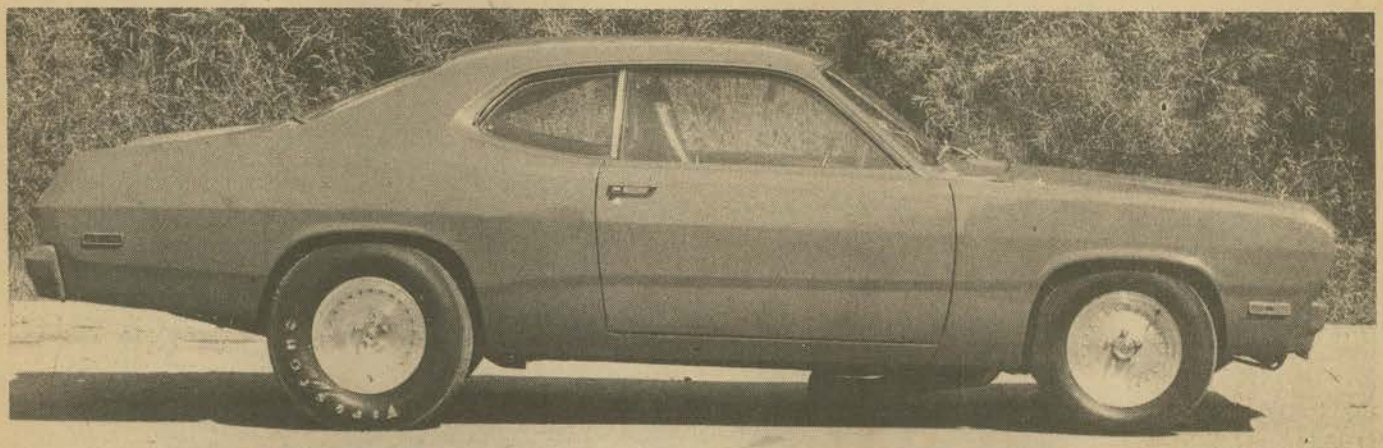
BUDGET MOPAR

Words and pictures by Terry Cook

BRACKET B-MOTOR

All the latest tips straight from Chrysler Drag Racing and Development

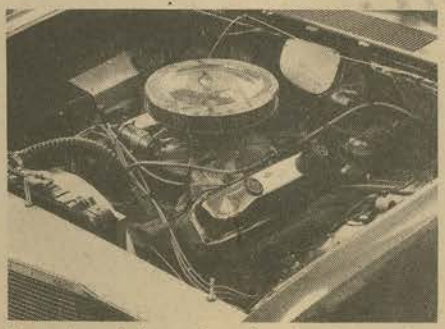


If you've got a 361, 383 or 400 cubic-inch Dodge or Plymouth, you are not alone. Chrysler Corporation built something on the order of three to four million 383s between 1964 and 1971, along with about three-quarter million 400 cubic–inch B-blocks between 1972 and 1978. The popularity of these engines for performance applications is understandable in light of the amount of development work which Chrysler's Drag Racing group dedicated to these medium sized V8s. With a few relatively inexpensive modifications and parts swaps, a motor from this "family" can be converted into a strong bracket runner.

While we will deal with the more modern 400 cubic-inch block, the bulk of the information is directly applicable to the 361 and 383 B-blocks, which are brothers to the 400. Because so many of our readers would like to go drag racing without so much of the drag on their wallets, we will be emphasizing the economy approach and will try to make each buck spent really count in terms of performance.

The subject vehicle for this article is a 1975 Duster, which might be a bit more radical than your average street machine or bracket racer. The engine, however, is perfect for our discussion of budget bracket racing the B-block. The car is equipped with fiberglass front fenders and a lift-off fiberglass hood. The stock front and rear seats have been removed and a pair of lightweight fiberglass buckets have been installed up front while the rear area was simply carpeted over in the interest of weight-savings. A lightweight fiberglass front bumper was also used. With the aforementioned "diet" of glass parts in favor of sheetmetal, the Duster tips the scales at 3,075 pounds, minus driver. The driver, incidentally, is Larry Shepard, an engineer in Chrysler's Drag Racing and Development department, and the car in question is one of that group's rolling test benches.

All 400 cubic-inch Chrysler blocks are the same, so you don't need to worry about having the wrong one. The block has a 4.34 inch bore. Shepard planned on using this engine for a great deal of exhaustive testing so he went to greater pains than are necessary, since the engine was prepared starting with a bare block. It was deburred and then painted inside with spray-on Emron. That particular paint was used because it is indestructible to solvent which might be encountered in future cleaning operations. Painting the inside of the block seals the cast iron and prevents any impurities from coming out of the pores and into the oil. Neither the deburring or painting are mandatory for bracket or street use, but it is a nice approach if you have the time and energy, and it doesn't cost much. The block was not align bored, but it was decked (enough material was removed to make the pistons reside .075 inches below the block's head surfaces). Larry chose to mill the block because he wanted to have an NHRA legal '75 type short block and to use a set of NHRA legal cylinder heads—and because the added compression would be helpful. For bracket racing it is easier to mill the heads and leave the block unmachined, but milling the heads might make the chambers too small for NHRA rules.



Larry found through testing that the car is a bit quicker when the air cleaner is left in place. Normally this is not the situation.

The crankshaft was almost stock. The only non-stock operation was a balancing job including the rods and pistons. Normally, balancing would not be required for the bracket racing operation, but because Larry planned on using the engine with a variety of transmissions and torque converters, he elected to have it internally balanced so he could enjoy the convenience of changing from one torque converter to another without worry. The balancing required about one foot of Mallory metal (a very heavy alloy, denser than lead) in the crank's counterweights. The stock crank is cast, rather than forged, and as long as the engine doesn't see abnormally high rpms (7000 or higher), it should be sufficient for the job.

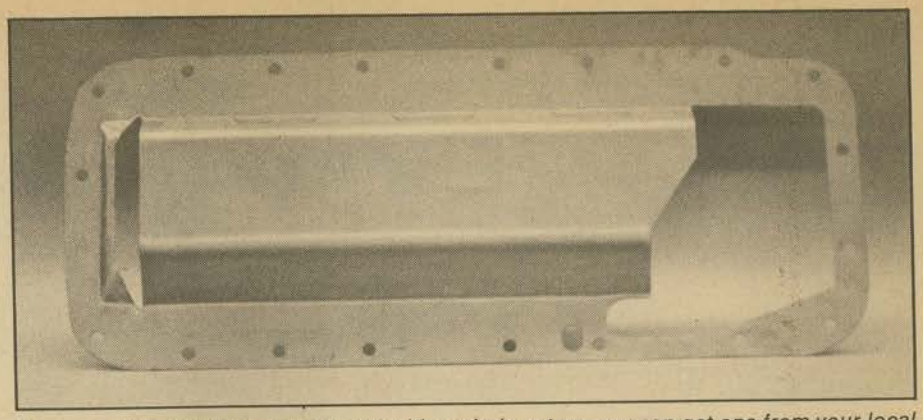
Stock pistons with an 8.75:1 compression ratio were employed. They were tried with stock rings. Later, Dykes compression rings with a spacer were used in the top ring land, but they produced only a very small improvement in performance be-

cause the engine was equipped with a hydraulic cam and automatic transmission which kept the revs at moderate levels. A solid lifter camshaft and manual transmission might show a greater improvement in performance due to the use of Dykes rings, but for bracket racing the cheaper and simpler stock rings will work just fine. Incidentally, gas ported rings are not advisable for bracket racing because they wear out much faster. Larry had his pistons notched for use with a big lift (.750 inch) camshaft (during another phase of the development work) but for the bracket proposition they need not be notched.

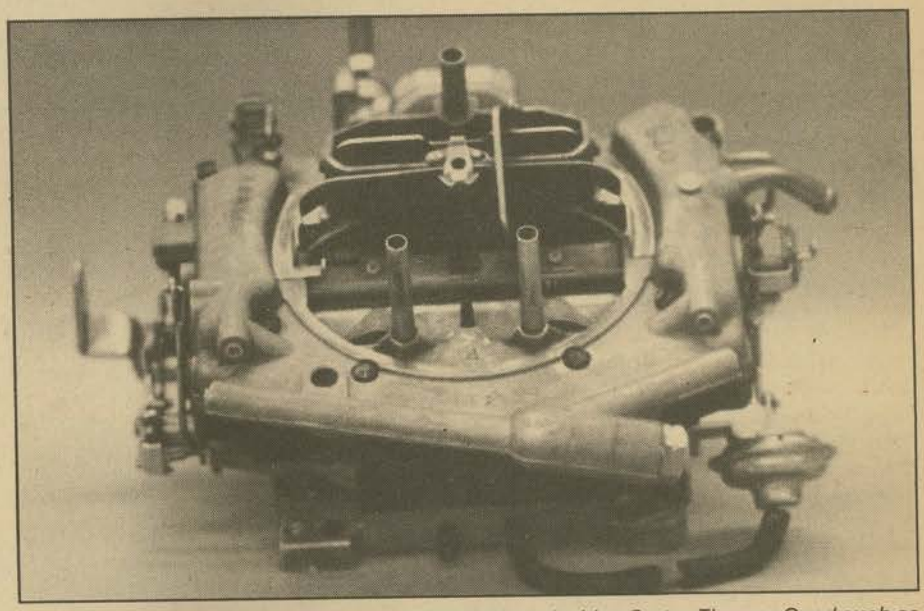
The connecting rods were balanced, as we mentioned, and were also shot-peened (sprayed with small balls of shot to work harden the surface). Larry installed a set of heavy duty ⅜ inch rod bolts for durability, but this is only important if the engine will buzz above 6,000 rpm. In other words, if you plan on using a hydraulic cam and automatic transmission, there is no mandatory reason for your short block to come apart or even for your engine to come out of your car! See what we mean about budget—so far you haven't spent *any* money.

One place where a small investment will pay off, however, is in the oil system. You can have your stock pan deepened two inches: lower the sump by cutting if off the bottom of the pan, welding sheetmetal stock around the edge and welding the sump back on the bottom of the new extension. Check to see that your engine came equipped with a windage tray. Some high performance 400s came with the tray, but if yours didn't you can get one for about $7 from your local Dodge or Plymouth dealer. The tray has Direct Connection part number 3751236. A 440 4-bbl high pressure relief spring (2406677) for the oil pump is another good idea.

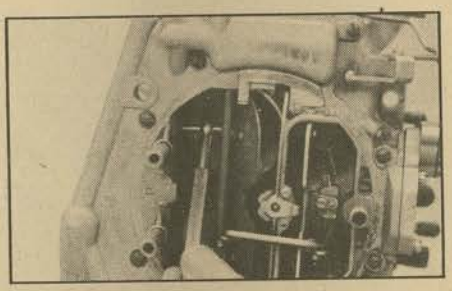
Selection of a camshaft should be done carefully. The more lift the cam has, the more horsepower it has—but driveability, low end torque, idle characteristics and throttle response all generally suffer as the lift goes up. Fortunately, there is a new series of cams from Direct Connection (developed by Chrysler's high performance group) which are specifically designed for bracket racing. Seven hydraulic camshafts were tried in the Duster with the following results.



If your engine didn't come equipped with a windage tray, you can get one from your local Mopar dealer for about $7. Ask for part number 3751236 at the parts counter.



Many B-block Dodges and Plymouths came equipped with a Carter-Thermo-Quad such as this 1975 model. A Carter Strip Kit was used to provide the .149 secondary jets.



An inside micrometer was used to measure the proper air door opening of .825 inch as shown.

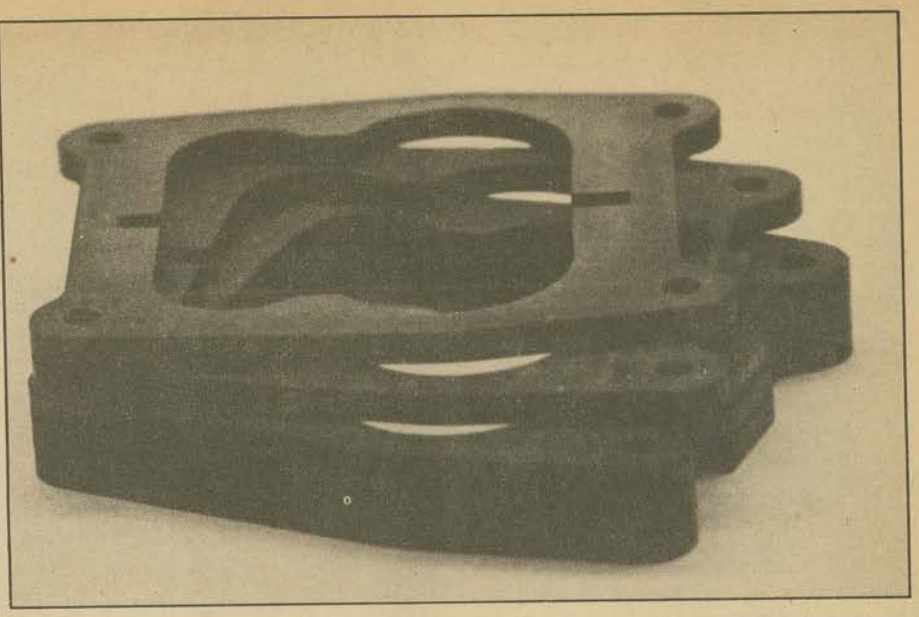
In case you don't know what "50' time" means, one easy way to tell if a car is launching properly and to compare starting line techniques is to place a separate set of ET clocks fifty feet off the starting line and compare times. It should not be interpreted from the above figures that one camshaft is better than another for all cases—only for this weight car with this rear axle and transmission. Since many bracket racers also use their vehicles on the street, things like idle characteristics and low end torque are quite important. Long duration cam-

CAMSHAFT	*Direct Connection Part Number*	*50' time*	*ET*	*mph*	*Shift rpm*
Stock hydraulic	not available	1.580	12.35	110.27	5800
Street Hemi Grind (PSHB-471)	P3690214	1.599	12.18	112.60	6000
CRB980 Cheater	P4007277	1.664	12.08	114.94	6300
SSH-44 Racer Brown	P3690812	1.621	11.95	115.18	6300
PSHB-509	P4120237	----	11.82	116.61	6300
SSH-25 Racer Brown	P3412073	1.610	12.08	113.50	6000
PSHB-484	P4120235	----	11.91	116.30	6300

shafts used with the stock torque converter result in an absence of low end torque. The Cheater cam was especially bad in this regard, making the car harder to drive. It made the engine idle very poorly and it was difficult to launch from a 1200 rpm stall speed. Cams with high overlap and long duration therefore make poor choices for street use. All camshafts used in the tests were ground on 108 degree centers and installed straight up using the standard roller chain and the same set of lifters.

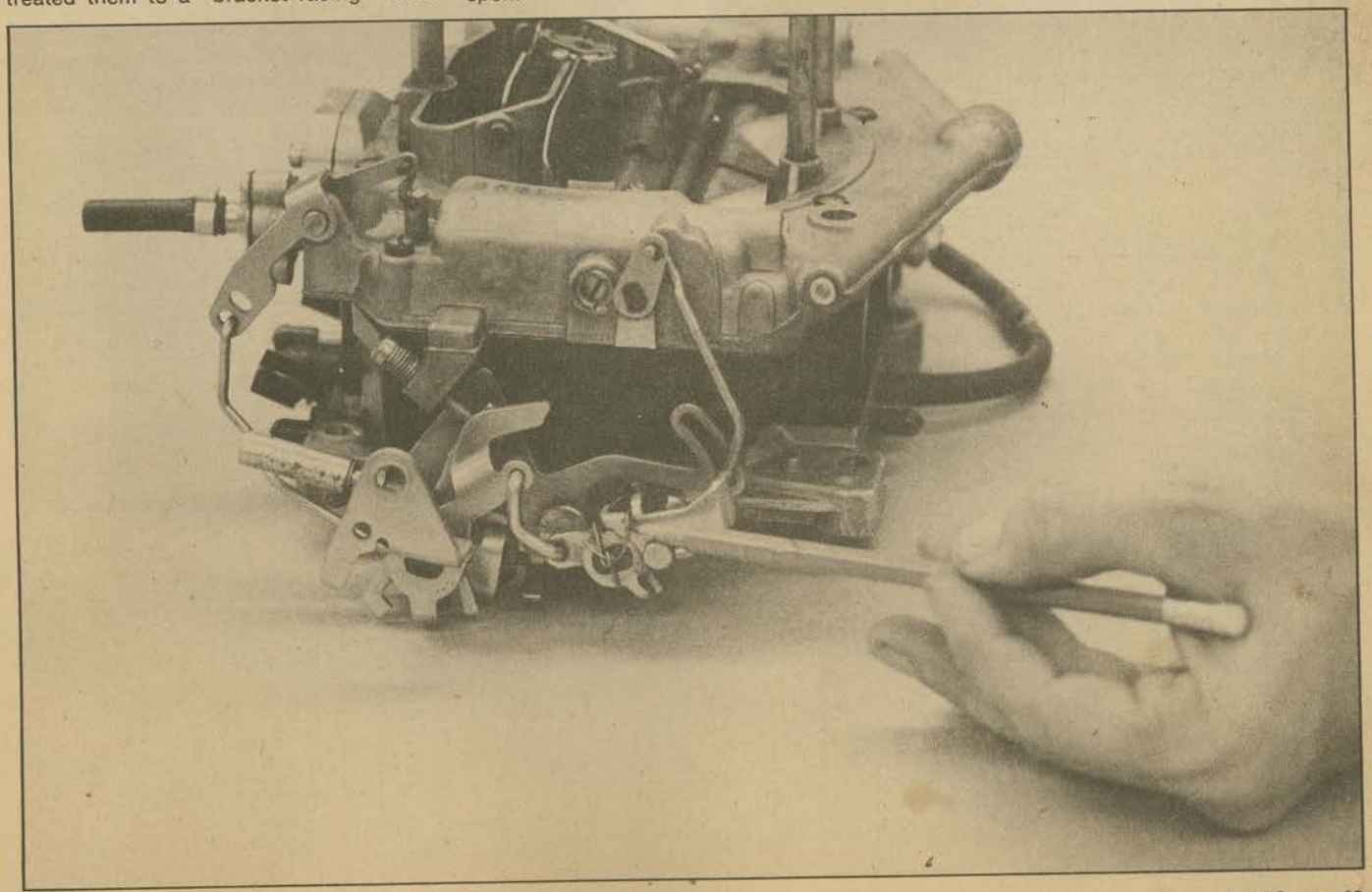
The evaluation of the above camshaft comparison is as follows: The SSH-25 is a good compromise for multi-purpose use; The SSH-44 is better at the lower speeds than the 980 Cheater cam, but is still very marginal with a stock converter even in a light car. The new purple shaft PSHB-484 is the best compromise for high performance multi-purpose use, especially with an automatic transmission. It is one of the two new cams designed for bracket racing using today's race technology. The other new bracket cam is the purple shaft PSHB-509 which would be best used with a manual transmission and axle ratios of 4.10 and up. This cam can also be used in race cars with automatic transmissions and 4.30 and up axle ratios. The street hemi grind (purple shaft PSHB-471) is still the best all around camshaft choice with 2.91-3.91 axles. Since these two new Direct Connection camshafts sell for about $100, including lifters, they stand out as economical performers.

As far as cylinder heads are concerned, Larry started with a stock set of heads and treated them to a "bracket racing" valve job. The stock 2.08 inch intake and 1.74 inch exhaust valves were used. He backcut the intake and exhaust valves, he cleaned up the throat with a two-angle cut for a smoother approach, and he milled the heads to bring combustion chamber volume down to 83cc. He could have milled the heads more for more compression but it's not a good idea given today's gasoline.

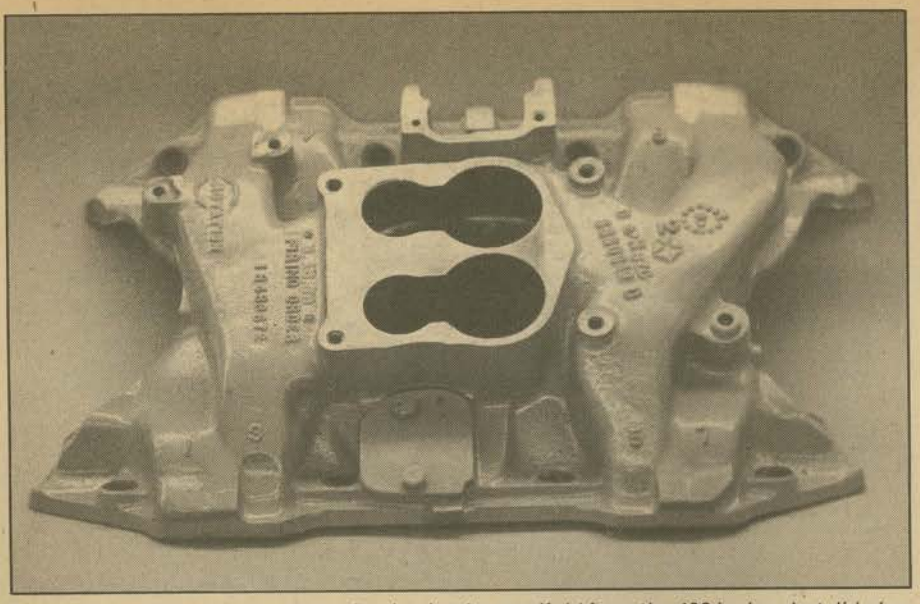


Carb spacers (two to four) are used to insulate carb from heat and improve fuel distribution.

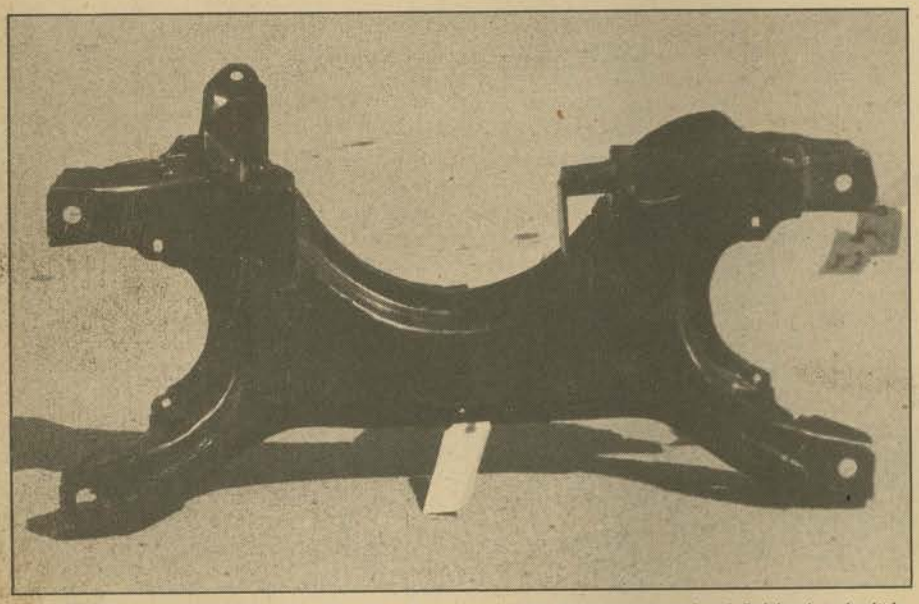
The ports on the heads were left stock and for valve gear Larry chose Direct Connection single springs with damper (P3690933) which are good for camshafts with up to .520 inch of lift. Seals were used on the intake valves only and the standard keepers and retainers were employed. Heavy duty hydraulic rocker arms (left P3690712, right P3690713) were used to prevent the pushrod from piercing the rockers, and the springs were set up with an installed height of 1.83 to 1.86 inches. Stock pushrods and the standard hydraulic lifters were used and worked fine. If you want to spend the extra money on the new B-block heads, they should be prepped like the stockers



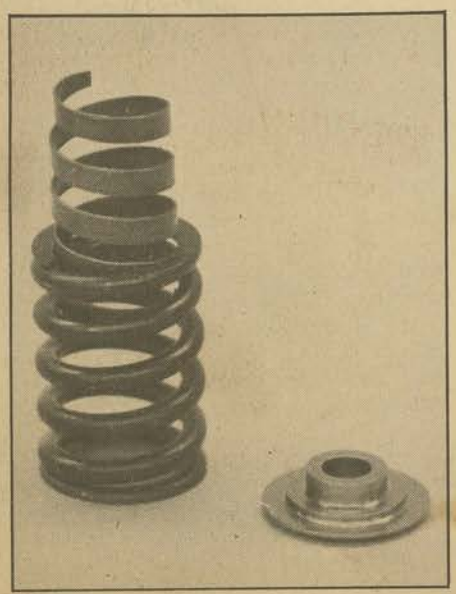
Wire insures a positive engagement of clip on throttle linkage so secondary throttles open.



Larry elected to use the stock production intake manifold from the 400 incher, but did plug the heat cross over passage to eliminate carb heat. Plug the EGR at the track.



This K-member (P4007935) can be used to make the B-block or raised B-block a bolt-in proposition for 1967-'76 A-bodies (Duster, Dart, Valiant and early model Barracuda).



Single springs with damper (P3690933) are good for camshafts with as much as .520 inch of lift.

we discussed, but you must grind away a bit for intake pushrod clearance (See November '78 *CARS*).

The induction system used on Larry's Duster varied, but the one he favors is the stock cast iron production manifold for the 400 cubic-inch engine. The heat cross-over in the manifold was plugged and if your car is equipped with EGR (exhaust gas recirculation) you can plug it while you are at the track. Just remember to unplug it if you're heading back for the street. The carburetor used was a stock Thermo-Quad with the dual rear vent. If you should happen to have one of the Thermo-Quads which came through with a giant single rear event and the electric bowl vent, make sure to keep it hooked up (electrically), or the carb will go sloppy rich. The carb used in the tests was about a 1975 vintage Thermo-Quad. The primaries were left alone with the exception of pump shooters which were drilled out to about .050. The secondary jet was a .149 and came from a Carter Strip Kit (P4120240), which is available at any reputable speed shop for a few dollars. The nozzles were left stock (.086 driver's side, .083 passenger's side), as were the metering rods. There is one critical adjustment which should be adhered to with this carburetor. The air door opening was .825 inch, measured with an inside micrometer from the tip to the back of the thermal plastic (see photo). And if you think that running with the air cleaner off means better performance, tests with this car showed Larry that the engine runs a tenth quicker with the air filter in place than with it off. And it keeps the inside of the engine cleaner. Without the air cleaner, the carb needs to be richer to go faster, which it will.

The ignition system used on the 400 bracket Duster was Chrysler's basic late-model electronic unit. It is advisable to remove the production control box and install either the blue box or the new chrome control box (P4007298). Set the total advance at 38 degrees and forget about the initial advance. You can find the 38 degree setting by either buying a degree tape (P4007657) through the Direct Connection or do it the cheapo way (measure 2⅜ inches backwards from the zero line). Larry used Accel wire and Champion J-10 plugs gapped at .036.

The exhaust department was accommodated by a set of tube headers (P3690594) that are 40 inches long, 1⅞ inches in diameter, and have 18 inch length, 3½ inch diameter collectors. Chrysler's Direct Connection offers a variety of tube headers to accommodate most of the popular late Mopar engine/body combinations.

The transmission is an A727 Torqueflite with a Turbo Action valve body assembly (P4007291) which is manually shifted at 6300 rpm. A Street Hemi torque converter that is found in the 383 Road Runners and Hemi automatic combination is employed. While it is termed an 11 inch converter, it actually measures 11¾ inches. If you have the 13 inch converter in your car you might consider the swap to the smaller unit (no Direct Connection part number). The 8¼ inch ring gear Sure-Grip rear end used a 4.30:1 ratio and twists 9 inch wide (28½ to 29½ inch tall) Firestone Stock Eliminator tires which are mounted on 15 x 8 wheels and run at 10 psi of inflation (hot). Through experience Larry has found that you can run quicker by power stalling the converter at 2500 rpm. But since consistency is the rule in bracket racing, an off idle launch (smashing on the throttle with it between 1500 to 2000 rpm) will provide the same ETs run after run. This rig runs 11.90s at 115 mph, which is a fun ride in anybody's book. The beauty of the combination is that it requires no inside-the-block work and is really in the economy price realm as far as drag racing goes these days.