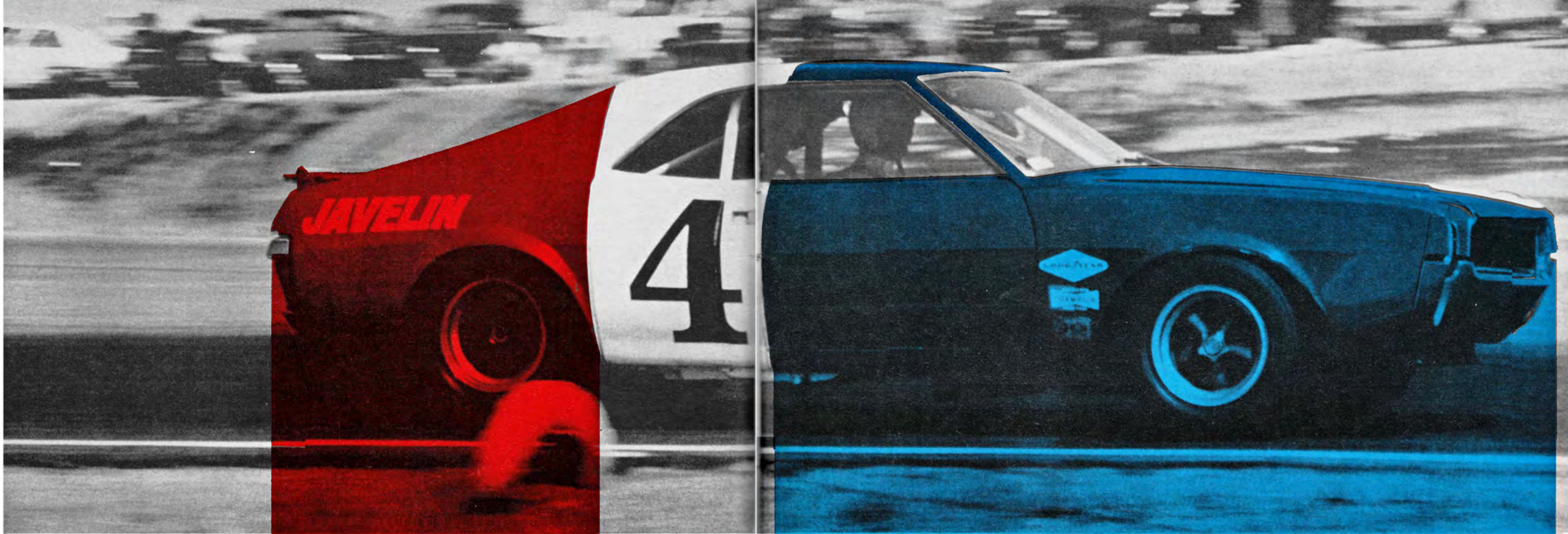

PHOTO BY CAM WARREN

HOW THE PROS COMPETE WITH JAVELINS, AMXs

We set out to discover what the enthusiast could do to make his own car more like Breedlove's or Revson's. There were few secrets, and we drew up a loaded chart.

BY ALLAN GIRDLER, ASSOCIATE EDITOR

AMERICAN MOTORS doesn't sell cars the way it used to. Bold, bright letters on Ron Root's Super Stock Javelin tell drag racing fans the car is sponsored by the American Motors' Dealers Racing Assn.

Racing. Right out there in front of George Romney and everybody. Javelin and AMX, the image makers, are competing at Bonneville, the drags, professional road races, amateur slaloms. Everybody loves the underdog, provided that he has a good grip and a chance to turn the tables. It's a long way to the top, but AMC has a good grip.

What the racers do to get that grip depends on the rules, and on what the factory can come up with. As CAR LIFE's exclusive chart shows on page 16 the factory has come up with a good selection of parts.

The racers benefit, and so do AMC owners. Few Javelin or AMX owners will run at Bonneville, or in professional road races, but they're showing up at dragstrips and slaloms in rapidly increasing numbers. What the professional does serves as a good example for the amateur racer, or the driver who simply wants a more satisfying car.

The factory's biggest splash has been in the SCCA's Trans-American sedan series. That's where most of the money goes, and where most of the new parts come from. Trans-Am rules are loose: the cars can use any equipment the maker lists as available; they must weigh at least 2800 lb.; and the engines can't exceed SCCA's limit of 305 cid.

Ford and Chevrolet simply reached into the ol' parts bin, and put engines of the right displacement into production. AMC couldn't, so Ron Kaplan, who prepares the team Javelins, increased the bore of the AMC 290 V-8. The factory helped by putting the 343 cylinder heads, with bigger valves, on the list. (They bolt right on to the 290 block. Not as much horsepower as Ford's tunnel-port heads, but much easier to buy.)

The factory also listed new intake manifolds and twin four-barrel carburetors, and disc brakes for the rear wheels. Stripping the cars for competition got the weight down to the limit, and the Javelins have braking and displacement-to-weight that equals the competition.

They may be down slightly in power. Even with the bigger valves, the heads are restrictive. Javelins get short of breath in the upper range, and the camshaft timing in the racing cars is very mild. The racing Javelins have 308° duration, while the street/stock Camaro Z/28 has 346°.

Suspension changes are limited, by the rules, to refinement of the stock system (*full* details are in the November, 1968 CAR LIFE). Spring rates are changed with the course and the weather, and both the Koni and Monroe RS series shock absorbers are stiffer than would be tolerable in highway driving.

The road racing equipment shows up ▶

HOW IT'S DONE depends on what the racer is trying to do. The chart below lists what the top teams have done and what—just as important—they've left alone. Where possible, factory parts numbers and brand names are listed, so the enthusiast Javelin or AMX owner will know where to ask, and what to ask for.

	Javelin Racing Team, Trans-American Series Javelins (two)	Breedlove's Bonneville Speed Spectacular Javelins (three)	Breedlove's Bonneville AMX	Ron Root's SS/F Superstock Javelin	Dave Kempton's SS/FA Superstock AMX	Dick Mahan's Slalom Javelin
ENGINE	AMC 290 V-8	AMC 343 V-8	401-cid experimental AMC	AMC 390 V-8	AMC 390 V-8	AMC 343 V-8
Displacement	304.3 cu. in. (bored)	373 cu. in. (bored)	373 cu. in. (sleeved)	390 cu. in.	390 cu. in.	343 cu. in.
Cylinder Heads	from AMC 343 V-8	from AMC 343 V-8	from AMC 343 V-8	stock	stock	stock
Camshaft	Engle 308° duration, intake lift 0.493 in. / exhaust 0.511 in.	Crower 310° duration, 0.525 lift	Crower roller tappets, 383° duration, 0.565 in. lift	0.520 in. lift (experimental) Sig Erson, 312° duration	0.510 in. lift, Clay Smith 310° duration	Crower ground to stock contours
Ignition	Delco CD, AMC #4485742	Grant Flamethrower	Joe Hunt Magneto	Cragar CD	stock	stock
Intake Manifold	Edelbrock Aluminum AMC #4486228	Edelbrock Aluminum AMC #4486228	Grant experimental	Offenhauser aluminum	Edelbrock aluminum AMC #4485729	stock
Carburetion	two Holley 600 cfm 4-barrel model 4160	two Holley 600 cfm 4-barrel model 4160	supercharger from GMC diesel, Hilborn 4-port fuel injector	one Carter 4-barrel	one Carter 4-barrel	one Carter 4-barrel
Exhaust	Belanger steel headers	Doug's steel headers	Breedlove, steel headers	Doug's steel headers	Doug's steel headers	Jardine steel headers
Flywheel	stock or Schiefer aluminum	Schiefer aluminum	Schiefer aluminum	Schiefer aluminum, 19 or 45-lb.		stock
GEARING						
Transmission	4-speed manual	4-speed manual	4-speed manual	4-speed manual	3-speed automatic reworked by B&M Automotive	4-speed manual
Gearset	1st...2.23...2.43...2.64 2nd...1.77...1.76...2.10 3rd...1.35...1.47...1.46 4th...1.00	1st 2.64 2nd 2.10 3rd 1.46 4th 1.00	1st 2.64 2nd 2.10 3rd 1.46 4th 1.00	1st...2.23...2.64 2nd...1.77...2.10 3rd...1.35...1.46 4th...1.00		1st...2.23 2nd...1.77 3rd...1.35 4th...1.00
Final drive ratios	2.87, 3.15, 3.54, 3.73, 3.91, 4.10, 4.40 and 5.00:1	2.87:1	2.87:1	4.4 or 5:1	4.4:1	4.1:1
CHASSIS						
Brakes	disc front and rear (factory option)	disc front/drum rear (factory option)	disc front/drum rear (factory option)	disc front/drum rear (factory option)	drums (stock)	disc front/drum rear (factory option)
Springs	factory handling package	factory handling package	factory handling package	factory handling package	stock	factory handling package
Shock absorbers	Monroe or Koni	Cure-Ride 50-50	2 stock shock absorbers at each wheel	Cure-Ride 90-10		
Front antiroll bar	0.88 or 0.94 in. dia.	0.88 in. dia.	0.88 in. dia.	0.88 in. dia.		
Rear antiroll bar	0.50 or 0.56 in. dia.					
Other	Panhard rod built by Kaplan Engineering Inc.	traction arm from AMX	front-end geometry revised	12 in. traction arm on rear spring. Rear shackles lengthened 1 in.		
WHEELS						
Size	8 x 15 in.	8 x 15 front / 10 x 15 rear	7 x 21 front / 8 x 25 rear	3.5 x 14 front / 6 x 15 rear	6.5 x 15 front / 5.5 x 14 rear	7 x 15
Type	magnesium	steel	magnesium	steel	steel	steel
Maker	American Racing Equipment	Cragar	Haliburton	Cragar	Cragar	Keystone
TIRES	Goodyear	Goodyear	Goodyear	Goodyear	Cooper front / Goodyear or Casler rear	Michelin
Type	Sports Car Specials	Sports Car Specials		Powercushion front / racing slicks rear		
Size	5.25 x 11 x 15 front / 5.75 x 11 x 15 rear	5/8.30 x 15 front / 6/10 x 15 rear	7 x 21 front / 8 x 25 rear	5.50 x 14 front / 10.50 x 15 rear	8.25 x 15 front / 8.15 x 14 rear	195 x 15
BODY MODIFICATIONS	AM #8992357 deck-mounted spoiler, fiberglass front bumpers, rear bumpers removed	Breedlove-designed spoiler above rear window	hood scoop for air inlet and supercharger clearance, rear deck spoiler developed for Trans-Am Javelins, rear fender wells enlarged for tire clearance	rear fender wells enlarged for tire clearance		
Other changes in equipment	passenger and rear seat removed, trunk mounted battery, engine, transmission and differential oil coolers, Goodyear fuel cells			light or heavy flywheels, depending on track conditions, fuel pickup moved to rear of tank, undercoating and padding removed to reduce weight	undercoating and padding removed to reduce weight	

COMPETITION DISPLAY at dealer convention included Doug Thorley and his Javelin-replica funnycar, backed up by the Trans-Am Javelin and drivers George Follmer and Peter Revson, Hayden Profitt and his Rebel funnycar, and Breedlove with Bonneville Javelins.

JAVELINS

continued

in some unlikely places. The three Javelins prepared by Craig Breedlove as a *Car Craft* magazine project will compete in the production class. Like the Trans-Am rules, production at Bonneville means the engine block had to come with the car. Breedlove bored the 343-cid engines to the 373 allowed in C-production, and chose the carburetors and manifold that became an option when the road racers discovered they needed more carburetor. Camshafts, again, are mild. Breedlove doesn't plan to run the engine much higher than 6000 rpm, figuring that there will be enough power produced at that speed to drive the cars to new records, with tall wheels and tires and the factory's lowest (low numerically) final drive ratio.

Each of the three project cars will have more tricks after the runs than they have now. The project is a contest. *Car Craft* chose three teams of tuners, one for each car, and is giving them a free hand with the basic package. Before rain postponed the runs, the contestants were reworking carburetors, moving ignition components, calling for headers of different designs, and building internal ducts to control air flow in and around the engine. What works, and how well, aren't known at this writing. Breedlove and the factory may both learn something.

Breedlove's AMX will run as a supercharged GT car, and the rules are looser yet. Starting point for the AMX engine is the factory's experimental 401-cid block, with four-bolt main bearing supports. It's sleeved down to the class limit of 373 cid. Intake and exhaust ports are reshaped and enlarged, and the valves are bigger. Grant Industries made an intake manifold that mounts the ubiquitous GMC diesel Roots supercharger. It's driven by a Gilmer belt, and geared to produce 22 lb. boost. Compression ratio is reduced to 8:1. The camshaft timing is radical, for an AMC engine. Breedlove's engine builder rates the engine at 1100 bhp at 8000 rpm. The engine will later be installed in Breedlove's new Land Speed Record contender, where it's expected to push the tiny streamliner to well over 400 mph.

The only major body change to the AMX is the fiberglass hood, with a bulge for the supercharger and a scoop for the Hilborn fuel injectors above that. Breedlove designed a rear spoiler for the Bonneville Javelins, but it wasn't ready when the AMX was planned, so the AMX will use the adjustable spoiler designed by Kaplan for the Trans-Am cars.

The radiator has been replaced with a cooling tank, and the air intake is sealed, to reduce drag. The rear fender wells have been enlarged to accommodate the 28-in. wheels and tires the car needs to reach the 200-plus mph Breedlove expects. The tires and wheels will never appear on anybody's option list for street cars. Goodyear made the tires just for Bonneville, and Halibrand made the wheels just for the tires. The tires have no tread; they run at 250 psi; and they are tubeless. To hold the pressure, the insides of the wheel rims are coated with epoxy.

NHRA rules for Super/Stock classes are neither loose nor tight. They're selective. Any flat-tappet camshaft and valve gear are allowed, but the heads can't be touched. The intake manifold can be replaced, but the carburetor must be production. That's actual production, not options. Root is an NHRA official; ▶

INSPECTION OF Bonneville Javelins took place while the cars were being loaded for the trip to the salt. Dick Clements, marketing director for Breedlove's company, explains suspension details, above, and engine work, below, to Car Life's Allan Girdler.

AMX PREPARATION was still underway at this point. Front view, above, shows extra lights for night driving during endurance runs. Below, engine builder Jim Ward puts final touches on the supercharged AMX engine.

SPEED RECORD AND DRAG PHOTOS BY JIM HAMILTON

SLALOM JAVELIN prepared by Dick Mahan, below, was so nimble with stock suspension that Mahan left the suspension alone. He won two of the three slaloms entered so far this year, and placed third in the other. He's placed first, second or third in all seven rallies entered in 1968. Best time at the dragstrip is 13.71 sec. at 105.66 mph, although Mahan has yet to win an important meet. Using the same car for three types of competition puts Mahan at a disadvantage. With a Trans-Am engine, he'd do better in slaloms, but wouldn't stand a chance at the strip. Mahan would rather keep engine stock. He drives the car to work, a tradition now almost extinct, and the Javelin also serves as stand-by ambulance at Ridgecrest High School football games. Mahan works as a designer for the Navy, and a sports director for the Ridgecrest radio station.

JAVELINS

continued

he knows the rules, and said, "I've done everything possible that's allowed."

The 390-cid engine is blueprinted, but Root doesn't start there. He uses sonic sounding, which measures the thickness of the cylinder wall in the same way a depth finder measures depth of water, to be sure that the block doesn't have any weak spots. When the engine was assembled, he ran it on a dynamometer for eight days, partially to tune the engine to a fine edge, and partially because he had thermo-couples plugged in at vital points, to make sure oil and heat flow were the way they should be.

Root's camshaft was ground only after he spent 30 hours with the heads on a flow bench. The lift and duration were chosen only after he and Sig Erson knew how high, and for how long, the valves should be opened. The timing is very close to that used in the Trans-Am and Bonneville Javelins, and Root says wild camshafts for the engine are money down the tube. Root would like new heads, but he'd rather have the carburetor which the Trans-Am rules allow and the NHRA rules don't. With it, in run-what-ya-brung match races, he's turned elapsed times under the national record for his class.

Suspension is standard dragstrip. A short, flat bar keeps the rear springs from twisting. The shock absorbers transfer weight by holding the front of the car up, and the rear down. The car is raised the one inch allowed by the rules.

Root juggles gearing and flywheels to adapt to each strip. The rules require explosion proof flywheels, and Root has two, one heavy, one light. He has two transmissions, one with close-ratio gears, one with wide ratios, and two rear axles, with high and higher gearing. On a fast, slick strip, he uses the light flywheel, which lets the engine rev quickly, the low numerically transmission, the 4:1 final drive. If the track has grip, he switches to the higher ratio transmission, for torque multiplication. If it's really sticky, the heavy flywheel will keep the engine from bogging at the start. (After describing his technique and speed secrets, Root smiles, and says that sometimes he'll go through the whole routine, and his times won't change at all.)

When Dave Kempton needed to have the transmission in his AMX prepared for the drags, B&M Automotive was willing, but surprised. They've lost count of the transmissions they've

RON ROOT'S SUPERSTOCK Javelin charges off the line during qualifications for the Super Stock championship, above. He trailered the Dodge factory's best, but lost in the third round. Below left, Root checks his instruments. The Javelin has extra gauges in the panel, and atop the cowl, in the driver's line of vision. Fuel pick-up tank, below right, has the pick-up below the tank proper, so gasoline will be forced into the line during acceleration.

AMX CAMPAIGNED by Dave Kempton in Super Stock class for cars with automatic transmissions, sits in pits, left, between practice runs at Super Stock championships. Crewman Terry Kvidahl, right, talks about speed secrets while he makes sure everything is go. Kempton was only 0.11 sec. off the national class record at the meet, but he, too, was eliminated during class run-offs. AMX transmission prepared by B&M Automotive, but modification kit won't be ready for sale for several months.

prepared for racers using Big Three equipment, but American Motors was something new. The job isn't complete yet, and it'll be several months before B&M is ready to take orders, but they must be on the right track. His last time out, Kempton was 0.11 sec. off the national class record.

Kempton has the same rules to follow that Root does, and his engine is very similar. Kempton's suspension is changed even less. The AMX has a traction bar to start with, and the AMX's shorter wheelbase transfers weight so well that shocks and springs are stock. Kempton uses only one final drive ratio. With it, his engine is at maximum revs through the timing lights. Kempton says he can't do better than that, so he leaves the gearing alone.

His rear tires are relatively small, again because he has all the traction he can use. The front tires are bigger. They raise the front of the car and they break the light beam a fraction earlier than small tires. Kempton thinks a lot.

All the cars described at this point are racing cars, examples of what can be done with work and money. Dick Mahan's Javelin is a consistent class winner in rallies and slaloms, and all it took was work. Mahan says the Javelin doesn't even need much of that.

"I was competing in another brand when the Javelin came out. I was offered a ride. I wasn't really interested, but I agreed to try it out. I came back and said, 'I'll take two.' "

Mahan's Javelin was supplied by Charlon and Simolon, the AMC dealers in Ridgecrest, Calif. He gets tires from A&L Tire Co., the Michelin dealer there. Everything else Mahan uses comes from Mahan.

He doesn't use much more. The factory's high-performance suspension is fine as it is, Mahan says, and it's stock. Same for the body and interior. He did change final drive ratios at first, with a 3.50:1 ratio for rallies, and a 4.1:1 for slaloms and an occasional drag meet, but making the change is 22 hours of drudgery, so he leaves the 4.10 in place for everything.

The Javelin runs in a stock class at the drags, and that caused the only engine work. Production camshafts vary. One or two degrees here and there are acceptable on the street, but Mahan wanted the engine to be right. Crower trued the cam, grinding it so that everything happens at the exact time and place it's supposed to happen. Mahan did a valve job while the heads were off, but the engine's never been out of the car. ■

Late news from Bonneville:

With the course virtually awash, and traction much reduced, the fastest Javelin ran 161.038 mph, and the AMX turned a two-way average of 181.552 for the mile.