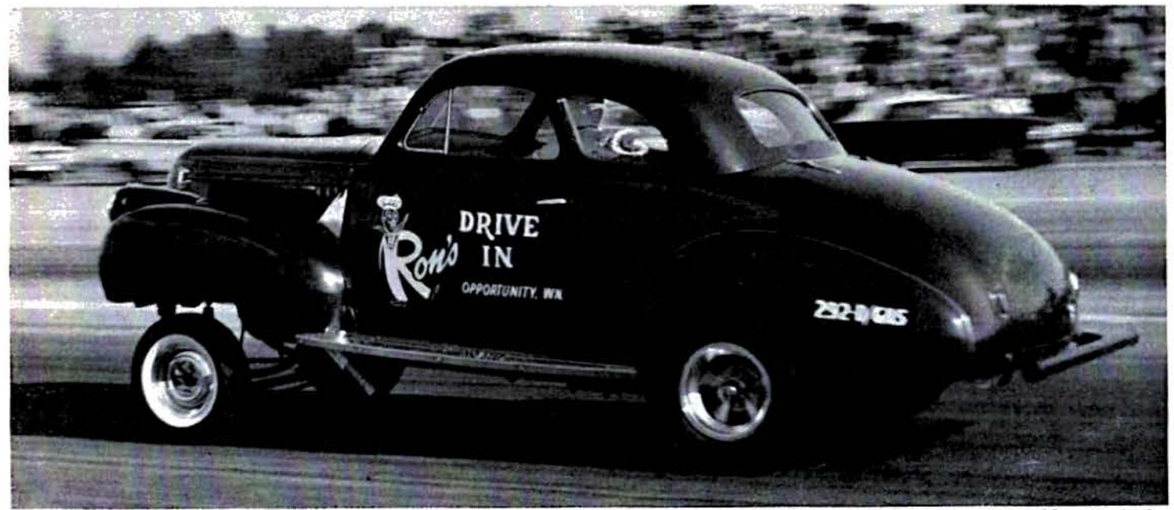


Starting with the stock '40 Chevy chassis, the committee used all of the tricks in the book to attain maximum acceleration. The front suspension came from a '40 Willys, as did the brakes and spindles. Full length torque arms tied on at the rear of the front springs, carried all the way to the rear axle housing. Rearend was from a '50 Mercury. Beefy quarter-elliptic springs handle the rear suspension assignment, while the shocks are Monroe all the way around. The crew found a 5.38 gear the best for the rearend. Transmission is a Muncie four-speed unit.







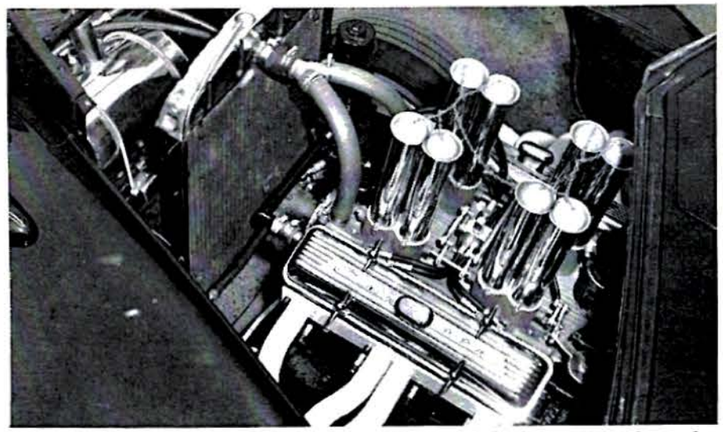


ABOVE LEFT — The finished product gave the committee just what they were looking for, a real fun car capable of winning. Bill Andres handles the driving chores, switching the gears with with a Hurst Competition Plus shifter. Upholstery is black leather. ABOVE — At the strip, the black beauty has taken on the best available in the Pacific Northwest and came home with the gold.

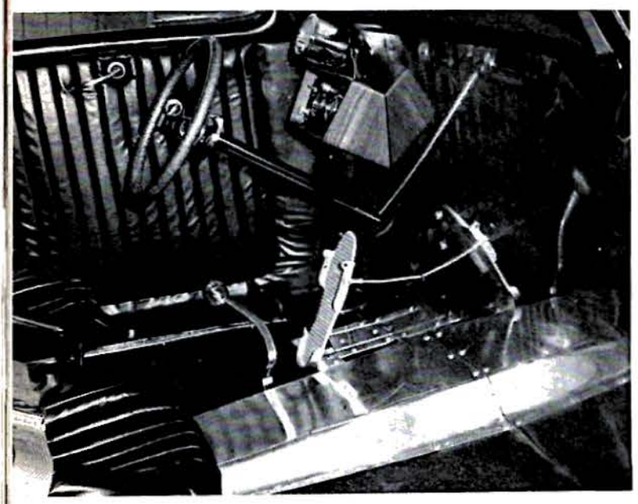
COUPE BY COMMITTEE

After detailing the stock '40 Chevy body, the crew gave it a boss blue enamel paint job, using '65 Pontiac blue. The interior was upholstered in black roll and pleated leather by the Committee. An ultra-sharp hand formed dash is highlighted by an instrument cluster with all the necessary gauges.

In its finished trim, the car weighs in at 3400 pounds and definitely meets the Committee's desires of having something to race competitively instead of just being fans.



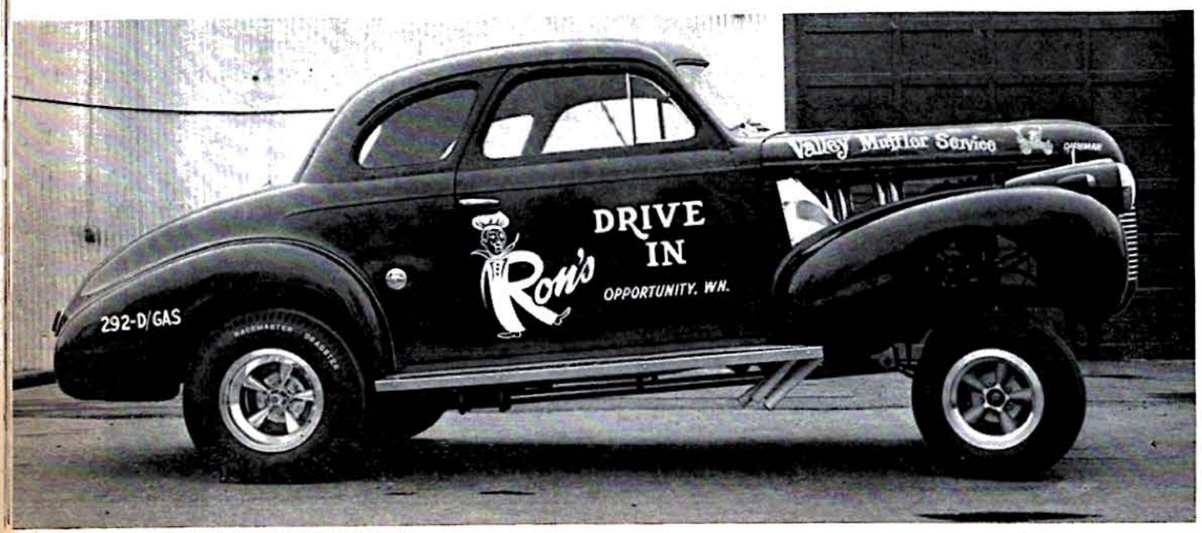
Power for the coupe comes from a bored out Chevy V8 displacing 292 cubic inches. Chet Herbert made the cam, while Hilborn supplied the injectors and pump system.



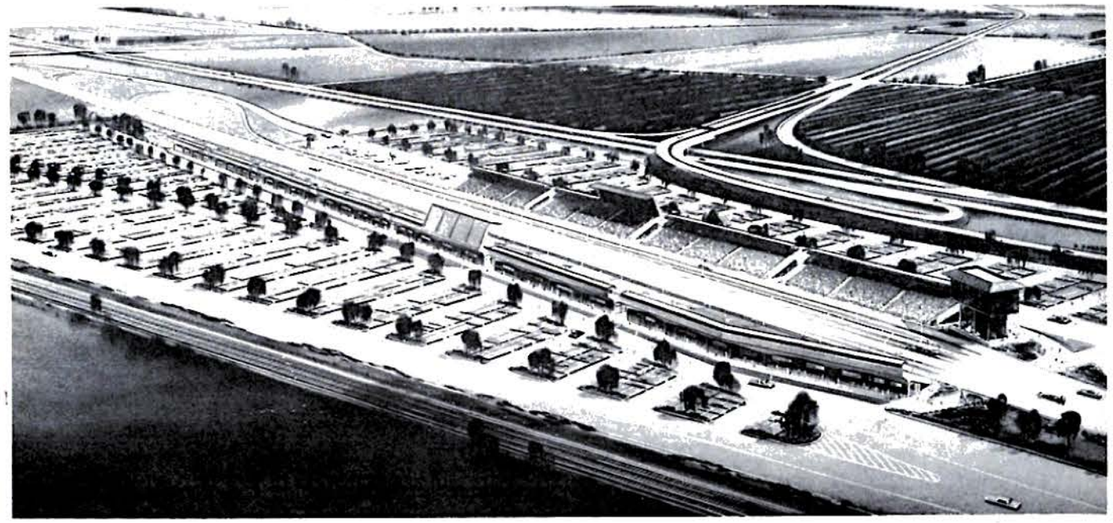
ABOVE — Neat instrument cluster was made by the crew, houses all the necessary Stewart-Warner goodies. Fuel shut off is handy at left of the console. Crew fabricated aluminum work.

LEFT — Everything that's required and nothing extra was the decision for the interior and that's what they ended up with. Covico steering wheel works with a Ross steering unit inside.

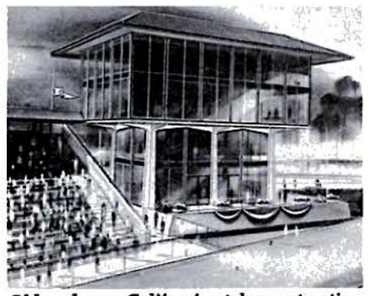
BELOW — Car weighs in at a hefty 3400 pounds, but has an impressive performance record with runs above 110 mph and elapsed time marks approaching the 12.50 bracket for the dash.



ORANGE COUNTY INTERNATIONAL RACEWAY



SOUTHERN CALIFORNIA GETS MULTI-MILLION DOLLAR SUPER-STRIP



Old and new California style construction will be utilized for ultra-modern timing tower, other buildings and grandstands.

SPECTATORS and competitors will share star billing on an equal basis at the new Orange County International Raceway, according to officials of the new drag racing complex. The multi-million dollar super-strip is being built on the grounds of Southern California's historic Irvine Ranch.

Orange County Raceway is the first drag racing facility to be built around the "stadium idea," according to William T. White III, president of the firm which will build and operate the track.

"Other strips have been laid out primarily to serve the participants, with spectators receiving secondary consideration," White observed. "Orange County International Raceway is intended to put the fan in the best possible position and to provide him with every comfort," White added.

Even the buildings, which have been designed to complement the Irvine Company's blend of "old and new California" architecture, are totally unlike those of any racing plant in the world.

To be erected on a 120-acre site close to the intersection of the Santa Ana-San Diego freeways, the complex will eventually include permanent stadium-type concrete grandstands; display and working space for manufacturers and retailers totalling more than 100,000 square feet; a four-story glass enclosed control tower and press facility which includes a TV camera deck; attractive, tree shaded picnic area; completely paved parking for thousands of cars; numerous food concession installations and a playground for children whose parents may be spectating or participating at the raceway.

Competition will be conducted under the sanction of the National Hot Rod Association, pioneer governing body of the sport. Through NHRA's affiliation with the world-wide organization ACCUS-FIA, OCIR's major championship events will be eligible for inclusion on the international racing calendar.

Participants will find an outstanding layout with emphasis on safety, communications, and service provision. The 70-foot wide strip will be paved for 4200 feet with the newest formula high-traction asphalt. Past the timing trap there

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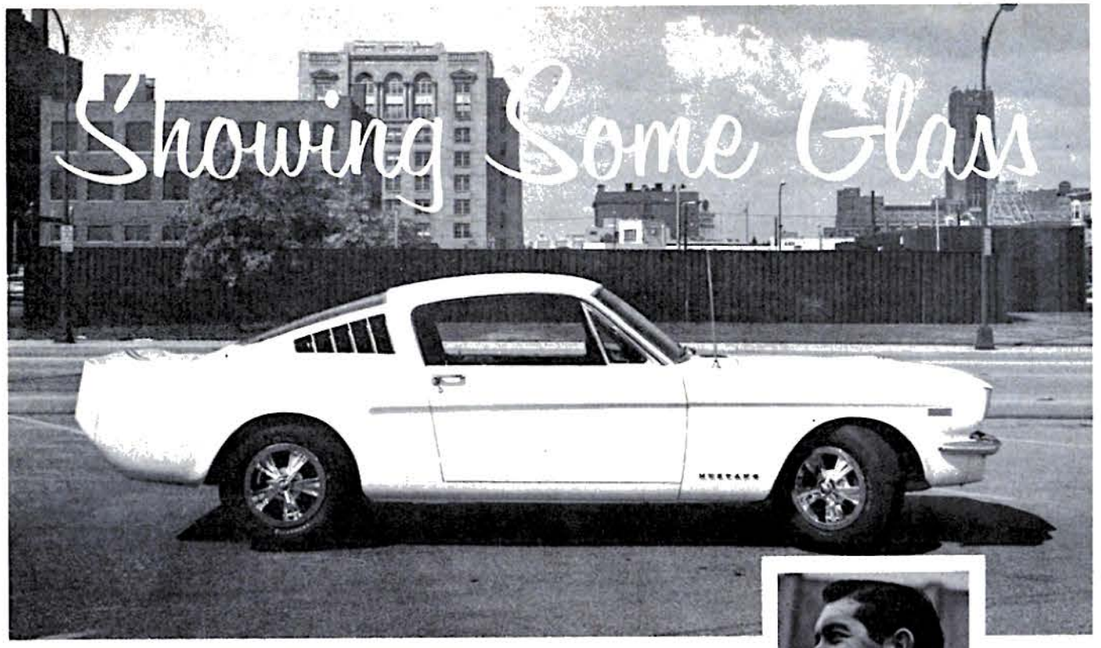
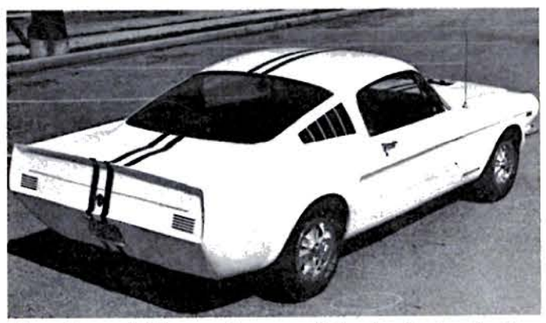
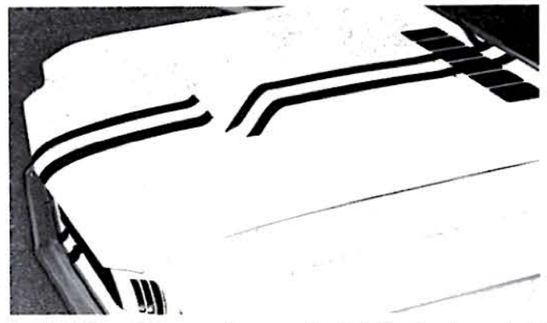
Grandstand mounted electronic scoreboard is tied directly into Christmas tree starting system. Elapsed times and speeds for both lanes are instantly recorded in lights.



Model man Budd Anderson has long been associated with a wide variety of scaled down automobiles, but when he decided to dress up his full size Mustang with a few little trick things, he suddenly found himself in a new 1/1 scale business

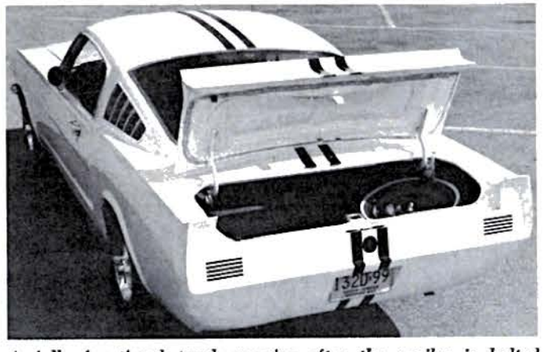


There is no drilling, cutting or welding involved with these fiberglass components. Spoiler is available for all models.



Ford's "J" prototype sports car motivated the development of this unique hood design which eliminates all lift and heat.

Cibie head light conversion unit adds real European class to the conversion, but check with your local police first.

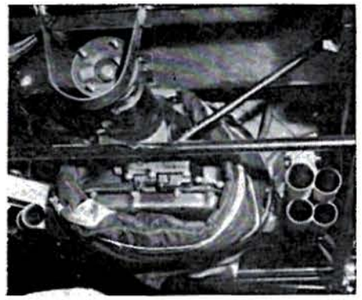


A fully functional trunk remains after the spoiler is bolted in. A quick trip to the painter for a spot-in finishes it.

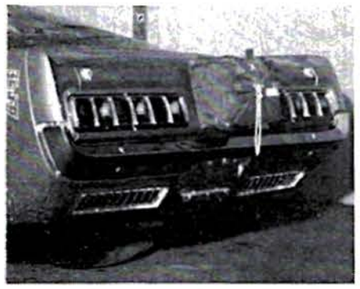
Stone·Woods·Cook GO "FUNNY" ROUTE

One of drag racing's pioneer Gasser teams expand their operation to include a sensational new match racing "Hemi-Horse." By capitalizing on all of the experience gained during years of competition in the wild and rugged A/Gas Supercharged bracket, S-W-C have built a stormer that was running competitively on its initial trips down the asphalt ribbon.

The old warhorse of a '40 Willys coupe earned Stone-Woods & Cook a reputation which is widespread. Younger brother Ray Cook will drive the "Swindler A" gasser.



Just to be on the safe side, a B & M and Chute Metal Co. ballistic nylon shield was wrapped around the transmission to contain any possible Torqueflite mishap.



Wait until you see those T-bird lights blink sequentially during the burnouts. Corvair vents below bumper allow air to escape from body, filling Simpson chute.

AFTER WINNING everything there was to win in A/Gas Supercharged class competition over the past five years, that terrible threesome from Los Angeles, the fuedin' and fightin' brotherhood of Stone-Woods-Cook, are at it again. Yes, "Pebble-Pulp-Chef," better known as Fred, Tim and Doug, have had their fling with "Big June," "Chaos Pussycat," "Ohio George," and other formidable A/GS competitors and have decided to change mounts. Although their trusty '40 Willys coupe, the "Swindler A" will not exactly be turned out to pasture, as Doug's younger brother, Ray "The Prince" Cook, will drive it, the S-W-C strategy will be spearheaded by a new "funny car."

The steed chosen to butt heads with the best is a Mustang, appropriately titled "Dark Horse II," in keeping with the Stone-Woods-Cook heritage, as one of their earlier supercharged gas coupes bore the same name. With wheelbase stretched to 120 inches to handle the surplus horsepower of the supercharged, alcohol-burning 448-inch Chrysler engine, the 2050-pound machine looks to be a terror. The second weekend out, one of the initial shakedown runs clocked a tremendous 8.40 elapsed time with a 175 mph speed.

The whole reasoning behind the switch to "funny" competition comes from Tim Woods, who owns and finances the operation, and Doug Cook, who builds, maintains, and drives the S-W-C mounts. Fred Stone has dropped from the actual active racing game, but is kept on the door of the car to carry on the "name." Tim and Doug feel they have achieved every success possible with their gas coupe, and figured that the "funny car" game would be a lot more fun, offering more competition.

Rather than utilize the Mustang frame, the team decided to have the crew at Exhibition Engineering in Van Nuys, California, handle the chassis chores. Specializing in tubular chrome moly "funny car" frames, Pat Foster and Ronnie Scrima really have a going little concern in Exhibition Engineering. The 70-pound bare chassis is of

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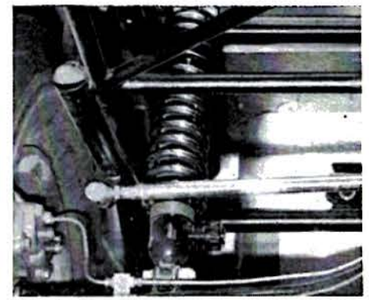
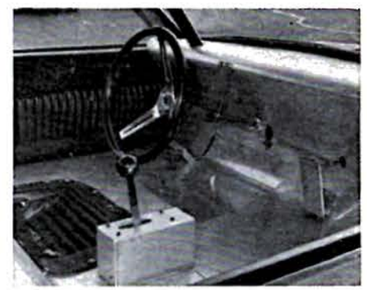
The man behind it all, Doug Cook is drag racing history, having been at it since the year one. He builds and tunes the Chrysler, in addition to driving the car.



The basis of the rear suspension is two coil shock units by Armstrong. A pair of beefy traction bars secure any rearend rotation, anti-sway bar aids handling.

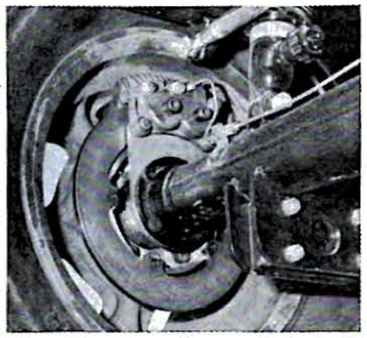


The interior looks stark but is actually plush by today's standards. The Martinez upholstery on door panels is a rarity. Shifter is a product of B & M Automotive.

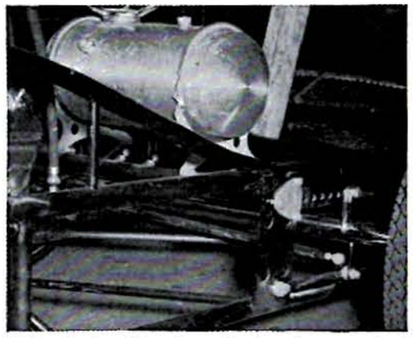
Stone·Woods·Cook

ladder type construction, with an integral roll cage structure incorporated into the design. With .049 lower main rails and .058 upper rails, the exceptionally sturdy 1⅝-inch o.d. .065 roll cage completes the basic dimensions. The tubing was heli-arced together, and then the suspension components were added. The rearend is positioned via a pair of adjustable shocks with coils over them, a pair of traction bars, and an anti-sway bar. A 1959 Oldsmobile rearend is employed, utilizing 3.90 gears for a starting point. A stock iron Olds third member is used. The axles were special products of Henry's, shortened and splined to fit the narrowed housing. A pair of Airheart-Cragar dual spots cinch the spinning discs, as hydraulic pressure comes from a single Girling master cylinder. Cragar S/S wheels and M&H 11.00x16 Racemaster slicks complete the rearend picture.

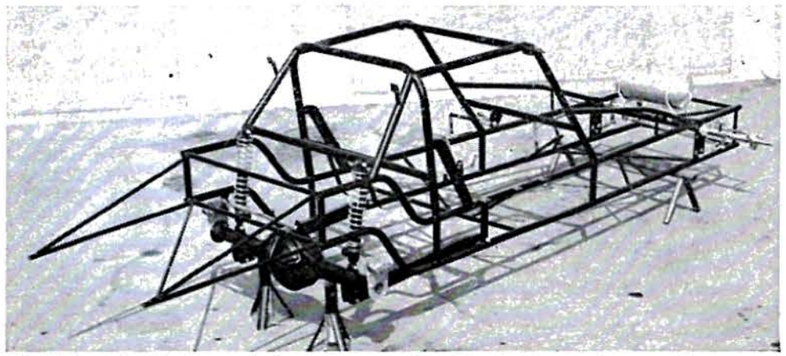
Photos by Bob Swaim



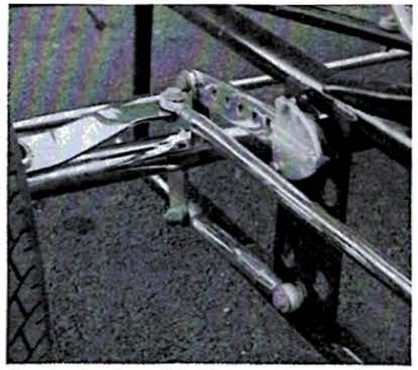
Those big slicks and mag wheels build up a lot of momentum at speeds around 170 mph, but Airheart-Cragar dual puck spot brakes slow the action with ease.



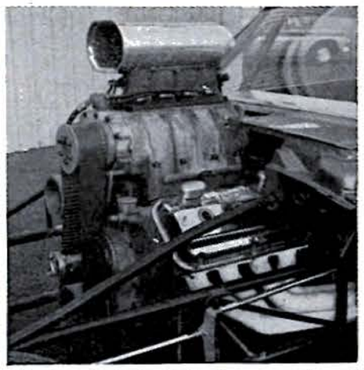
Talk about safety, the roll cage braces extend up past the front of the engine. Ladder type construction is deceiving, as it looks light, but is in reality strong due to good design.



The lightweight chassis was built of chrome moly tubing by Ronnie Scrima and Pat Foster of Exhibition Engineering in Van Nuys, California. You can see that the roll cage structure is actually a part of the whole design, and was not just "glued on" as an afterthought.



One torsion bar with a lever arm on each side, along with a short pair of radius rods handle the front suspension requirements of the car.



The heart of it all is the supercharged Chrysler of gargantuan dimensions. Big 448-inch hemi feeds on alcohol mixture.

Looking to the engine compartment we discover a bit of a switch. The powerplant for the Ford Mustang is none other than a healthy Chrysler of 1958 vintage. This is the basic engine which Doug has used to win fame and fortune in the gas supercharged ranks and the team, feeling a bit of loyalty to the Chrysler, decided to stick with it. In addition, engine builder Doug knows these motors inside-out. The only real change from the engines which powered the Willys will be alcohol fuel, with a possible splash of nitromethane, in place of the gasoline.

Starting at the top, a four port Hilborn injector and scoop are fed by a Hilborn PG-150 pump, and pass the fuel vapor into a Don Hampton modified GMC 6-71 Rootes type supercharger. The blower sits atop a Mickey Thompson manifold, while a M/T blower drive spins the puffer at 25% over engine speed. A Frankenstein magneto by Tony Cirello provides the spark for the Autolite 403 plugs. The heads have received the Mondello porting handiwork, and 2 1/16-inch Donovan "bullet proof" intake and exhaust valves are used. The rocker arm shafts have been chromed by Delta, but the rocker arms themselves remain stock. Chromed stock valve covers, M/T water filler necks, and a Weiand front cover complete the external appointments of the engine.

Down deep inside, the heart of the valve train is an Engle L-162 roller cam and kit a brand of cams which has been Stone-Woods-Cook's favorite for years. A Keith Black cam gear drive is used up front to replace the timing chain. The "ooomph" for the quarter-mile comes from the C & T ½-inch stroker crank, which has been hard chromed, center counterweights added, and generally "tricked up." With a .030 increase in the cylinder bore, the displacement is boosted from 392 to 448 inches. The stroker crank, in effect, provides the muscle for the engine. Doug likes to use Chrysler 300 bearings, and Mickey Thompson provides the forged aluminum connecting rods. The pistons are more of M/T's work, and two dif-

(continued on page 81)

CAR CRAFT CUT-A-WAY

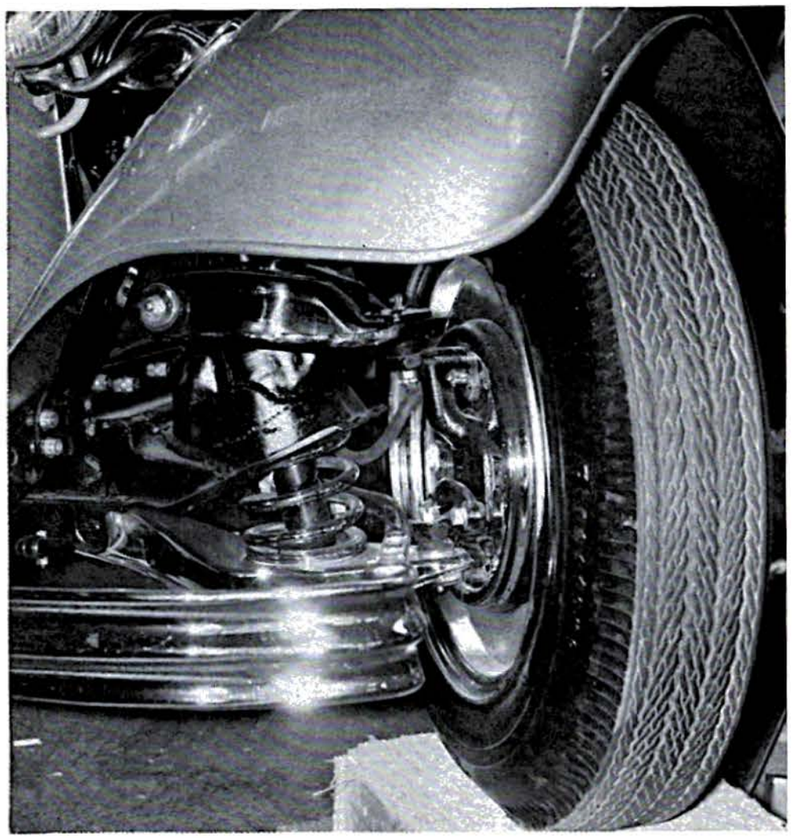
From out of the west comes that stormin' combination of Fred Stone, Tim Woods and Doug Cook with a fitting sequel to their wild A/Gas Supercharged Willys. This blown Chrysler of 448 cubic inches feeds on alcohol and pushes an Exhibition Engineering chassis mounting a Cal Automotive fiberglass and steel Mustang body to speeds in the 170 and elapsed times in the low eight second bracket. Candy blue paint and Martinez black Naugahyde add spice to the 2050-lb. rig.

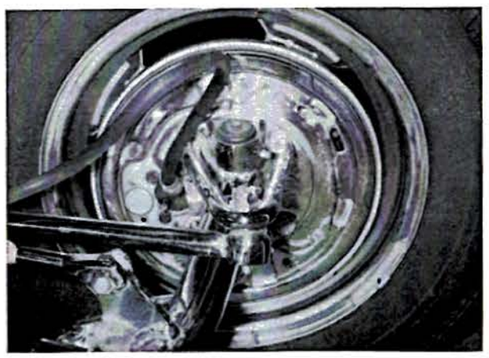
Illustration by William A. Moore

FRONT BRAKES

If you've just about given up hope in locating a set of early Ford hydraulic brakes for the front of your rod, don't panic, there are still other inexpensive ways of getting the job done.

rod building tips
CAR CRAFT





It isn't necessary to go this far for front brakes, but it certainly is different. Corvair independent design is not too clean for non-fendered cars but looks wild on '32's. Front brake lining area is decreased from '48 Ford's 84 sq. in. to Corvair's 55 square inches.

LEFT — Early Falcon backing plate and drums were machined to fit on pre-'49 Ford spindle for this rod. Sheet metal was welded into center of backing plate then rotated 90° to provide enough wheel cylinder clearance from king pin. Much machining is required for change.

IT LOOKS PRETTY EASY... just about every rod you see in automotive magazines and at car shows has early model Ford hydraulic brakes on the front, so naturally you think that's the easy way to go. But hold it right there before you definitely decide. Better start trying to locate that '48 Ford assembly before you settle down to other problems. You're right, it is the easy way to go *provided* you already have a set laying around the garage. If not, it's either to the telephone or off to the wrecking yards. But where'd they all go?

Let's face it, those '48 Ford parts are going on 19 years old, so they're getting a lot more difficult to locate than they were a few years ago. Not only that, parts houses are not renewing their stock on that early stuff, adding to your problem of rebuilding pre-'48 equipment. The only logical course to take is with newer parts, preferably General Motors or Ford due to their availability in the yards.

The two components that go pretty much hand in hand are the spindle and axle. Assuming that you are going to use a beam or tubular axle, the next decision is what type of front brake-spindle combination you prefer, or is available in your area. With machining of course, almost any combination of backing plate-spindle could be produced but if you are like most rodders, a machine shop is not always readily available, besides, machining costs money. Therefore, the best way to get around additional expense is to locate an assembly that is complete and already engineered for a heavier car, then you can work out the adaptation.

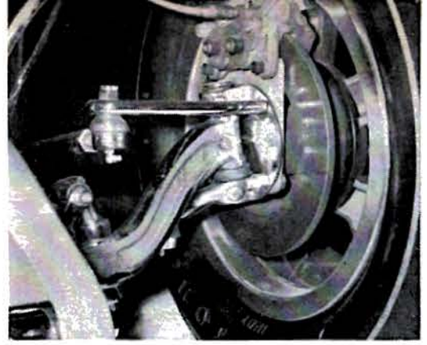
Probably the most common late model spindle-brake combination being installed today are the '52 to '54 Chevy passenger car units, which are available just about everywhere at very competitive prices. The '49 through '51 spindles may also be used, but these units were kown for their wheel bearing shortcomings. A side benefit using the Chevy spindles and drums is that the lug bolt pattern matches the rear, when a Chevrolet rearend assembly is installed, makall four wheels interchangeable.

If you use an Olds rearend, then it is possible to adapt '40-'54 Pontiac spindles and brakes with their five-inch diameter lug patterns. For an early Ford rearend, go '57 to '64 Ford pickup front spindles and brakes as they retain the 5½-inch circle up to the present.

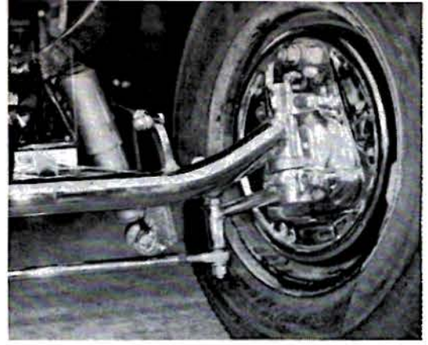
There are undoubtedly many other combinations, but these are proving the most popular, and actually it's not too difficult to convert your axle to adapt these spindles. Main problem is with the inside diameter of the king pin bosses. These measure .812 inches (13/16) in early Ford axles with a 2⅜-inch length. The Chevy, Pontiac and Ford pickup king pins are designed to fit a .867-inch hole in a 2⅛-inch long boss. By drilling the Ford king pin hole out to .867 and machining or grinding the length down a quarter inch, the Chevy-Pontiac pickup units will fit right on. That isn't the end of it, however, the king pin inclination must be adjusted to match the particular spindle. Since these vary from year to year, it will be necessary to have a front end alignment shop make the adjustments by bending the axle. One thing for sure, the front end should be completely assembled and aligned before being chromed, otherwise the chromium might be damaged in the alignment process which incorporates the use of chains and jacks. A little hard on chrome plating!

Suppose you want to use one of the custom made dropped or straight tube axles. In this case, you merely notify the supplier of the type of spindle you plan to use and the axle will come with the correct king pin boss. The front end should be properly checked and aligned by a competent alignment shop.

Brakes, especially the front, take care of over 60% of the stopping power. It may look nutty and be the easiest way to go by leaving them off, but when it comes to safety, there isn't much without front brakes. If your state requires a brake test, you'll certainly be out to lunch when it comes to meeting the stopping distance requirement. So far, we've never seen a car, equipped with rear wheel brakes only, stop anywhere near the allotted space. The dragster has a chute and usually a half-mile stopping area. When do you have *that* on the street.

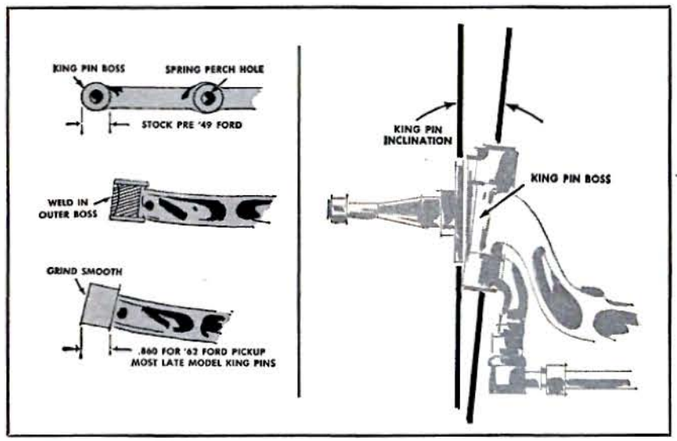


Considered the ultimate, Airheart-Cragar dual spot disc brakes are available to adapt to almost any front spindle. Airheart builds the calipers with Cragar providing the hub adapters and blank discs. Kits for '39-'48 Fords are most popular.



Dragmaster Company prefers to use the '52 to '54 Chevy passenger spindles, brakes and drums due to their stronger bearings and greater availability in salvage yards. Tubular front axles may be requested with either Ford, Chevy king pin bosses.

RIGHT — By far the easiest to adapt, but becoming the most difficult to obtain, are the 1939 to '48 Ford hydraulics. Adapter rings, which center the backing plate to the spindle and properly position the wheel bearings, are the only extra items needed to correctly mount them on 1929-36 spindles.

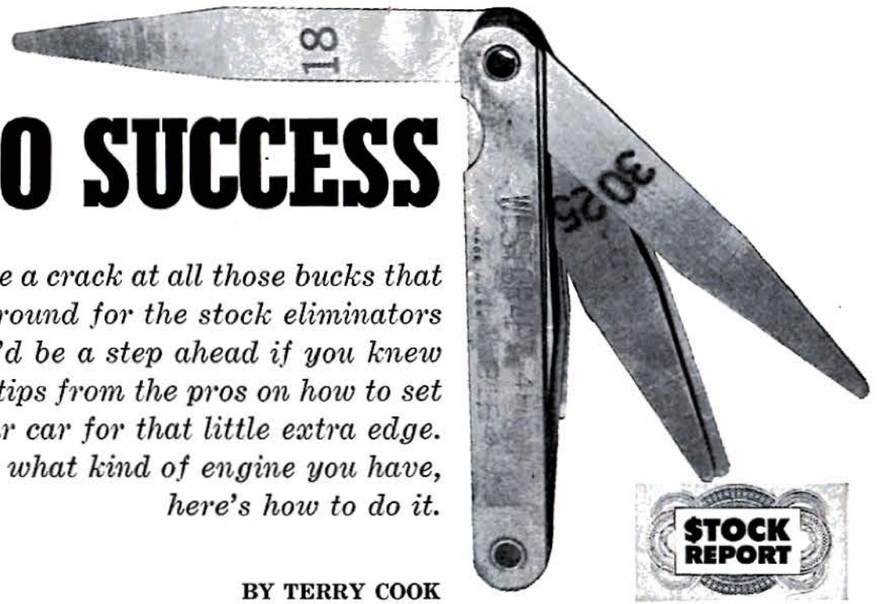


ABOVE LEFT — Here is the simplest way to convert a standard '32 to '48 Ford axle to use '40 to '54 Pontiac, '57 to '64 Ford pickup or '49 to '54 Chevy spindles and brakes. Original king pin boss is enlarged from .812-inches to .860. Boss should be filled in order to provide adequate strength for pin.

ABOVE RIGHT — Front end shops are equipped to adjust the king pin inclination to correspond to the spindle angle by bending the center of the axle either up or down. Custom made tubulars are built with correct degree for spindles.

Super different front brake and spindle combination is displayed by this rod which pirated tubular axle, spindle and brakes from '36 Plymouth. Yep, they had hydraulic brakes in those days! Drum was redrilled to Corvair lug circle.

THE KEY TO SUCCESS



If you'd like to take a crack at all those bucks that are floating around for the stock eliminators this season, you'd be a step ahead if you knew a few of the tips from the pros on how to set the valves on your car for that little extra edge. Regardless of what kind of engine you have, here's how to do it.

BY TERRY COOK

265-283-327-350 CHEVROLET

Bill "Crumpy" Jenkins has been the man behind the engine and the man behind the wheel of some of the hottest Chevys to ever hit the quarter-mile asphalt.

PERHAPS THE most popular drag racing powerplant in existence is the small block Chevrolet engine which initially debuted in 1955. Available in four stock displacements, the 265, 283, 327, and the new 350 cubic inch engines have almost identical valve trains, so the following applies to any of the four engines.

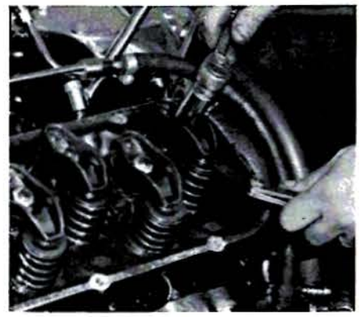
Just as the small block Chevy engine is popular, so is the name of the champion tuner who offers his tips on this mill, Pennsylvania's Bill Jenkins. A past NHRA Top Stock Eliminator and constant threat in that category, Bill makes a living out of preparing a record busting lower class stocker in his Berwyn, Pennsylvania shop. It is only fitting that we consult "professor Jenkins" for the tips on setting valves for the small block Chevy.

The standard operating procedure for running the valves on the small block 265-283 and 327 cubic inch Chevrolet engines with mechanical or solid lifters involves a technique which will come in handy for virtually all valve settings. It involves the "feel" which must be developed when using the feeler gauge and is relatively simple. The selected thickness gauge should be inserted between the rocker arm and the tip of the valve stem which is located atop the spring and retainer. As the rocker arm is loosened or tightened depending upon which direction the nut on the rocker stud is turned, the feeler gauge will become easier or harder to manipulate. As the rocker is tightened, the gauge will become difficult to move between the two surfaces and as a result the tolerance between the valve and rocker will become smaller. These tolerances are measured in thousandths of an inch, and if an .018 clearance is recommended for a certain engine's valves, then an .018 feeler gauge should be used and so on. If you can move the gauge around with no restriction, then you know the valve is too loose. Conversely, if you cannot move the gauge without a great deal of effort, then you know it is too tight. After a short while you will know when the feel of the gauge is just right between these two conditions.

As a general rule, the 1955-56 Chevrolet camshafts require the following clearances: Intakes .008, exhausts .013. All Duntov cams perform best if they are adjusted as follows: Intakes from .010 to .012, and exhausts from .015 to .018. The bigger 365 through 375 horsepower Chevys (which have camshafts bearing 346 as the last three digits of the parts number) run best when adjusted at .030 for both intakes and exhausts. The engine should be warmed up for at least ten minutes, then shut off while the valve covers are removed. Restart the engine and set the valves as quickly as possible. While there is no particular order for setting the valves, Bill likes to run all the intakes first, then do the exhausts.

As for small block Chevys with hydraulic lifters, back off the nut on each rocker stud until the valve just starts to "tick." Then tighten it to the point where it just stops "ticking," go ⅙ more turn, and secure it there.

396-427 CHEVROLET



ABOVE — Big bore Chevy tips come from old pro Hayden Proffitt. His impressive victory credits include major wins at both the Nationals and Winternationals. His match racer is legend.

LEFT — When you are working with extremely close tolerances such as encountered in valve settings, it is vital that detailed precision standards are maintained. Victories will then follow.

WITHOUT A DOUBT, Chevrolet's new 396 and 427 cubic inch engines are making a bid to overcome the unbelievable popularity of their younger brothers, the small block Chevy engines. Their release has sparked new hope in the bigger classes for Chevy lovers.

One of the better known names currently associated with Chevrolet drag racing is Hayden Proffitt, the owner and driver of what is at present the hottest stovebolt "funny car" on the scene. It's only fitting that "the Old Master" give us a few pointers on these popular 396-427 Chevy engines.

The first step is to mark the balancer on the front of the engine in 90 degree increments using the established mark as a starting point. Then bring the piston in cylinder number 1 to top dead center and set both the intake and exhaust valves for that cylinder. Next spin the engine over 90 degrees and set the valves for number eight, both intake and exhaust. Rotate the engine another 90 degrees to the next mark on the dampner and set the intake and exhaust valves on cylinder number four. Then revolve it another 90 degrees and set the valves for number three. Another 90 degrees and cylinder six, both intake and exhaust, still another 90 degrees for number five, then 90 degrees to cylinder number seven, and a last 90 degree rotation to cylinder number two where the intakes and exhausts are set. The clearances desired for this procedure are .025 for both the intakes and exhausts if the engine is hot, and .026 for the intakes and .028 for the exhausts if the engine is cold.

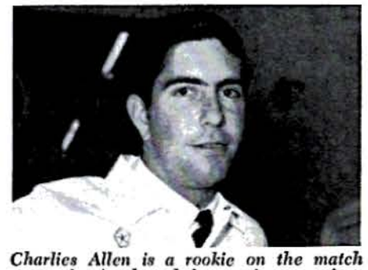
If the engine is equipped with hydraulic lifters, loosen each rocker individually until it clatters, tighten it to the spot where the noise stops, and cinch it down there. Use a rubber hose held to the engine and ear for close detection of the tell-tale clattering.

426-413-383-273 DODGE & PLYMOUTH "WEDGE"

ALTHOUGH THE hemi MoPars are taking the spotlight, there are virtually thousands of wedge Dodge and Plymouth engines to be found on the street and strip. Working down from the 426 cubic inch "wedge" to the 413 and 383, if the engine has solid (mechanical) lifters we can set the valves. Those MoPars with hydraulic lifters are non-adjustable, thus solving that category.

When it came to a consultant for the wedge MoPar engines, we contacted California's Charlie Allen, a veteran of many "funny car" skirmishes. At present, he is heading up the high performance center at Atlantic Dodge in Los Angeles, so he seemed to be the right man to confer with.

Basically, the procedure for setting the valves on the Dodge and Plymouth wedge head engines is the same as that used on the hemi MoPars. Bring the engine to top dead center (TDC), put a 180 degree mark on the vibration damper, and do two and seven intake and cylinders, four and eight exhaust. Rotate the engine another 180 degrees and check intakes four and three and exhausts five and seven. Spin the engine another 180 degrees and set the intake valves for cylinders five and six and the exhaust valves for cylinders one and two.



Charlies Allen is a rookie on the match race circuit, but he's moving up fast.

MoPar valve trains are quite similar in everything from 426 down to the 273's.

Charlie suggests the following settings for these engines. For the 273 Dart performance package which has mechanical lifters, .013 for the intakes and .021 for the exhausts. These settings, along with all the others which are to follow relating to the wedge MoPars, are to be set with the engine cold. For both the 426 and 413 engines, set the intakes at .028 and the exhausts at .032. The 383 cubic inch engines should receive a setting of .026 for the intakes and .028 for the exhausts. One little "speed secret" which Charlie includes concerning the amount of lash is as follows: If you desire to decrease or "kill" some of your bottom end horsepower, tighten your valve settings about .002 and you will decrease your bottom end horsepower and increase your top end horsepower. Conversely, if you desire to kill your top end horsepower or increase your low end power, loosen the valve setting .002 from your normal placement. One should not consider this to be a method of gaining horsepower as a whole, as it is simply picking up a little more power on one end of the rpm range while sacrificing it at the other. This general rule applies regardless of what type of camshaft you are running.

The alternative method for setting the valves is described at length in the procedure for running the valves on the hemi MoPar. In essence, it involves wiggling the rocker arm on the closing intake valve and setting the corresponding exhaust valve for that cylinder the instant you are able to move the rocker. Also, by spinning the pushrod of the exhaust valve when it stops and gets tight, you know it's time to set the intake of the corresponding cylinder.

426 HEMI DODGE PLYMOUTH

Banker size cigar isn't required to set Dodge valves unless you're Dick Landy.

NOW THAT CHRYSLER Corporation is flooding the streets with those wild street hemis, its only natural that we consider the hemispherical head MoPar in our listing of popular engines. Let's take a look at the 426 Dodge and Plymouth.

Our choice for a consultant on this one was a natural, as Dick Landy is one of the best known names in drag racing to be associated with the hemi head Mopars. Landy's current "funny car" runs in the eight second bracket, but his experience with street hemis alone qualified him as an expert.

Unlike most other engines, Dick relates that there is a two stage procedure which must be followed for setting the valves on a hemi MoPar, all of which have solid lifters. Because the valves are so big and nearly collide, this initial step by step method must be followed before firing the engine if it has just been assembled. Turning the engine over by hand, set number one to top dead center coming up on the compression stroke. The settings for the valves will be .028 for the intakes and .032 for the exhausts. Obviously, these settings are for a cold engine. Set the intakes for cylinders seven and two, and also the exhausts for cylinders four and eight. Rotate the engine 180 degrees, and set the intakes for holes one and eight. Then set the exhausts for cylinders three and six, and rotate the engine another 180 degrees. Next, set the intake valves for cylinders number four and three, and the exhaust for cylinders five and seven. Again, rotate the engine another 180 degrees; run the intakes on holes five and six, and the exhausts on cylinders one and two, completing preliminary procedure.

Now that we are in the ball park and don't have to worry about gnashing those big valves together, we can get down to the more precise setting procedure. Now it is safe to turn the engine over with the starter, assuming the pushrods used are the proper length. Dick explains the fine tuning steps as follows: As the intake valve is closing, set the exhaust. This should also be done while turning the engine over by hand. An easy way to tell the instant the intake has closed is by trying to wiggle the intake rocker back and forth with your fingers. The instant you are able to wiggle it while turning the engine over slowly, you know that it is time to set the exhaust. After you run all eight exhausts, start working on the intakes. The procedure here is as follows: You are to set the intake the first instant the exhaust opens. While turning the engine over slowly, try to spin the exhaust pushrod with your fingers. When you can spin it, set the intake valve for the corresponding cylinder.

221-260-289 FORD

IF ONE WERE to draw a parallel between engines, you might say that Ford's 289 cubic inch is FoMoCo's answer to the popular small block Chevy. With a valve train somewhat similar to the Chevy's with stamped rocker arms on a stud rather than a row of cast ones on a shaft, the little Ford is the standard V8 in the very popular Mustang. Needless to say, there are thousands of these motors to be found and their popularity is growing by leaps and bounds. Although they have now been discontinued, there are two smaller versions of this engine which are identical in every respect when it comes to the valve train, the 221 and 260-cubic inch models.

"Mr. 289" is the name they've hung on Ed Terry, right, and with the help of mechanic George Bailey he's earned it.

Mechanical or hydraulic lifters are the main considerations when it comes to setting the valves on any type engine.

One racer who achieved fame by virtue of his record pounding performance and constant threat in his eliminator bracket was California's Ed Terry, often referred to as "Mr. 289." With the help of his ace mechanic, George Bailey, Ed has revealed a few of the tricks and principals which have made his Fords run so strong.

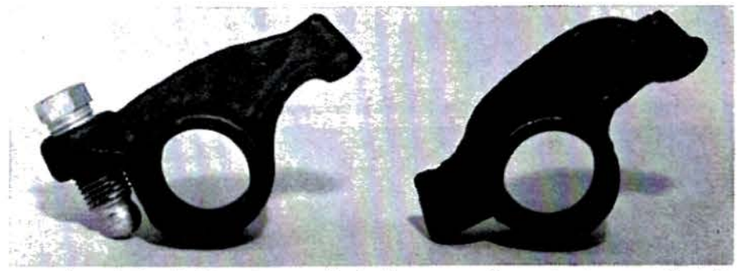
One technique which the boys emphasize for this particular engine, and which also applies to other engines, is the practice of warming the engine up before attempting to set the valves. The reason for this is quite simple. Metals have a characteristic known as the coefficient of linear expansion; in other words, as the metal is heated, it expands. Now since we want to approximate running conditions as closely as possible, we want the engine to be warm when we set the valves, therefore we automatically compensate for any growth due to heat. Ed suggests running the engine a good fifteen minutes before setting the valves and also suggests that the engine be running while the valves are being set. This seems troublesome, but closely simulates racing conditions.

Assuming the car has solid or mechanical lifters, set the idle as low as possible (about 600 rpm) and work from one end of the head to the other, then do the opposite head. Ed likes to start with the intake on the right bank and move back, then switch to the other side and work from the back forward. The suggested clearances to use are .018 for both the intakes and exhaust if the engine is hot, or .022 if you have not warmed it as suggested and it is cold.

When you start the engine with the valve cover off, don't be surprised by the spray of oil which squirts out of the heads, as this is normal. Rags, or possibly a cardboard baffle, can be used to limit the flying oil but for the most part there is nothing you can do about it.

As for those cars equipped with hydraulic lifters, loosen each rocker separately by backing off the nut until you detect a distinct ticking noise, then slowly tighten until you hear it go away. Since the clearances (lash) with hydraulics are nearly nothing, it is impossible to use a feeler gauge to set the valves.

390-427 "WEDGE" FORD



If you have hydraulic lifters in your Ford, chances are the engine has non-adjustable rocker arms like the one on the right. The one on the left permits setting the valves.

Drag racing's suave Gas Ronda qualifies as an expert on the bigger Fords, being a leading match race winner.

ALTHOUGH THE single overhead cam Ford engine is creating quite a stir, the fact remains that these engines are a virtual nonentity in stock class. But the Ford's low and high riser 427 cubic inch motor, and others of smaller denominations, will be prevalent on drag strips across the country, so it figures that we should consider this engine in our synopsis of setting valves.

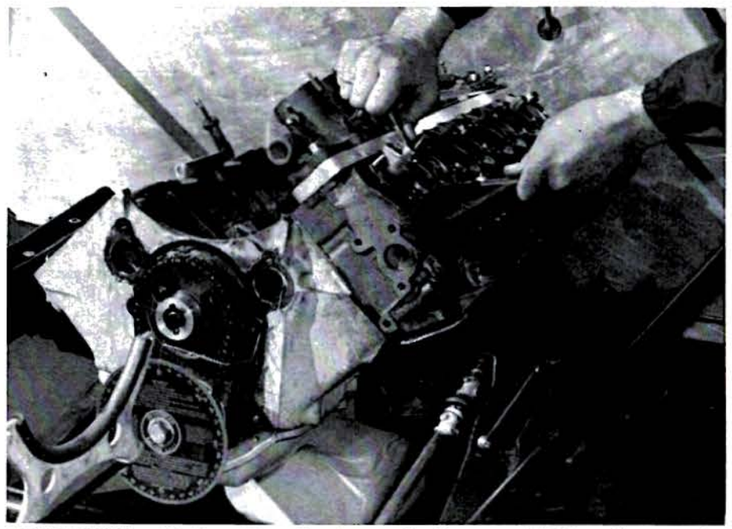
One of the larger names associated with Fords across the country and perhaps the biggest on the west coast is Gas Ronda, a suave ex-dancing instructor who not only qualifies as the best dressed drag racer, but also as one of the hardest to beat. Ronda's tips on the big inch Fords may prove invaluable.

Assuming the engine we are concerned with has solid (mechanical) lifters, we would set the valves in the following manner. After marking the balancer on the front of the engine in 45 degree increments, starting at the established mark, bring cylinder number one to top dead center and set the intake and exhaust valves for that cylinder. The suggested settings are .019 for the intake valve and .021 for the exhaust. Then we would rotate the engine 45 degrees and set the intake and exhaust valves for number five. Rotate another 45 degrees and set number four's valves. Then one more 45 degree rotation and set the valve for number two. Another 45 degrees and set the valves for number six. A 45 degree rotation and number three. After another 45 degree turn, set the valves for cylinder seven. One last 45 degree rotation, set the intake and exhaust for number eight and you're ready to go.

The majority of engines you run across will have hydraulic lifters, and if you own a 390 cubic inch Ford the chances are it will have non-adjustable rocker arms. If you obtain a set of adjustable rockers and cam to go along with them from your local Ford dealer, the procedure for setting the hydraulics is quite simple. Set each valve so it just clatters, then give it another quarter turn of the wrench to tighten and secure it.

389 PONTIAC

THE LAST OF the engines we will discuss is the Pontiac, most commonly available in the 389 cubic inch version. We contacted Jess Tyree, a header manufacturer who is a Pontiac lover at heart and races his own "Indian." Jess explained that since solid lifters were not available in the stock Pontiacs, the problem was limited to hydraulics which could be set at .001 if you have a super-thin feeler gauge, assuming the engine is really hot. One tip he included was to keep a close eye on the compression of each cylinder and correlate that to the valves for the accompanying cylinder.



ABOVE LEFT — Big Jesse Tyree has been a Pontiac man right from the very start. While others change around, he stays with his "Indian" and continues to win. ABOVE — Jess was hard at work on a new match racer when he was contacted for a few tips. He quickly obliged with a few little inside trick things he uses.

SO YOU WANT TO BUILD A DRAGSTER?

Before you roll up your sleeves and start thrashing, here are a few important tips from the west coast "professor" of drag chassis construction, "Woody" Gilmore. Pre-planning, design, construction, detailing, it's all here. Follow the Race Car Engineering man as he tells you how it's done with Tony Nancy's beautiful new 22 Jr.

BY TERRY COOK It might be a good idea to do a little window shopping and decide exactly what it is you are looking for if you are thinking of building a dragster. Regardless of the class you have in mind, be it anything from an AA/Fueler to a B/Gas Modified Roadster or Competition Coupe, the basic chassis will be of slingshot dragster design. Admittedly, although there are exceptions to this design such as special rear engined machines, the basic configuration of driver behind the rearend is the common practice.

If you are planning to build a big AA/Fuel or gas dragster, perhaps the best bet would be to go professional all the way. There are many competent commercial manufacturers of dragster chassis such as Woody Gilmore, Kent Fuller, Race Car Specialties, Speed Products Engineering, Logghe Stamping Company, T-Bar Chassis, Don Garlits, etc. If we are aiming at a lower dragster class or the modified roadster/competition coupe bracket and funds for construction are limited, building your own car may just be the answer.

Many racers like to get right down on the floor and build their own car, as then it is done their own way. Actually, when you compare the price of buying to the price of building a dragster, the investment is relatively close. The difference is that a purchased car involves the outlay of one large bundle of cash rather than the repeated string of small purchases which go along with building your own car. Assuming that you want to take a crack at it yourself, here are a few things you should think about before you get involved, and in addition, a few pictorial tips from one of the west coast's leading chassis builders, Woody Gilmore.

Of primary concern in the planning stages are two decisions; what material to use and how to fabricate or join it together. The dragster chassis has undergone a slow but now complete changeover from mild steel tubing (the 1000 or plain carbon series) to chrome moly tubing, especially 4130 Molybdenum steel. The reason mild steel was used in the early days of professional dragster chassis fabrication was because it was inexpensive, easy to locate, and because few racers knew of chrome moly steels. In time, however, pro chassis builders made the switch and their reasons may also sway you to choosing 4130 over mild steel. Initially, 4130 was developed during the war for use in airframe construction. The material had to be light and strong and able to withstand high vibration and twisting. Since the dragster chassis undergoes much of the stress and strain an airframe does, it made sense to use the same materials in race cars. Chrome moly steel tubing was first discovered for race car use by the oval trackers and sports car builders, and now it is enjoying widespread use in drag racing. The important thing to remember, however, is that chrome moly steel is about one-third stronger than mild steel tubing, therefore, it can be used in thinner wall thicknesses while providing the same strength as mild steel. Although chrome moly has a number of advantages over mild steel, the latter is a bit easier to weld. If finances are of primary concern, it may be better to use mild steel.

Whichever of the two basic types of tubing you decide to use, follow the Speed Equipment Manufacturers Association minimum suggested standards for dimensions of tubing, both in wall thickness and outside diameter. You can write S.E.M.A. at 3208 Hutchinson Avenue in Los Angeles for a copy of their suggested minimum specifications. Simply look in the phone book for a tubing supply warehouse and ask specifically for the material of wall thickness and outside diameter you desire. Make sure you ask for seamless tubing as opposed to welded. Since tubing comes in long lengths (20 feet or more) a search through the tubing company scrap pile will save you some bucks.

Basically, there are three different methods of welding which may be used to assemble the chassis. Arc welders are perhaps the most readily available units, but because of the thin wall thicknesses which are selected for dragster chassis tubing, the arc welder is highly impractical. In essence, arc welders are used to join the thick steel plate of battleships together and are a bit too "hot" for dragster application. Even a highly experienced arc welder will have trouble keeping from burning through the tubing rather than welding it together.

The second method of welding which has been used in the past with success is the oxyacetylene method, better known as gas welding. The use of a torch fed by bottled acetylene and oxygen, along with a welding rod, is another common unit, but this is not the optimum method, as oxygen is induced into the welded areas destroying the molecular

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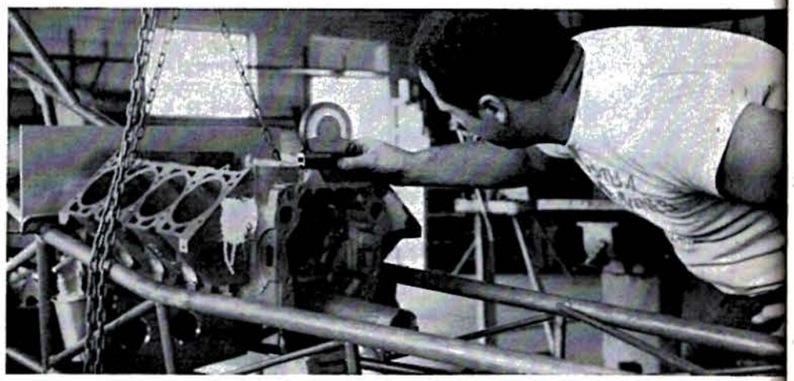
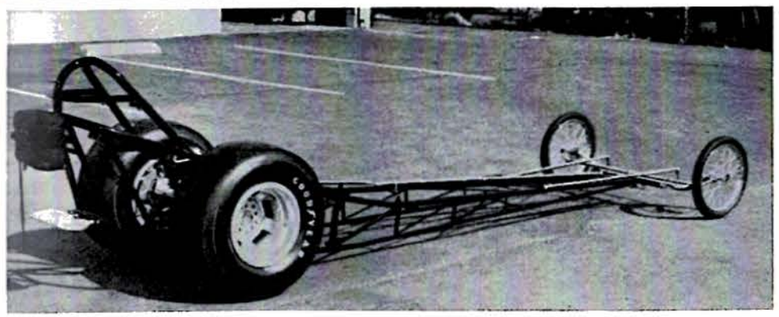
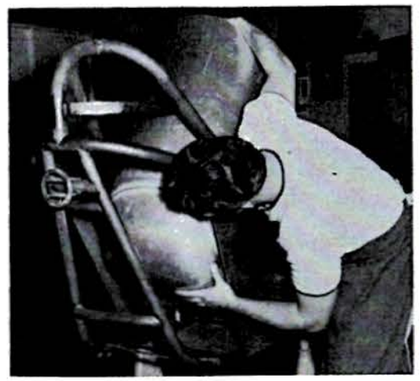




The bare chassis and running gear looks slick already, even though engine, body, and details are missing. Tony prefers a rigid car, so Woody connected upper and lower main rails with vertical and diagonal uprights which provided rigidity.



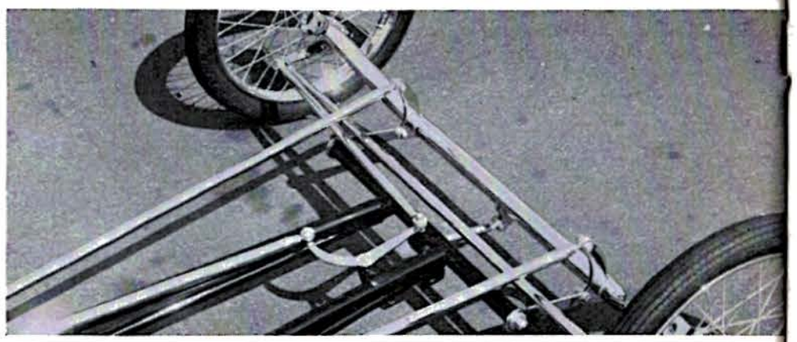
Right—Aluminum expert Tom Hanna did the body work for Nancy's car. Here he fits the wrap-around bucket seat. The current trend is to replace the swoopy tailpiece with this simple seat which acts as the back portion of the body when in place.

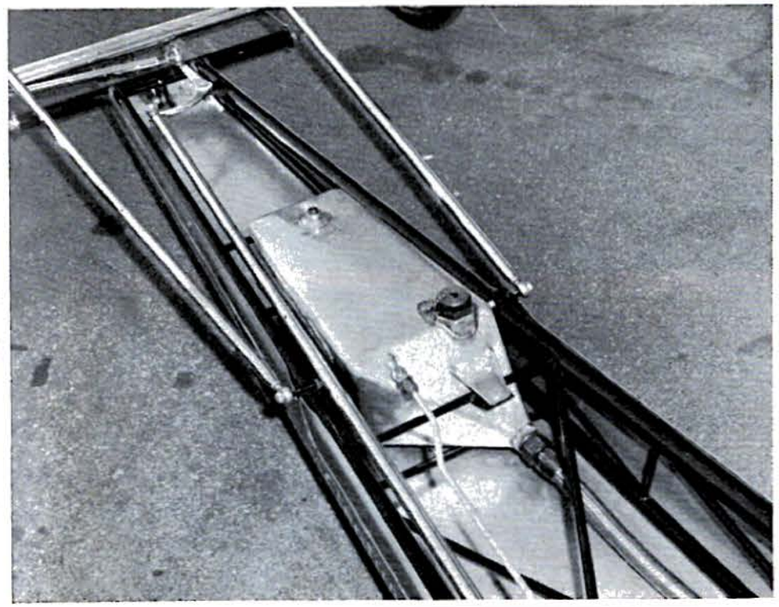
Below — Hanna also fabricated this fuel tank which nestles snugly in the front of the chassis between the main rails. Notice how Dzus button mounting replaces mounting cord and the like. Neat twist off cap is a new innovation in dragsters.

A good tip is shown here as Woody likes to use a level to assure correct engine positioning. This handy gauge is also a good thing to use when mounting the rear.

Right—After the bare chassis is done, Pete Ogden and Woody Gilmore (center and right) fit gas and clutch pedals, brake handle, and steering to driver Tony Nancy.

Below — Notice how the brackets for the radius rods and torsion arms are one in the same. Single radius rods are used, but doubles may be built if preferred.





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structure of the metal.

Currently the "hot setup" in dragster chassis fabrication is the Tungstun Inert Gas method, better known as heli-arc welding. Without a doubt, this method is the hardest to find, and most expensive, but the end result makes it well worth searching and paying for. Because the special gun pours the inert gas Argon into the area to be welded, keeping the oxygen in the atmosphere out, the molecular structure of the metal is not changed. In addition, the actual heat is concentrated into the specific area to be joined so a minimum of stress results from the welding. One general rule to follow when it comes to welding is . . . don't do it yourself unless you are a certified welder. Your best bet may be to tack the pieces together yourself, and then take the whole car to a certified welder with a heli-arc unit. Let him weld the car exactly the way you want it, yet you know that it is welded properly and will stay together.

Now that we have decided what materials and method of welding we will use, the next step concerns the design of the dragster chassis. Assuming we desire to follow the accepted trend of the slingshot configuration, there are two basic dragster chassis designs currently in use. The first of these is the "Woody Car" type which is easily identified by the dual back braces extending upward behind the driver's back from the lower main rails. In addition, the Race Car Engineering concept of Gilmore's design is along the "flexy" approach, where the upper and lower main rails are not connected, thus allowing the main rails forward of the firewall to flex, float or bow for better weight transfer and traction.

The second design is generally referred to as the "Fuller" type, which is the original model of today's accepted designs, utilizing one single back brace. On cars of this type, the frame rails are not necessarily flexy as uprights connect the upper and lower main rails. The idea here is to choose the design of roll cage we desire, be it single or dual back brace, and combine it with the type of main rails we want either flexy or rigid.

Once these facts have been established, we can start thinking about a few of the other necessary dimensions of the design, such as engine placement, or number of inches from the rear of the engine block to the rearend housing. If the engine is too far back, the car will experience wheelstands. By the same token, if it is too far forward, valuable traction will be lost. In addition, the all important wheelbase must be considered along with the front and rear tread widths. Today's current trend in wheelbase lengths has shot out past the 150 and 160-inch marks, but if you are building something other than a big fueler you don't need the gobs of wheelbase. Somewhere between 130 and 150 is a good length to consider, and although a longer car necessitates a long trailer, less weight will be required to keep the front end of a long car down due to simple lever arm mechanics. The tread width in the rear should generally be as narrow as possible, allowing for an inch or two of clearance between the tires and body. Up front, tread from 50 to 55-inches will fulfill the task admirably.

Before actual construction begins, one important consideration must be undertaken. Do not start welding the frame together unless you have the front suspension and rearend housing ready to go. They should be built into the car and not added on as an afterthought. Kent Fuller revolutionized dragster chassis design by building the car around the engine, rearend and driver, rather than building a frame and then making provisions for these essential components. It would be a good idea to have a bare engine block, your bellhousing, transmission (if you plan to use one) complete with shortened tailshaft and/or universal and the rearend housing. Straddle the driver over the rear to the point where he is comfortable, measure out to your desired wheelbase and position the front axle, and then connect it all together with tubing. The important thing to remember is that time spent in pre-planning and measuring will save hours of trouble during construction.

At present the common system used for the front suspension is a simple torsion bar setup. With a laminated steel torsion bar from a Volkswagon and a bit of tubing and plate, you can construct a light and inexpensive suspension system for your digger. The bar slips inside of a tube and is pinned by a set screw. Arms are then mounted on each end to extend the axle, while a cap for each side completes the unit. Another simple unit which can be adapted is the Lakewood Chassis torsion setup revealed in the December '66 issue of Car Craft. Whatever you do, remember that the rules require a front suspension system of some type and your best bet is to take a tip from the pros. Torsion assemblies can be purchased separately from many of the pro chassis manufacturers.

As for the rearend, one of the more crucial steps of construction involves narrowing the rear housing so that the two outer flanges are parallel or true after the housing is chopped. If they are out of kilter, the car will not handle properly. You can either build a small

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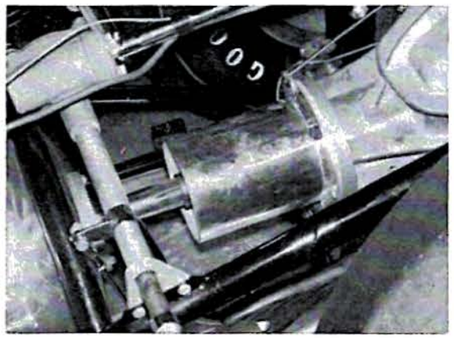
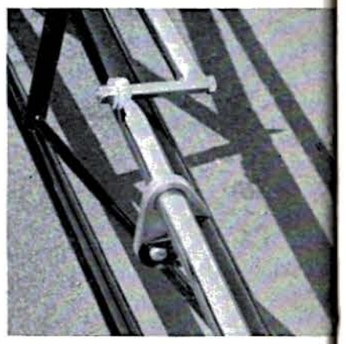
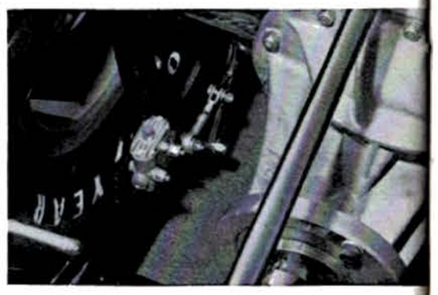


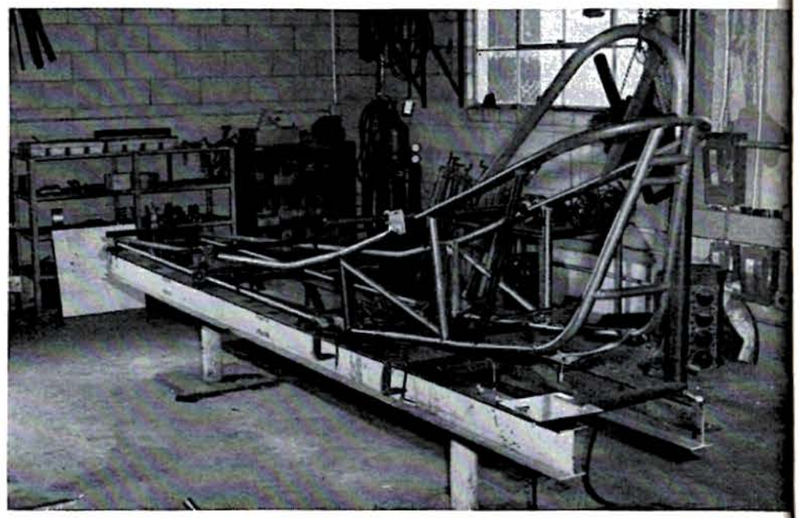


Protection of your ankles is mandatory, so that universal joint or coupler must be covered by a ⅛-inch steel 360 degree shield. In this case it is mounted on the flange of the magnesium third member.



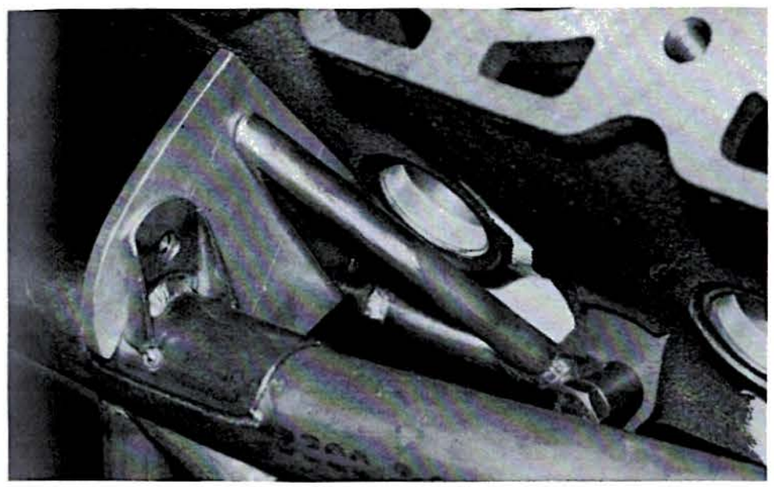
Above right — With long wheelbase came long drag links that would oscillate or "whip" at speed. Idler arms were later replaced by this unique tab which stops oscillation admirably, weighs one ounce.

Right — If you'll look down to the base of the brake handle you will see a tiny Airheart master cylinder. This activates the spot brakes, yet is light and simple.



When building the frame, some sort of a table or jig is almost mandatory as the heat generated from welding invariably warps the tubing. You won't need a jig as beefy as this, but working on cement can be deceiving as the floor may not be level. A small angle iron jig will keep your main rails true during construction.

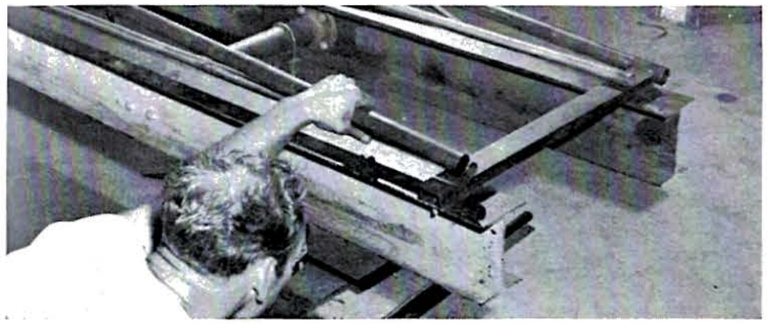
Right — Drag racing professionals can't stress enough the importance of a set of good stopping devices. Money invested in a set of good spot brakes is insurance. These Airheart-Cragar spots will pay you a dividened on every run you make. With a good parachute, or pair of dual chutes, and spot brakes your investment is safe.

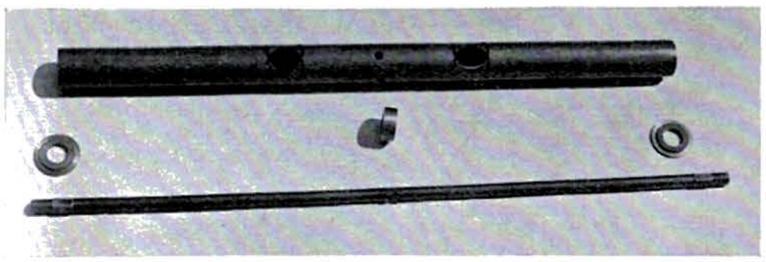


A close look at the front motor mounts shows where a small plate was welded on the frame rail to spread the stress, a bolt hole indicates solid mounting, and clever tubular brace to the engine block.

Right — Woody (left) and Tony scope out Steve Swaja's drawings of the finished car which were made before construction began. Forethought and pre-planning can save time and money; are well worth it.

Below—When laying out the bare chassis, the front end of the main rails should be trimmed to the proper length and then aligned to accept the torsion bar tube. After measuring, clamp it all in place.





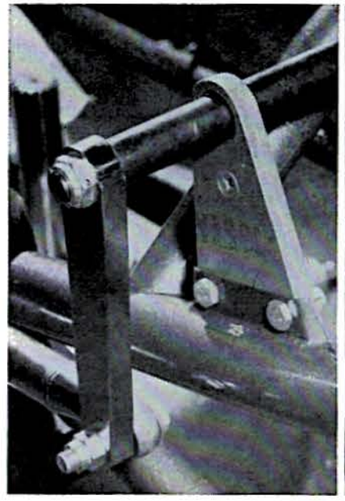
Here's Woody Gilmore's answer to the torsion bar problem. A specially machined spring steel bar with hexagonal and threaded ends is one of the many unique innovations in the Race Car Engineering cars. Woody designed these units and had them made up for his cars.

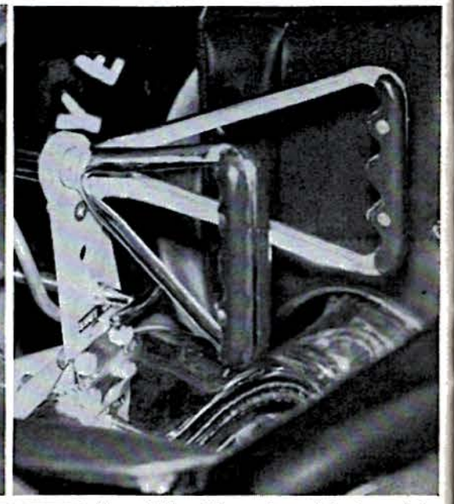
DRAGSTER

jig and narrow the housing yourself, or send it out to a local machine shop or dragster chassis manufacturer who narrows rear housings. In addition, the axles will have to be narrowed an equal amount and then resplined. The Olds rear is perhaps the most popular because of the beefy axles it provides, but the selection of rearend ratios is limited. If a small engine of limited horsepower is slated for the car, a combination rear may be the answer. In essence this involves taking a Chevy third member and center portion of the Chevy housing and grafting on the outer portion of the Olds housing. Then the Olds axles are narrowed and splined for the Chevy centersection producing a strong rearend with a wide selection of ratios. Whatever rearend you choose, the most important thing about the whole car is that the front and rearends be true or parallel to each other. If they are out of alignment with one another, the car will not go straight.

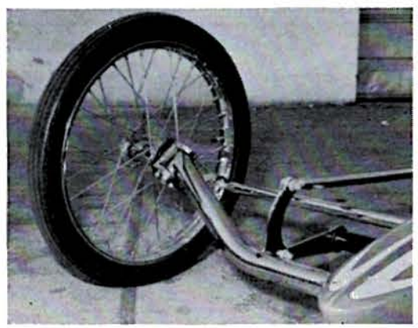
Starting up front and working back, you'll need a set of dragster wire wheels and tires to make contact up front, and there are two basic methods of procuring a pair; make them or buy them. All of the leading chassis builders manufacture and sell special wire wheels and tires for any of the popular spindles. If you choose to make them yourself, you can machine the steel or aluminum hubs from stock and then purchase the spokes, rims and tires from a motorcycle shop. A good size tire to select is 2.25 x 17, as this satisfies the need admirably.

Moving inward to the spindles, the neatest setup on the market is the P & S forged Anglia-type spindle which is designed and machined from billet stock to produce a light and strong unit. The price may be a factor if you are on a budget, so stock or machined Anglia spindles will fill the bill. The Ford spindle which was once popular is now rarely used because of its heavy weight. If automotive spindles are used, make sure a new set of kingpins are secured as the original pins will most likely be worn, producing a sloppy fit. The axle may either be straight or dropped, but should be seamless tubing of a heavier wall thickness than the main rails. During construction allow for the proper front end geometry by providing around 40 degrees of caster, along with around one degree of camber. Woody Gilmore suggests that no aluminum be used in the front end assembly, and that chrome moly spherical rod ends be used to connect the front end components together along with clevices and lock nuts. The radius rods can be of lighter tubing and should allow free up and down travel of



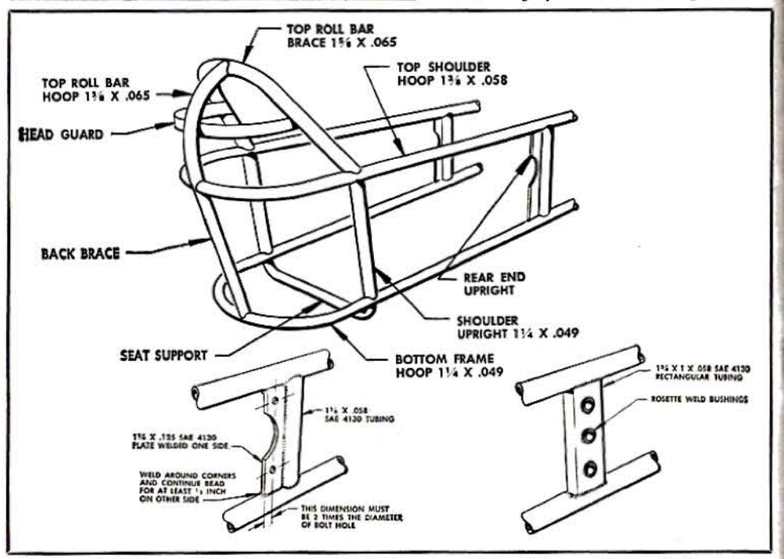


Above left — Magnesium plate is used for mounting the steering because it is very light, yet strong. A set screw secures the two tabs together. One thick piece was found to often bind; two work fine.

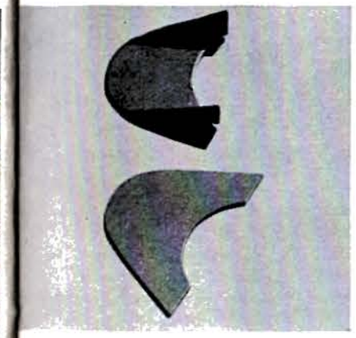


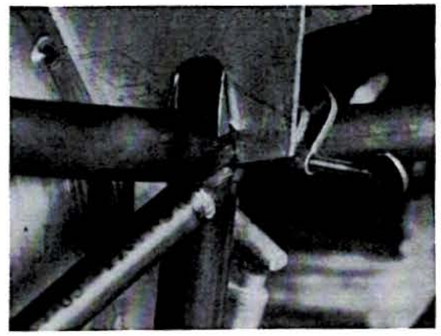
Above — More mag plate was used here to form the steering brace, also mounting fuel shutoff or mag kill button. Inlaid wood on the butterfly steering wheel is also on brake handle. A touch of class.

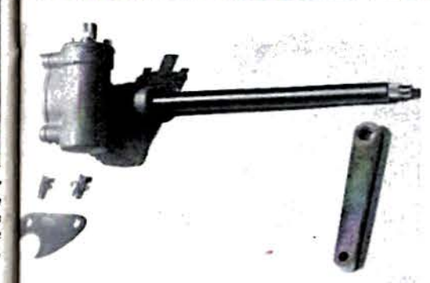
Left — These wire wheels are a product of Gilmore's RCE shop. By purchasing parts through a motorcycle shop, it is possible to make your own. P&S forged chrome moly spindles were Tony's choice.



The Speed Equipment Manufacturers Association assembled all the professional chassis men and came up with these suggested minimum specifications which were accepted by NHRA. The dimensions (top) are not required, but if complied with, no minimum car weight will be necessary. Below we see two different suggested methods of mounting the rearend to the chassis. Either round (left) or tubular (right) uprights may be used; take your pick.

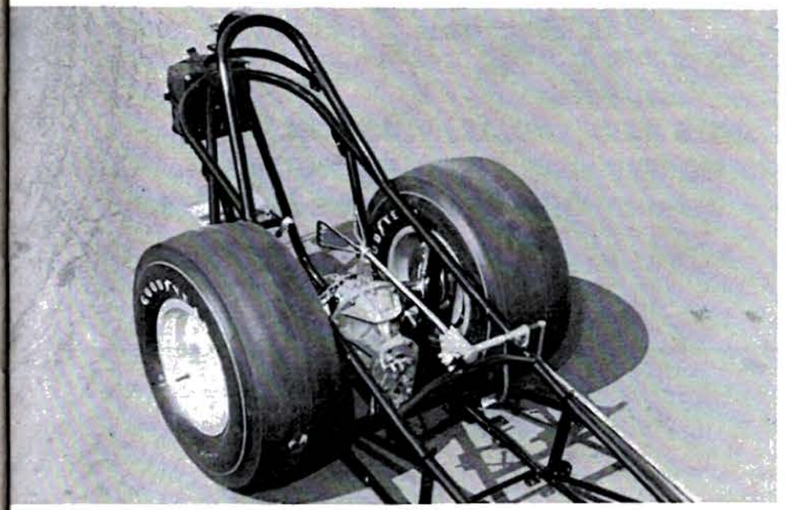






The fabrication of those unique little tabs is simplified here. First they are cut from sheet steel stock (above left) and then folded as shown. The tabs are positioned on the frame, and welded in place. Here they are used to fasten the blast plate, but they can also be used to secure the fuel tank or function as radius rod sockets. Make templates from cardboard that fit before cutting steel.

Left — Here is a closer look at the P&S steering unit which Woody uses on all of his cars. In essence this is an aluminum modernized copy of the heavy but popular Ross unit. Workmanship is high quality.



Many weightsaving techniques were used in mounting the components like three small tabs holding the steering, clutch pedal hanging from the shaft, aluminum plate serving as the anti-spin device. M/T magnesium third member is light, but is not a must. Note how steering is mounted to a separate crossmember.

Left — Body man Tom Hanna used a torch to put a distinct crease in the custom plexiglass windscreen. This technique should first be practiced with pieces of scrap plexiglass, as an expensive windshield may be destroyed with the torch if one is not careful. Keep the modifications simple and it will work.

the front axle while limiting the movement in other planes.

Moving to the frame, a pocket should be built into the foreward most portion of the chassis to hold any lead ballast which may be needed to prevent wheelstands. Behind the lead pocket is the perfect place to mount the fuel tank. The present procedure is to build a custom aluminum tank which slips into the space between the rails as far forward as possible so as to limit wheelies serving as progressive ballast. If the conventional "Moon" tank is used, it should also be mounted securely between the rails as far forward as possible.

The engine mounting system used by Gilmore is a bit "trick," and may or may not be duplicated, depending on the owner's particular taste. Woody likes to attach the rear of the engine block to the motor plate and use front motor mounts that rest on the top half of the chassis. When the clutch is released, the engine is then free to raise an inch or two for weight transfer. Many other chassis builder prefer to mount the engine rigidly within the main rails foregoing any possible weight transfer advantage. The important thing in the engine mounting is the blast plate which fits onto the back of the engine and doubles as a firewall and rear engine mount for the car. By bolting the plate to the chassis, it saves weight, time and trouble. Use aluminum or magnesium plate of ¼-inch thickness. One of the current little innovations which you might like to adopt is replacing the overflow can with a hose that runs from the water filler neck to the header. When the engine boils over, the water which would normally go to the overflow is dumped into the hot header and turned to steam. Don't run the overflow line into the last pipe on each bank, however, as this will throw steam onto the tires, a situation which should be avoided. Remember, also, if you are using "Zoomie" headers, they should be welded together with a strap to prevent the last pipe from breaking loose due to vibration, and falling back into the tire.

When we get into the driver's compartment, we can find a number of little tricks to help us. The first general rule is DO NOT attach the steering box or accelerator pedal to the bellhousing as this could prove most embarrassing during possible clutch explosion. Both the throttle pedal and steering box should be connected to the frame. Make sure that there are no unnecessary holes in the blast plate which would allow fire to come into the driver's compartment. Be sure to incorporate an anti-spin device on the rearend to prevent rotation if it were to break loose from its moorings. In addition to an anti-spin device, a suitable universal shield should be incorporated to protect the ankles and

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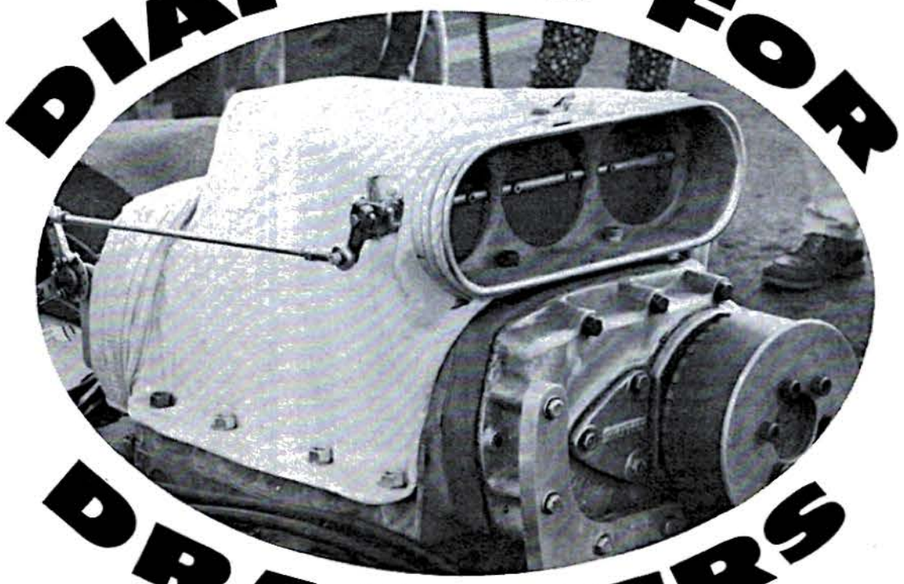
DIAPERS FOR DRAGSTERS



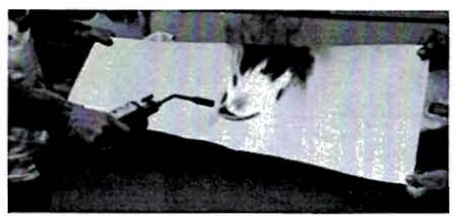
SPACE-AGE CLOTH FINDS NEW APPLICATIONS IN DRAG RACING, PROVIDING TOP AND BOTTOM ENGINE PROTECTION, WHILE KEEPING EVERYTHING CLEAN AND NEAT

Having made numerous contributions of its own to the automotive industry in past years, drag racing has recently been adapting various new discoveries from our space-age research and development programs for racing applications. Space engineers are usually faced with exactly the same design characteristics as drag racers – develop as much performance and reliability as possible with a minimum of space and weight requirements. As a result of their laboratory experimentations, several advancements have been made recently within the drag racing ranks.

The latest innovation to appear on the nation's strips with a space-age stamp is ballistic nylon "magic cloth" (see "Magic Carpet" in the December 1966 CAR CRAFT). This unique material was first used in drag racing as a lightweight safety shield for automatic transmissions, but this only opened the door for other new applications.

Everyone in drag racing – contestant, official and spectator – has watched with regret and despair as oil pours out of the bottom of a "launched" engine and trails a slippery mess down the strip. Even though the driver quickly turns off the asphalt course, everything must come to a complete halt as the broom crews clean things up as well as they can. Subsequent drivers in that particular lane either search for clean areas or run the risk of reduced traction efficiency.

From the top of the engine comes another problem – blower explosions. A full face mask and flame suit give the driver degrees of protection, but other hazards are involved when one of the high-winding superchargers explodes.



LEFT — Ballistic nylon has proven to be very successful in stopping flying metal parts and pieces. ABOVE — In addition to explosion protection, the "magic cloth" is also highly flame resistant as well.

These two areas are the latest to benefit from applications of ballistic nylon and other exotic materials from space research. Tom Abbott of Chute Metal Co., and Bill Simpson of Simpson Chute & Safety Equipment Co., have recently introduced new products that should go a long way in solving these problems that follow equipment failure. Abbott took care of the top while Simpson was working on the bottom of the engine. The end results are a pair of "dragster diapers" designed for overall protection of everyone involved.

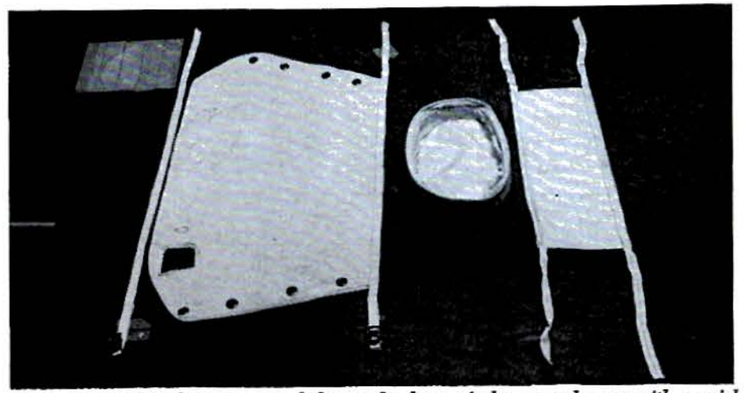
Simpson's multi-layer diaper fits snugly around the pan, after the engine has been installed in the race car. Strong nylon straps and gripper fasteners attach the diaper to the chassis. In the event of an engine failure, the diaper not only catches the oil, but will also retain any parts and pieces that might come through the bottom of the pan. Although the diaper is something else that you have to put on and take off for even routine inspection of the bottom end, its advantages far out weigh any disadvantages. If such a device keeps even one driver from running over his crankshaft or other parts with the resulting "wild ride" or even a flip, the little extra time involved in installing the diaper is well worth spending. Equally important is the safety feature of retaining engine oil that would normally pour onto the strip.

All of the advantages outlined for Simpson's diaper can be carried over to Abbott's supercharger cover. Made of similar materials, the cover or diaper is designed to provide additional fire protection for the driver, giving him an additional fraction of a second or so before the ball of fire from an exploding supercharger reaches his compartment. At the same time, the cover will contain pieces of the blower case and impellers that could fly into spectator areas.

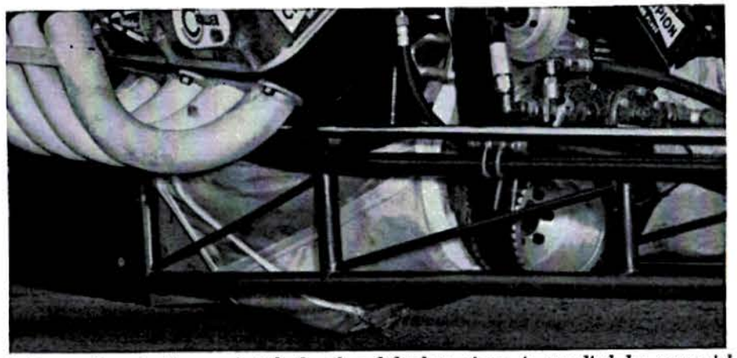
Specal mounting bolts, slightly longer than usual, hold the cover tight against the blower case. Drivers report the diaper does not "grow" during a run, an important factor in the driver's already reduced field of vision with a supercharged dragster. Openings for throttle controls and fuel lines are individually designed by Abbott for each engine/injector application. Like Simpson's engine diaper, Abbott's supercharger cover presents minor installation time requirements, but the overall advantages cancel them out.

"They are just like a flame suit," one driver reported, "once you get used to them they are just another piece of safety clothing, this time for the engine instead of the driver."

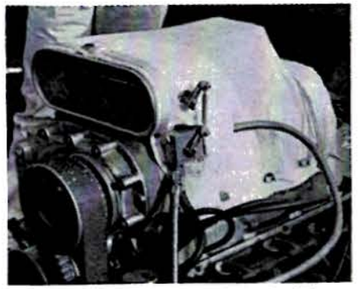
But in the long run, it's the driver who really gains, together with the spectators and other contestants. They gain both in safety and a better event.



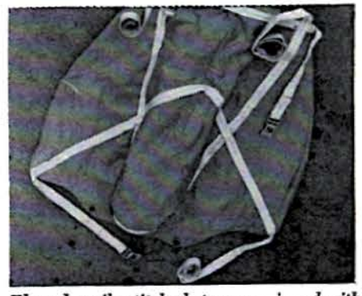
Chute Metal Co.'s blower cover bolts to the base of the supercharger with special bolts and then wraps securely around the unit. Special fasteners complete the job.



Bottom end protection against both oil and broken pieces is supplied by a special dragster "diaper" from Simpson Chute Co. Tight fit proves to be very effective.



Special openings for variety of different injector set-ups are available, providing positive operation of the various controls.



Three heavily stitched straps equipped with gripper type buckles holds diaper firmly to engine and chassis for complete protection.

Violent force from blower explosion hurls parts and pieces over a wide area. Cover would hold pieces and help choke fire.

Heavy duty sewing machine used to make protective items from special cloth. Nylon thread used in multiple seams for safety.

STREET SCRAMBLER

An old friend with new trim and loads of mechanical improvements extends a invitation to bike enthusiasts everywhere to take a spin on a . . . .

BY BOB BRAVERMAN

Probably one of the finest tributes that can be paid to any motorcycle manufacturer is not having to completely redesign its merchandise every year or two. There are only a very few companies that can boast of having the same basic design for seven or eight years. The Yamaha offered to the public today is basically the same motorcycle that you found in the dealer's shop in 1958. This does not mean there haven't been improvements. Far from it. Aside from styling changes, many mechanical improvements have taken place in the past eight years. The new YM2C is the culmination of many new ideas that will provide the rider with a reliable mount and increased performance.

At a first casual glance, the engine looks the same. But upon closer examination, you'll notice a number of changes over last year's model. One of the most significant changes is in the clutch. Up to this model, the clutch assembly has been mounted on the left side of the crankshaft. This created a number of problems, so the factory found it advisable to move the entire clutch assembly back on the transmission mainshaft. This should do wonders to increase clutch life and minimize problems previously encountered with the Yamaha. The clutch assembly itself is an entirley new design. Lining area is adequate for a machine of this displacement, and although our test machine has a slight grabbing tendency when the clutch was engaged, no problems of any type cropped up.

While the engine looks the same as last year's model, it is basically a brand new unit. Starting at the top we find new alloy cylinders with steel liners. This has been a long time in coming and we're glad to see the cast iron cylinder done away with. This will improve engine cooling and reduce the overall weight of the engine by about ten pounds. The heads and pistons are the same, but these are very serviceable items so actually there was no need to change them. Housed in the new crankcase halves is the same basic crankshaft, with one difference. The crank half on the left side is new. Since the clutch is moved back, the crankshaft had to be shortened. Instead of the clutch being mounted on the crank, a pinion gear replaces it, and rides in mesh with the secondary reduction gear mounted on the clutch. A much more practical system.

In an effort to extract more power, a pair of 26mm carburetors were substituted for the older 24mm units. This we weren't too enthused about. Low speed performance suffers somewhat, and it isn't until you reach 4000 RPM that things really start happening. The larger carburetors make the engine peakier than is really necessary. However, once the engine does reach 4000, you find yourself accelerating down the road at a good rate of speed. For average city commuting, we feel the smaller carburetors would be better and there would be no appreciable change in performance under 65 or 70 mph. It is only after you exceed 70 that the 26mm items really come into play.

A new generator and ignition system is fitted to the right side of the engine and is driven off the right crankshaft half. The engine runs very smoothly through the entire RPM range, much as its predecessors did. Coupled to the engine is the same 5-speed gear box with the same ratios as last year's model and the ratios are nicely spaced. The maximum H.P. is rated at 30.5 which comes in at 7000 RPM. This figure seems quite reasonable, which is rather refreshing after some of the optimistic ratings we've seen. On the other hand, the quarter-mile times are given at 15.3 seconds, but the best we could get was 15.7. Top Speed is 92 mph., but the machine can cruise all day at 80 and not even breathe hard.

Handling wise, the '67 model is a big improvement. Yamaha has put another two degrees caster in the front end and this has done a great deal to improve the road runners. One thing we especially liked was the lack of effort required to throw the machine around corners with a certain amount of vigor. The 305 has a special sensitivity which you notice immediately. This makes riding over twisty roads at high speed comparatively easy. One thing we did not like was the all up weight of 352 pounds. This is just too much weight for a 305cc machine. At very low speed you feel this weight, but once under way the feeling of obesity rapidly diminished. A lot of this weight comes from the frame itself. It is much heavier than need be. If Yamaha could trim 50 pounds off, (and it's entirely conceivable that they could) they would have one of the best under 500cc bikes going. The fact that they get the performance they do is a tribute to the power developed by the engine.

The brakes were about average. The factory is replacing the present linings with new material, so the brakes should be even better. Yamaha has always been extremely safety conscious, so this change in brake material comes as no big surprise. There was no noticeable fade at lower speed, but repeated stops from 70 mph did produce some.

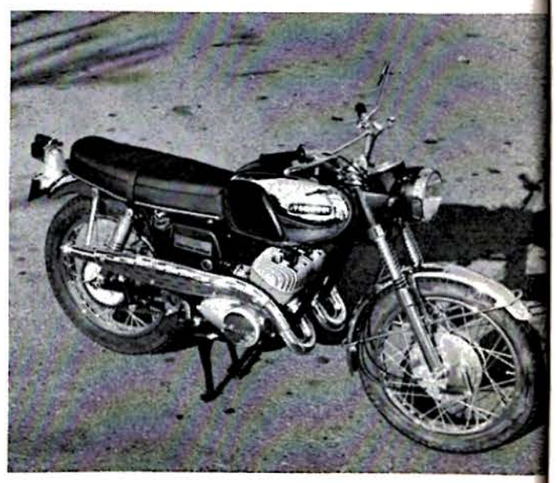
Styling wise, the 305 is very similar to last year's 250 Big Bear model. The tank is a new design, and we like it. It holds just under four gallons, which will carry you a long way. We averaged 53 m.p.g. The paint and most of the chrome is much improved. We're glad to see this, as this is one area that has needed improvement. Overall finish is quite good. The castings are clean, paint is good, and there is enough chrome to please most riders. Another thing we like was the lack of grime that collects on a bike engine. It's very clean running. While the bike is a '305,' it has a big bike look. The larger tires, (3.00 front, 3.50 rear) good sized gas tank and abundance of chrome give the illusion of a larger machine. The headlight nacelle houses the combination tach and speedometer. Both are comparatively easy to read while rushing down the freeway. Lighting must be rated as excellent. Of all the machines produced to date, the Yamaha has lighting equipment to equal the best.

In summing up, we can only say that the new '305' is a big improvement over last year's model. It is very clear that Yamaha is not letting the world (or their competition) pass them by. For someone looking for a spirited "Street Scrambler" the new '305' is a good choice. It will transport you in comfort, with a minimum of effort.

BELOW LEFT — Major improvements have been made in both the double leading shoe front brake and front forks over last year's model. Block tread tire works fair in dirt type riding.

BELOW RIGHT — New design aluminum cylinders and head drastically cut weight and aid considerably in improved cooling. Cylinders have steel lining, clutch was moved to new position.

RIGHT — Lots of chrome and candy paint are very eye-catching. Lighting receives an excellent rating, adding materially to riding enjoyment. Upswept pipes are effective and appealing.



ABOVE — All of the changes on the Yamaha have been made with improved riding and dependability in mind. The result is an old friend with lots of new things going for it. On the drag strip the bike proved to be a real trophy challenger.

BELOW — Yamaha's competition proven oil injection system eliminates the troublesome process of pre-mixing the fuel. The special oil tank holds sufficient lubricant for about a thousand miles of normal riding. The clutch has been taken off the crank.

FIREBIRD ROAD TEST

(continued from page 17)

six. I had never driven one of the sixes before and it surprised me the way it would accelerate right up 95-100 without any strain whatsoever, just a very steady pull all the way. At 4200 rpm we were traveling at 100 mph and it seemed like it could do a lot more. □ **The Firebird 400 is a wild car and I feel far superior to the other cars in its field. One reason is because of the refinements such as torque arms, nose encircling bumper, hood mounted tach and Turbo-Hydro. The tach mounting is a novel new approach which is functional as well as being an eye catcher. It's much easier to read as you dont' have to take your eyes off the road to see it. It's right in front of your sight but not in a position to block your vision. There's no other instrument to take your attention away from the tachometer. You can look at the road, glance down and catch the tachometer without actually looking down at the instrument panel and trying to decipher between how much fuel you have, how fast your speedometer reads or anything else, you just see your tach when it's out there.** □ **"Under no circumstances would I be without power steering or power brakes. It's worth the difference. It's quicker and it's just easier. Power units are so much more positive, quicker, and you don't have that lack of control like you had with the early models. The bulk of the cars will be sold in the city, and it would be out of the question, parking and the whole bit.** □ **"The only problem for me, being 6'2" and over 200 pounds, was that I had a difficult time getting out of the car, and found myself reaching for the release to allow the steering wheel to swing up, but all I was getting was the turn signal!"** □ After getting Chauvin unwound from the steering wheel, the test team headed for the trunk compartment to see what was left for luggage space. Upon lifting the lid, they found the most unusual item of the whole car. A deflatable spare tire! And, as standard equipment already! The entire spare takes up only about two inches more than the rim itself which adds considerable space to the rather limited luggage compartment. To inflate it, a pressurized can of freon is included which expands the tire to standard size in a matter of seconds. The space saver tire, according to B.F. Goodrich, the manufacturer, is good for several thousand miles when driven at moderate speeds but it is designed for temporary use to get you to a service station. When the air is removed, the tire returns to its original shrunken state. (rod owners, take heed.) According to Pontiac, it may be requested in place of the standard spare. The other four tires on the 400 are Goodyear D70 x 14 red stripes. □ Once the car was up on the rack, an unusual goodie was spotted hanging down ahead of the front crossmember. An air spoiler! Cheeze, just like the racers! Well, yes and no. Norm Cheal, of Pontiac Engineering, explained that the "spoiler" had two functions being actually designed as an aid to cooling. Its horizontal shield acts as a seal blocking the air from passing out below the radiator after it enters through the grille. The vertical blade creates a low pressure area, at the rear, so that air is evacuated from the engine compartment. □ Although our test cars were equipped with disc brakes, they are still installed only as an option. The brake system itself is the new dual circuit design which lets you know if either the front or rear system should fail. Other standard safety items include the energy absorbing steering column, a traffic warning system, lane changer turn signal, two-speed electric windshield wipers and dual front and rear seat belts. □ Our rallyist, Lyle Cunningham, was anxious to be heard after his run through the course. **"My only knowledge of this type was another magazine's road test I read**

on the Camaro. The testers were disappointed in it, having problems with wheel hop, plowing a lot on corners, and Chevrolet not offering the type of options that they thought were necessary for a car with the amount of horsepower they were putting into it. This is kind of what I was expecting with the Firebird, but I must admit, I am really impressed, Pontiac has taken care of the wheel hop situation with a Traction Masters type set-up and they've added a good heavy sway bar in the front eliminating any plowing. Although I didn't get to take it through some really tight turns, the overall handling on the road at high speed was really excellent. I took it down the main straight at about 100 mph and did a little bit of weaving. It held the road flat, there was no excessive body lean and the brakes were perfect. I think it's a good combination of engines and transmissions, both the four-speed and the six-cylinder engine. For overall economy of course, the six-cylinder is great. Driving around town or on the highway. □ **"Like Chauvin I'm a power steering fan. I feel that a car without power steering would be hard to handle on a tight course. It would be essential to have a quicker ratio power steering unit and with that, this car could be set up as a nice competitive road racing machine. The Firebird's an aerodynamic car and certainly packs enough horsepower.** □ **"To me, the instruments are the poorest part of the car, which is my greatest criticism of General Motors products. The speedometer matched by a fuel gauge of the same size is ridiculous. I would think they could use the space to a far better advantage. Apparently they had a lot of complaints from people who ran out of gas. They solved the problem of having too many gauges and dials by mounting the tachometer outside, which for viewing is beautiful. If they smoothed the cover into the hood nicer, it would be a clean little detail. I believe it's vital for these cars, with their high performance engines, even the overhead cam six, that they have a full set of gauges. On my own car I've got those warning lights and when they come on, you've blown an engine. The automobile enthusiast, regardless of what type of competition he's in, wants and needs a full set of instruments.** □ **"The flexible fan was an item I hadn't seen before which looks like a good idea. With the blades made of lightweight aluminum they flex depending on the rpm of the engine until at high speed they've flattened out to where they draw very little horsepower. At low rpm, such as idle, they have a regular pitch which draws the air through the radiator for normal cooling.** □ **"The spare tire is about the cutest thing I've seen for a long time. It's very clever. This is one thing I've always hated, that big spare taking up all the room. This takes care of that."** Prototypes are not always known for their razor sharp tune as these are often the cars used for various tests, other than speed or acceleration. However, we did find that our best time for the quarter came to 15.47 seconds, pretty much in line with the other cars in the Firebird's class. At this time the shipping weight isn't exactly established but we'd guess it close to the Camaro's 3000 pounds. With 318 advertised horsepower, the Firebird barely makes it into NHRA's "B" Stock. Ouch! Right at the bottom. If the shipping weight can get to 3030 pounds (you can bet it will) then the Firebird will be in great shape right at the very top of "C." Much better. □ It's pretty obvious that Pontiac has taken a good looking car and sharpened it up even more, both for the eye and for performance. Where Chevrolet ended, Pontiac started and now offers the complete package. □ As you could tell, the test team was excitingly impressed with the Firebird. Pontiac has done a great job in creating a car that is bound to please the enthusiast, whether he's a Pontiac rooter or a rodding fan in general.

"Aw fer Pete's sake, Harry . . . everyone loses once in awhile!"

INJECTORS INGENUITY

(continued from page 33)

bored and everything balanced.

Something new is being tried on the 11.5-1 compression Venolia pistons. Areas that could be subjected to intensive heat in case the engine should lean out have been sprayed with a space-aged development designed to provide resistance to piston melting.

From the mostly stock engine to the all-out speed equipment line-up, and varying combinations inbetween, the Injected Fuelers offer a wide range competition for varying budgets.

What lies ahead? In future articles we plan to explore similar development articles for Ford and MoPar engines. We are also maintaining very close contact with this expanding segment of drag racing as several projects involving automatic transmissions in Injected Fuelers are under development.

"We know that the real hot dogs in our group can pull an AA/Fueler off the line," remarked one of the developers. "The supercharged guys, however, contain the urge to stab it and simply drive on by us on the top end. Things might change a lot if they saw us move out a second time. The only reason dragsters moved away from transmissions is that drivers were missing shifts. With the lightweight automatics that are appearing on the scene things could change."

He went on to explain that it was not logical to expect a small 300 incher to pull a single gear for 1320 feet like a supercharged 427.

While this discussion was going on a roar went up from the loading grandstands at a popular Southern California strip as a couple of funny cars roared down the strip.

"There's another interesting field," another Injected Fueler commented. "What do you think about some Junior Funny Cars? Altered wheelbase, fiberglass, all the trick stuff, but engines under 305 cubic inches."

With interest in drag racing spreading like a wild fire throughout the automotive world the opportunity to open a common bracket of competition for everyone has immense appeal. Perhaps this area could be the start of an International Fuel Formula which would permit dragsters throughout the world to compete for a single and directly proportionate record.

METAL PROCESSING

(continued from page 39)

part absorbs carbon from the cyanide. In the event there is a certain area of the surface which you do not wish to have case hardened, simply copper plate that area and it will not be effected by the case hardening process.

Another related process which produces a hardened surface is induction heat treating where a part is passed through an electric coil of high voltage. This is used to produce localized surface hardening and heat treating. For example, if you desire to have one end of a metal part treated but want the other end untouched, induction heat treating would solve your problem.

NORMALIZING-ANNEALING — STRESS RELIEVING

One of three additional processes related to heat treating is normalizing where the part is heated to a certain temperature to return the metal to its normal grain structure or physical makeup. Annealing is nothing more than a softening operation used to make a part machineable which has been hardened. Stress relieving takes the part to a heat 50 to 100 degrees below its tempering temperature to relieve any internal stress which has developed due to forming processes to which the metal has been subjected. Imagine a part being twisted up and then treated so the internal tension and stress is relaxed.

INSPECTION PROCESSES

It is a well known fact that many failures and breakages in metal parts result from deep cracks in the material and that these deep cracks usually start out as shallow flaws or cracks on the surface. As a protection against possible failures or breakages, metal racing components are often inspected for minute surface imperfections and cracks which could lead to something worse. In recent years a number of methods have been developed to examine metal objects for both surface and internal flaws. The naked eye, even with the aid of a microscope, often has trouble detecting these minute cracks and surface flaws which lead to deeper cracks and then failures. Other methods had to be developed to make these imperfections stand out so they could be easily detected.

The first type of process which we will discuss is magnetic inspection. You may have heard of this process without knowing it, as it is often referred to by one brand name, Magnafluxing. This process is used to aid in visual inspection for surface cracks but only works on steel alloys. After the part to be inspected is thoroughly cleaned, it is placed in an electrical

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METAL PROCESSING

(continued from page 74)

current in such a way as to magnetize the part. In other words, the part is actually made into a magnet by giving it a jolt of electricity. A liquid mixture of kerosene and iron oxide is then squirted over the magnetized part. The iron oxide is black in color and is simply minute metal filings which are attracted by the magnet. As the kerosene drips or evaporates away, the iron oxide collects in the cracks. When the part is dry, this black substance is easily spotted and the surface flaws can be detected.

A second method for detecting surface flaws in metals is classified as the penetrant inspection process which can be used on all alloys. A more common name for this procedure is Zi-Glow, which is also a brand name like Magnaflux and Coca-Cola. After the part in question is cleaned, it is soaked in a solution called a penetrant. This material seeps down into any minute cracks in the surface of the metal. After a good soaking, the part is rinsed to get rid of the excess penetrant material. The next step is to apply a developer to the part and then let it dry. What the developer does, in essence, is make the penetrant visibly stand out so that the minute cracks can be found with the naked eye. A variation on this process involved the use of a florescent penetrant which is detected with the use of an Ultra-Violet or "black light." By shining this special light on the part, the florescent penetrant lodged in the small cracks becomes visible.

The last inspection process which we will discuss is not used for detecting surface flaws or imperfections, but rather internal cracks. The process is called X-Ray, and operates on the same principle and technique as the process which examines human bodies for broken bones and other medical purposes. The part in question is simply X-rayed with a fluoroscope of higher intensity. If there are any internal imperfections, they will show up on the negative which the fluoroscope produces. Thus between X-raying, magnetic inspection and penetrant inspection process, we are able to examine any metal parts for surface or internal imperfections.

ANY QUESTIONS?

Now that you have had your first class in metal processing, you can begin to understand what the different terms mean, what is accomplished and what the procedures are. It is obvious that these various processes may not add horsepower to your car, but when you stop and think about it, they may well be responsible for allowing that engine to stay together as it does.

YOUR CAR AND THE LAW

By Robert Gottlieb, Attorney At Law
CAR CRAFT MAGAZINE

A few months ago we advised you of your civil liability in the event you loaned your car to another. Another column advised you that under certain circumstances you could lose ownership of the car if your friend used it to transport narcotics. There is also criminal liability under certain circumstances when you loan a car.

Many states have laws which provide that no person shall knowingly permit or authorize the driving of a motor vehicle, owned by him or under his control by any person unless the person is then licensed under the law.

Sections of this nature are devised for the protection of the public. In a rather famous case entitled Owen vs. Carmichaels U-Drive Autos, the court held that renting a car to a person with knowledge that the driver was not licensed but held only a student's temporary permit was a violation of law and the fact was important evidence of negligence in entrusting a car to such a person.

Other similar laws are aimed at parents. One reads that "No person shall cause or knowingly permit his child, ward, or employee under the age of 21 years to drive a motor vehicle upon the highways unless such child, ward, or employee is then licensed." For a violation of this section, a parent can be convicted.

Another law provides that no car shall be rented except to a licensed driver and the person renting must inspect the driver's license in addition to comparing the signature on the license with the signature of the renter prior to the renting.

Finally, other laws prohibit a person from driving a vehicle in a parking lot or private place as distinguished from a highway, unless the driver is licensed. It is a crime to permit an unlicensed person to drive even if the car is not removed from the private area.

A few teen agers have loaned their licenses to friends and this is, of course, a misdemeanor. It is also a crime in some states to photograph, photostat, duplicate or in any way reproduce any driver's license or facsimile thereof so that it could be mistaken for a valid license. It is also a crime to have any type of a reproduced license on your person.

ORANGE COUNTY

(continued from page 44)

will be ample room for a braking area to accommodate the 200 mph-plus dragsters that will compete.

The contestants' time and top speed will be flashed instantly to spectators by a unique electronic scoreboard system. In addition, the starting line Chrondek "Christmas Tree" will be wired into the scoreboard so that fans can actually sense the drivers' reaction times.

Establishment by a major oil company of a service complex in the pit area will assure entrants of the immediate presence of fuel and other needs.

Future development of the Raceway and its permanence as part of the large national drag racing scene is encouraged by its location, according to White. Because of the nature of the installations immediately around the strip, including El Toro Marine Corps Air Station, there is little chance that land-use encroachment will be a hazard.

"Unlike many drag strips which are threatened by increasing land values and building up of neighborhoods, Orange County International Raceway should be in what might be called a model location for years to come," White said.

Other Orange County men who have been associated with White in the Planning and execution of the Raceway include Mike Jones, vice-president and general manager; Larry Vaughn, business manager; and Mike McKenna, public relations director.

FOTO FUNNIES

"Do you think a pink carnation is appropriate?"

SHOW CIRCUIT

The International Show Car Association salutes the following manufacturers for their participation in the Awards Jackpot of the 1966-67 International Championship Auto Shows: **Accessories International Inc.,** ten $100.00 merchandise certificates; **ARC Electronics,** one stereo tape deck and one auto record player; **Bell Auto Parts,** one fire suit; **Bell-Toptex,** four helmets; **Champion Spark Plug,** 30 sets of plugs; **Classic Products,** 10 car care kits; **Cragar,** one set of wheels; **DeWan,** 10 jackets; **Edelbrock,** one intake manifold; **Hurst,** eight shifters, six Line-Locs; **Kellison,** complete dragster chassis; **Schiefer,** three flywheels; **Stewart-Warner,** assorted instruments; **P. A. Sturtevant,** $200 selection of hand tools, 15 fender covers, five gold torque wrenches; **Suzuki,** three sportcycles; **Mickey Thompson,** headers, intake manifold; **Traub Co.,** diamond ring; **Weiand,** intake manifold, valve covers; and **Yamaha,** Campus '60' sportcycle. We know that car owners and enthusiasts alike join with us in expressing our most sincere appreciation for their support. ● Latest ICAS Point Standings finds **Art Russell's** Plymouth roadster from Ft. Edward, N.Y., still holding a substantial lead. **Marty Hahnfeld's** Show Roadster from Chicago has advanced to second, ahead of **Tom Myre's** '31 Ford from Union Lake, Mich, and **Dave Crook's** radical Pontiac from Amhurst, N.Y., which are tied for third. **John Greer's** T-roadster from Hamilton, Ontario, is fifth. The next three entries appear in the top ten for the first time. They are **Ron Niemela's** '32 Sedan from St. Paul in sixth; **George Brewer's** '56 Ford from Pleasant Valley, N.Y., in seventh; and **Don Connelly's** '64 Corvette from Denver, Colorado, in eighth. The **Coachmen Auto Club's** altered roadster from South Bend, Indiana, holds a slim lead over **Dick Jutila's** '40 sedan from Milwaukee, Wisconsin, for ninth and tenth, respectively. ● Next big shows on the International Championship calendar are: **Indianapolis, Indiana,** Fairgrounds on Feb. 17-18-19; and **Baltimore, Maryland,** at the Civic Center on Feb. 24-25-26. ICAS Points will be awarded in addition to regular prizes and trophies. For complete details, write ISCA at 19717 East Nine Mile Road, St Clair Shores, Michigan. 48080. ● Word from **Dave Puhl's House of Kustoms** in Chicago is that they are building a wild '64 Corvette for **Jeff Kaywood.** Jeff's brother Wiley had his Corvette restyled by Dave last year. **Joe Briske's** Sweepstakes-winning X-ALTERED is being revamped, as it **George Jilek's** Ford hardtop. Puhl has also been working on the famous competition machines of Don Prudhomme, Ron Pelligrini, Chris Karamasines and Romeo Palamides. Dave must have set some sort of record over the past few years with wins of Custom Sweepstakes at Indy 1963, Experimental Sweepstakes at Indy 1965, Competition Sweepstakes at Indy 1965, Winternationals 1966, Best Rod at Indy in 1966, and Body Shop Achievement at Indy in both 1965 and 1966. Dave set out to put himself on the customizing map and we think he has certainly succeeded. ● A word of **caution to car show exhibitors:** Be certain that **display lights** are securely positioned where they won't contact other display materials or upholstery. One lamp fell against the seat of a '57 Chev at the recent Minneapolis Show, and a foot square area of the fabric was smoldering before it was discovered. Luckily the seat was removed from the car in plenty of time to put it out. Another good practice is to **disconnect battery cables** while your vehicle is on display to prevent electrical fires. —Bill Moeller

ferent brands of piston rings are used in conjunction with them. A set of Forgedtrue dykes rings and Perfect Circle oil and compression rings are the combination Doug has found to be most effective. Milodon Engineering of Van Nuys supplied the trusty lower end main support and oil pickup, just to keep everything secure. Doug modified his own oil pan to fit the support and provide clearance, while B & M automotive provided the Chevrolet starter-motor. Doug Thorley fabricated a special set of his fine "Doug's Headers" to add the final touch to the engine.

Backing up the powerful blown Chrysler is the product of another manufacturer which has been with Stone-Woods-Cook from the start, a B&M automatic transmission. The Van Nuys firm normally supplies the boys with beefed racing Hydramatics, the famed "Hydro Sticks." Now, however, S-W-C have switched to B&M Torqueflites. As a protective measure, a Chute Metal Company built, B&M distributed, ballistic nylon transmission shield is wrapped securely around the Torqueflite. A B&M shifter was used to select gears from the driver's point of view.

Since the big hemi Chrysler is notorious for consuming fuel, a five gallon Moon tank is located ahead of the engine to supply it with alcohol. A strange departure from the normal "funny car" procedure is the fact that no water coolant tank is incorporated into the car. The team plans to run just the water in the block, changing it after every run. In light of the burnouts which are necessary for this new type of racing, the prolonged time required to run the engine may necessitate the future addition of a coolant tank. The needed voltage for the starter and other electric accessories is supplied by a large 12-volt battery which is located behind the rearend in the trunk.

With the chassis, running gear, and engine in place, the next problem was the body. A stock 1966 Mustang fastback shell was located and gutted extensively. Ronnie Olson of Bellflower, was in charge of the body surgery, as the rear wheel wells were relocated and widened, with a distinctive flare placed around the edge of the fender well. In addition, a pair of small Corvair grilles were frenched into the tail pan, and a Porche grille similarly placed in the short decklid, both designed to allow air to escape from the body at speed. The remaining body panels were supplied by Cal Automotive, and are fiberglass Mustang components, including doors and a one piece tilt forward front end. The front end, incidentally, had to be extended to cope with the longer than stock 120-inch wheelbase, and the fend-

(continued on page 82)

STONE-WOODS-COOK

(continued from page 81)

ers received the flaring treatment, matching the rear openings.

From the body shop the mount proceeded to Tom Hanna's aluminum emporium where it received the full floorboard and firewall treatment. In addition to sealing off the driver's compartment as protection from a possible fire, a hand formed bucket seat was sunken into the floorboards and rear firewall constructed. For double protection against possible fire, Doug had a special full fire-suit tailored by safety specialist Bill Simpson. In addition to the suit itself, gloves and a filtered breather mask will cover Doug. With a set of shoulder harnesses and seat belts, plus a plush abbreviated tuck and roll job in black Naugahyde by Martinez, the interior was completed.

When it came to paint, Tim and Doug decided that it was their duty to carry the colors of their famed '40 Willys, so the Mustang was painted candy blue, with gold accent, by Junior of Los Angeles. Lettering by Jones added the final touch to the immaculate exterior, and plexiglass windows all around, including special Shelby rear three-quarter windows, put the icing on the cake.

One of the really original features of the car are the taillights, mounted on either side of the Simpson 14-foot blue and white crossform parachute. The taillights were pirated from a Ford Thunderbird, and wink sequentially when activated. The turn signals will be used during burnouts to add a bit of spice and showmanship, and should be a crowd pleasing twist.

Now that you know what's under that wild candy blue Mustang shell, you can see why the "Dark Horse II" will have no trouble carrying on the tradition of rugged steeds from the S-W-C threesome's Los Angeles stables. With initial performances in the 170's and mid-eights, you can count on seeing this Mustang out in front of the herd of "funny cars."

"Mick, when I said 'put er to the wood' what I meant . . ."

BENCH RACING with Tony Nancy

THE SUPER LIGHT ERA: 1967

THE YEAR of 1967 will prove to be the year of giant changes in both design and materials used in the construction of all drag racing machines. Not only the fuel and gas dragsters, but altereds, factory experimentals, funny cars, and stockers. In the previous years, lightness was foremost in the constructors mind, but class rules hindered the using of the new techniques and exotic metals which now have the go ahead. N.H.R.A.'s 1967 Official Drag Rules have reduced the pounds per cubic inch weight limits in most classes. The trend will be for fiberglass body components mostly, lighter tube chassis, more and more aluminum and magnesium components and the introduction of titanium products.

Many components that were made of steel in '66, because of the heavier weight to cubic inch limit, will now be made of the more exotic metals. The magnesium blower cases, introduced a few years ago, will now be in demand. In the past, the average racer reduced the weight of his vehicle according to his pocketbook. But now, to be competitive, it will be necessary to dig a little deeper into that "almost over-used" pocketbook.

The new SEMA specifications were long overdue, but now, they have almost insisted that a professional chassis manufacturer's product be used. This should enhance the safety of both spectator and participant. The AA/Gas Dragster and Junior Fuelers should show a lot of fresh interest to the dragster builders. Funny cars, along with factory experimentals, should really jump in speeds and e.t.'s with the use of the many new products becoming available in '67. I predict the year of '67 will find a new trend towards the building of gas coupes and sedans, and altered coupes and roadsters, gas dragsters, and junior fuelers. These cars are as essential for a well-rounded show as the AA/Fuelers. I believe that the spectator will prove this in his enthusiasm for these classes.

Valve components for '67 will become even lighter than what we believed was the ultimate last year. The use of late-model Ford rearends, due to the weight factor and strength, should become quite popular. The new Detroit production big engines should become even more popular, and the trend of Chrysler power will find the new year in General Motors and Ford camps. The 427 Ford, 427 Chevrolet, and the 425 Oldsmobile should create a real dent in the Chrysler ranks. The potential is excellent on these products, and through research and development a lot of records should change. Safety will be pushed more and more this year, and inspections by tech committees will become harder and harder. All manufacturers are leaning harder towards a safer product. The speeds have grown so much, that the average racer is insisting for more and more quality and safety factors. Along with this, Detroit has become so interested in drag racing that many performance options are available. Rumor has it that aluminum heads for the 427 Chevrolet should soon be available through the dealers. Late Chrysler hemiheads are already available through Chrysler service garages. New lightweight automatic transmissions are being built and improved upon daily. Almost every engine component produced by a manufacturer is constantly being researched to develop the lightest possible component with maximum strength. Many racers have found last year's racing equipment out-dated this year. Even the mag drag racing wheels of last year have been reduced in weight, although from a quick glance they appear the same. A few years ago, the average racer bought the product for performance only. But today, weight, strength, and performance are also demanded. In order to have an advantage on any class, it becomes necessary to make changes for improvement in this area. The interest by all participants is why the sport has grown so fast and so solid.

COMING NEXT MONTH
N.H.R.A.
WINTERNATIONALS
Complete Coverage
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(continued from page 65)

legs from injury in case of coupler breakage. Seats used in most of today's rails are either fiberglass or aluminum, but both types wrap completely around and under the back half of the driver. Slots are cut into the seat to provide for seat belt and shoulder harness mounting.

The driver controls should all be within easy reach, and planned with much forethought. Some of the big rails have the brake handle located between the driver's legs as opposed to the standard right hand side of the cockpit mounting. Whichever you prefer, make sure the lever is within easy reach. The kill switch may be located either on top of the brake handle, on the steering wheel, between the driver's legs or on the brace from the rearend housing to the steering shaft. The fuel shutoff should also be within easy reach. Although it may not be used on every run, it does come in mighty handy in certain situations.

The most popular trend in the steering wheel department still seems to be the deep dish "butterfly" wheel, now with inlaid wood handles for a better and more comfortable grip. Some racers, however, still prefer the round wheel, as you have more to grab for when moving your hands about the compartment for shifting, etc. There are a number of variations in the parachute release, the most popular of which still seems to be the "O" shaped D-ring located over the driver's left shoulder. Other variations are a small lever located behind the brake handle on the right side of the car so the driver can activate the chute lever while reaching for the brake. Still another variation is a pedal to the left of the accelerator pedal for a foot operated release of the second parachute. One general rule to follow concerning all of the driver controls is to keep them simple as they will have less opportunity to malfunction.

When it comes to the body, a few decisions must be made. If weight is of no concern, a full body with tailpiece and nose piece can be formed, creating a really beautiful and individualized car with personality. But if the car is being designed to run as light as possible, the "wrap-around" is the answer. This brief body serves all the functional purposes required but is the "bikini" of dragster bodies. Consisting simply of a cowl, side panels that extend from the firewall to the seat, and a bellypan, the "wrap-around" body relies on the seat to serve as the back portion of the body. Today's current trend, however, is a compromise between light weight and individuality, combining a wrap-around body with a nose piece. Tony Nancy's car is but one example of this trend. Regardless of what body design you decide upon, 3003-H-14 aluminum should be used. Although it will involve quite a bit more work during the construction stages, the time will be well spent if you mount the body with Dzus buttons. It will prolong the life of the aluminum body and save time and trouble any time you want to take the body off, or put it on. The windshield should be pop-riveted to the cowl for a sturdy and convenient mounting.

One item that has been overlooked in this discussion is the steering box and linkage. There are a number of special aluminum lightweight steering boxes available from P & S and Race Car Specialities, but if weight is not a factor of importance and the budget is, the best bet is a Crosley-Ross cast iron steering box or some compact unit of this nature. Woody has come up with a time-tested linkage that is about the slickest yet for dragsters. The tricks start with the drag link which is segmented and supported in the middle to prevent whip or lash. Up front is where the real ingenuity shows up, as a bell-crank arrangement is used to get the job done. The idea here is that with the axle tipped back 45 degrees for caster, the drag link does not lie in a geometrically perpendicular place with the spindles. By using cross steering, force is applied to the spindles in a plane which is perpendicular to them, which simply means that the steering operates much more efficiently and simply.

One facet of dragster construction which all the pro racers and builders cannot stress enough is stopping devices. If any money is to be spent, here is the area where top quality equipment should be used, as stopping devices and roll cage construction are about the two most important things in a dragster. Investing your money in a good set of spot disc brakes and a quality parachute is like buying a life insurance policy for yourself. In essence, a good chute and set of spots will pay a dividend on every run by stopping your car, and yourself, safely. What good is it to spend all your money on speed equipment for the engine if poor stopping devices cause the car to go off the end of the strip?

When you look at a dragster from a step by step point of view, you can see that it's not really so complex and that if you really want to have a ball every weekend, just build a little unblown gas burning dragster and watch the fun begin. No matter how limited your budget is, you can still manage to build a dragster. The reason I say this is that I've really seen some nice *low* budget rails across the country. If you and some of your friends want to get started, send to S.E.M.A. for a copy of their minimum suggested specifications, and then to the N.H.R.A. for their 1967 rule book. After this, it's just a matter of ingenuity and time until you catch that exciting blast of wind in your face at 100 mph plus speeds.

dipstick

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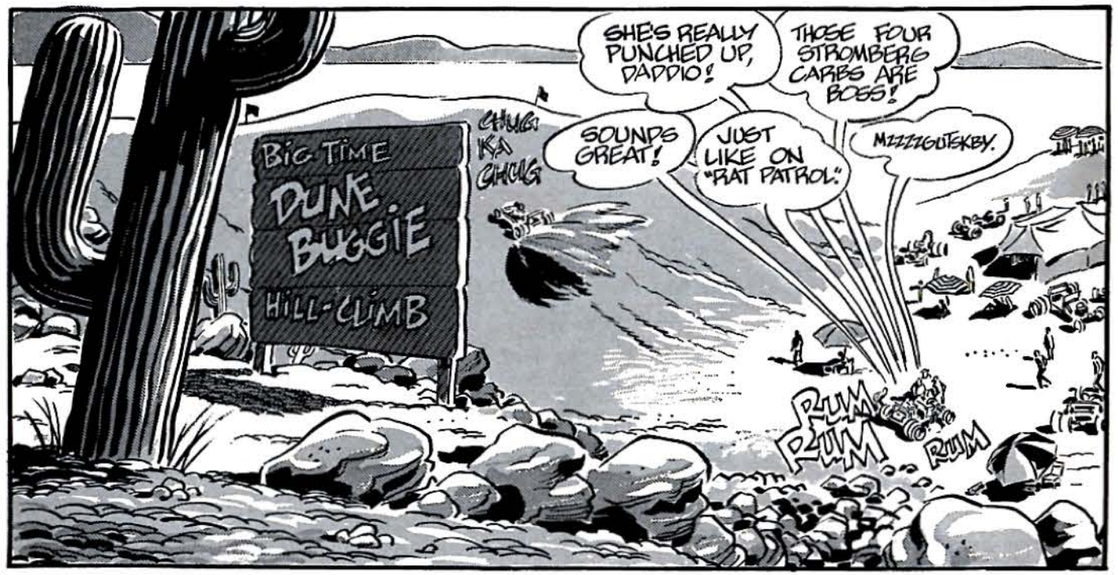
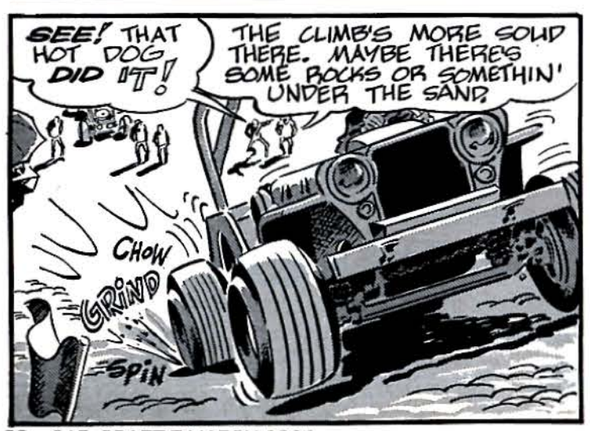
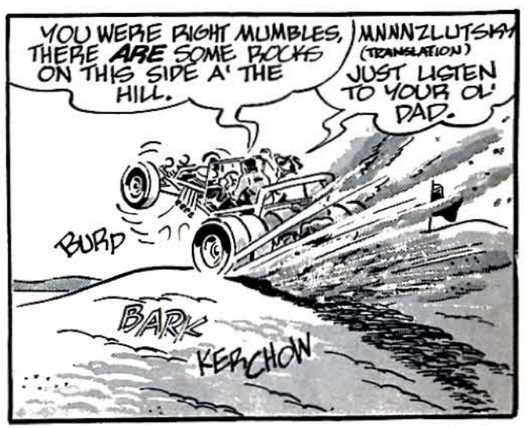
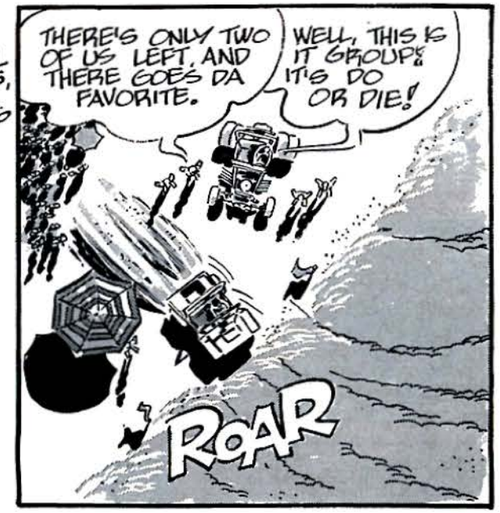
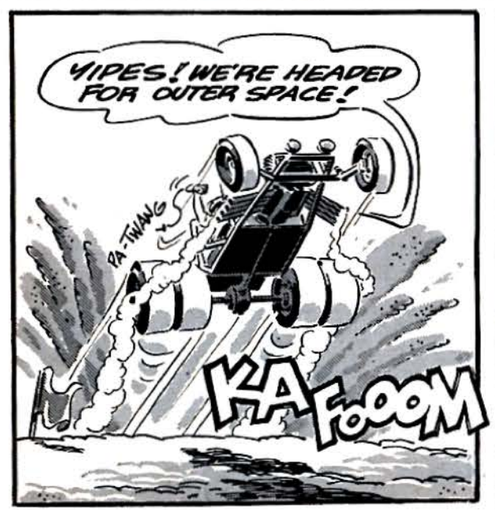


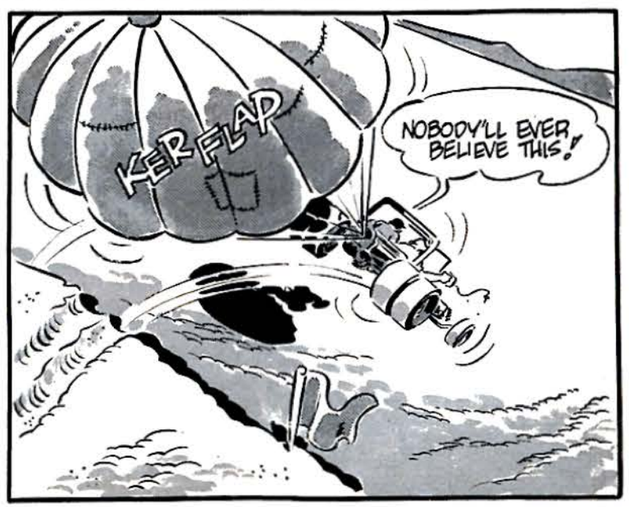




AFTER SEVERAL ROUNDS, THE STARTING LINE IS MOVED CLOSER TO THE HILL!







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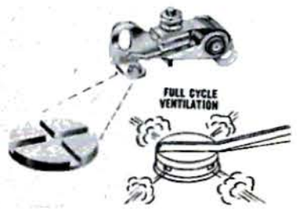

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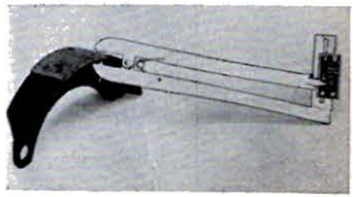

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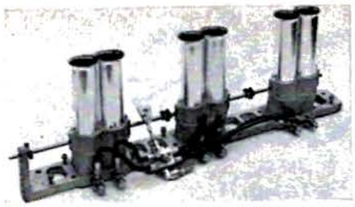

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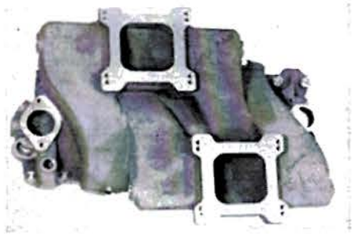

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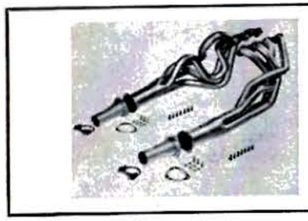

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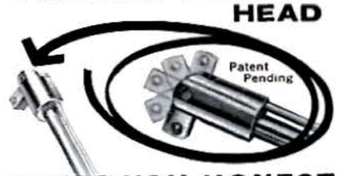

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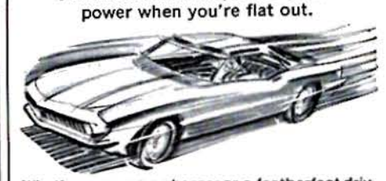

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CC/GASSERS

EDITOR: Jack Crandall

IT'S HOW YOU SAY IT
A motorcyclist that was packing double pulled up to a stop sign after a real hairy turn on the pavement. The guy on the back got off with his knees knocking and said, "What's the matter with you Herm, have you flipped or what? You almost killed both of us on that last turn." The driver was just as shook as the other guy and said, "Yeah, I know, but I just couldn't resist the challenge when you yelled 'hot shoe.'" The rider quickly replied, "Man, I didn't yell hot shoe, I just sneezed."

HE IS SO DUMB that he thinks a mini-skirt is something that goes on the back fender of a mini bike.

THE NAME GAME
The head coach of the Baltimore Colts was looking over some prospective rookies. He called one giant to the sidelines and told him, "I've been watching you, boy, and in spite of the fact that you weigh 390 pounds you move very fast, so for the '67 season I want you to play in the backfield." The new player replied, "Gee, when I came here this morning I was a nobody and now I am a '67-390 Mustang fastback."

WHEN ALL ELSE FAILS . . .
A woman was trying out her new car. First, she roared out of the driveway, knocking over the mailbox, destroyed several small trees, hit a dog, grazed a cat, bounced off another car, crashed into a building and then lost control.

QUICK REFLEXES
A cowboy with nothing much to do ambled into the local blacksmith's shop and picked up a horseshoe without realizing it had just come from the forge. Instantly he dropped the hot shoe, shoved his seared hand into his pocket, and tried to appear nonchalant.
"Kinda hot, wasn't it?" asked the blacksmith.
"Nope," replied the cowboy. "Just don't take me long to look at a horseshoe."

HE WAS SO DUMB he saw a "Wanted for Armed Robbery" poster in the Post Office and applied for the job.

HELPFUL HELPER
On a cold day a woman's car stalled at a red light. She tried the starter again and again, but nothing happened. A restless type behind her blasted away on his horn. Finally, she got out and walked back to him. "I don't seem to be able to get my engine started," she said. "If you'd like to give it a try, I'll stay here and keep your horn honking for you."

HE WAS SO DUMB he thinks a wheel-stand is a roadside tire store.

SOMETHING'S MISSING
A sweet old lady was sitting in her car after the light turned green and was a bit flustered. The car wasn't in gear, but she was pumping up and down on the clutch and the engine was screaming just a little below blowing up. A policeman on the corner came over and said, "Lady, you'll have to put it in gear, the fan just ain't big enough to pull it up that hill."

WORDS OF WISDOM
Go to college, continue your knowledge
To be a person smart, brave and true.
For if they can make penicillin from
moldy cheese
They surely can make something of you.

HE WAS SO DUMB he thought a mental block was a psycho engine.

WELL BEHAVED
Bob (In the back of the classroom): VROOM-VROOM-VROOM-M-M!
Teacher: "Bob, you stop that this instant."
Bob: E-R-R-R-R-R!

TOUGH TALE
Once upon a time in a little town called Tary there was a car club called the "Stokers." They all ran Hydros in their cars. One day at a drag race one of the members got into a terrible argument with a stick shift enthusiast from another town. After the rumble, he stood up with a black eye and proudly declared, "Us Tary town Stokers would rather fight than shift."

MORE FACT THAN FICTION
What good is a tiger in your tank if you have a donkey behind the wheel?

"It's tragic to see a guy's nerve, when it starts to go!"

WILD THING
Two beatniks were sitting on a park bench and a little kid on a tricycle peddled by. One turned to the other and said, "Wow, Herm, did you pick up on that freaky thing that kid was driving?" The other replied, "Man, don't you know what that was?" "No, what was it?" asked the first. "That was a unicycle with training wheels!"

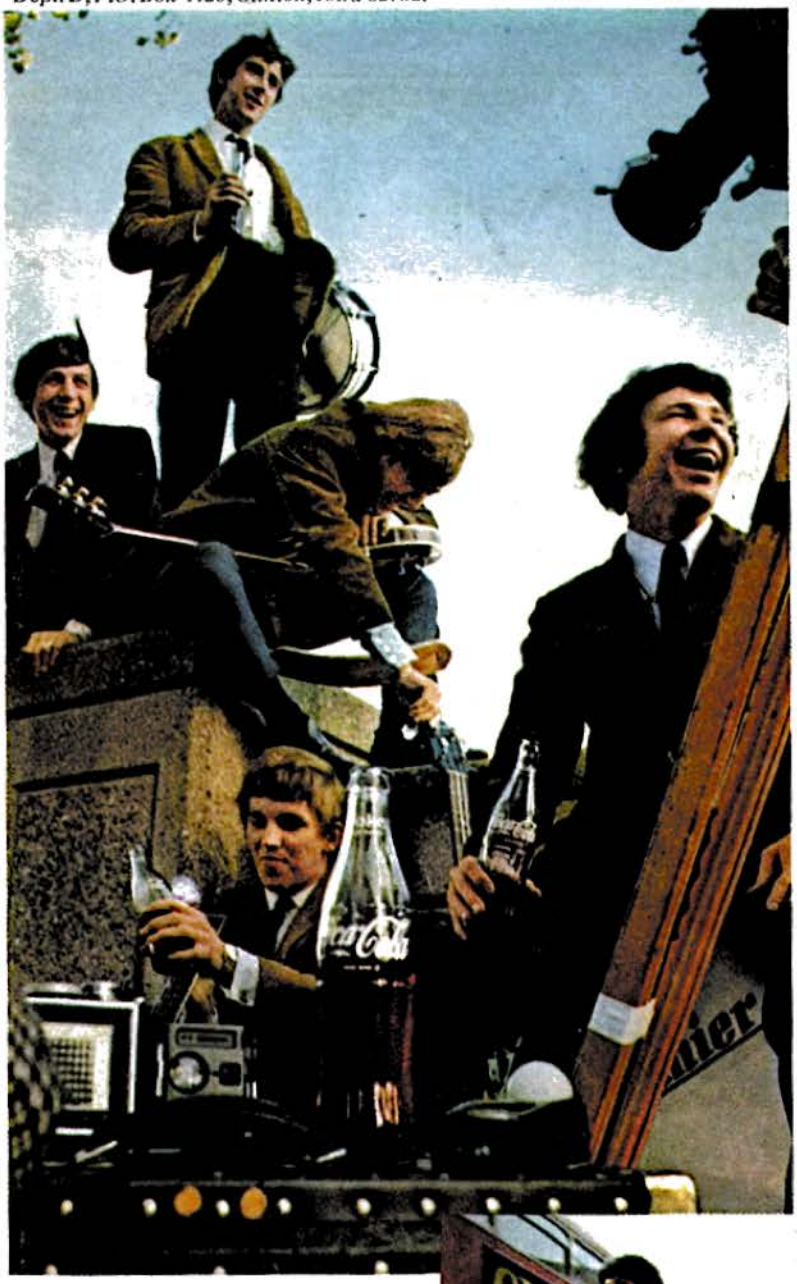
"I'd like a word with you, Gary!"

ANOTHER TEXAN?
A rich Texan was bragging about how he let his son drive one of the family Cadillacs. "But Herm," replied his friend, "your son is only five years old." "I know," said the Texan, "that's why I only let him drive it in the living room."

RICH TEXAN
A Houston millionaire asked his son what he wanted for his birthday. The son replied he would like a set of mags. So his dad bought him Car Craft, Playboy, Life, Look and Post.
Another rich Texan asked his son what he would like for his birthday. The youngster replied his own keys, so his dad bought them for him and told him he would throw in the rest of Florida for a graduation present.

If you've heard a good one lately, let's hear it. Whether it's a funny tale, gag or even a wild poem—Car Craft will pay you $5.00, if accepted. Address all material to "CC GASSERS" Car Craft, 5959 Hollywood Boulevard, Los Angeles, California 90028.

During shooting of publicity film, The Fortunes (Andy Brown, top; Dave Carr, top left; Barry Pritchard, top right; Shel McCrae, on ground; Rod Allen, standing right) clown and relax with their favorite drink. For an 8" x 10" color print of this photo, send 50¢ to cover mailing and handling to: The Fortunes, Dept. D, P.O. Box 4420, Clinton, Iowa 52732.



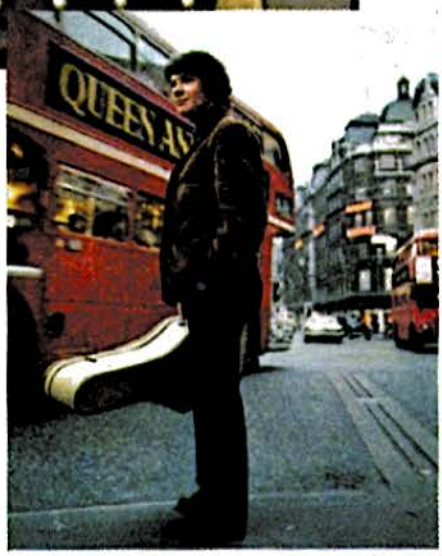
In "Hung On You," a chic Chelsea boutique, The Fortunes try on nipped-in, striped and velveted jackets in newest styles.

Final choices made, The Fortunes enjoy bottles of Coca-Cola ...compliments of the shop for good customers.

THE FORTUNES LONDON TALKS ABOUT

There are five. Young. Charming. Musicians, all. And they've sung their way to international fame. London claims them, though The Fortunes commute each day from Birmingham, Essex and Coventry. For London is the place where they record new discs, pose for endless photographs and buy their clothes. Through it all, they drink Coke. Because Coca-Cola has the taste they never get tired of. And during 15-hour days in London, it's Coke after Coke after Coke that helps to make things go better.

Back in their travel bus, equipped with cooler for Coke, Shel, Andy and Rod doze while Dave strums.



When in town The Fortunes often travel by the 2-story red London buses. Here, Rod Allen scans Knightsbridge, an exclusive shopping and business district.

The Fortunes relax at a publicity shooting. It's been a long day. And there's more of the same coming up tomorrow.