Z-CAR CLUB

Z

OF WASHINGTON

Volume IX Issue I | The Newzletter of the Z-Car Club of Washington | September, 1996

So saddle up partners, here we go!

Unless someone is reading this to you from the passenger seat as you blast through some unnamed sweeper in the high side of third gear, searching hard for the next apex, no doubt you've noticed a few changes around the ol' newsletter. And if you do happen to be driving at the moment, well this newsletter isn't going to mean one whit to you. But there is a rather nice story here. When the prototype for this issue showed up in my mailbox last month, unannounced and unanticipated, I thought: Golly Gee Fish Whiskers!....This isn't the newsletter I sent out. This one looks... mmm....uhhh... good.

And so it is. Let me introduce Michael White, silent but deadly HTML Web coder for the Z Car Club of Washington's very own Web page, and now also the newsletter's grab-em-by-the-hair-and-don't-let-go layout artiste! We've just escalated another evolutionary notch. Who knows what will come next. Doesn't it feel that we've really MADE IT now??

Next Scheduled Meeting

Saturday, September 28
4:30 pm at Z-Sport

On the Agenda:

Officer Elections

Contents

Carefully infiltrating an e-mail conversation about the Web page, Michael had casually suggested to me that he might do the layout for the newsletter. I thought about it a bit and then stacked that bit of info on my mental desk, which very much resembles my real desk. Fortunately Michael was not put off by my neural misfire and nailed me with a sample of his work, the key features of which you now see before you.

So I want to welcome Michael and thank him for adding so much to the club, both in his newsletter and his ongoing Web efforts.

The ZCCW Web Page

All you hooked up, jacked in, cyberniks out there should have by now taken a peek at our new Web page. What, you say; didn't know about it? We'll fix that. Copy this pup into the breech of your favorite URL booster:
http://www.sos.net//home/mswhite/zccw/ZCCW.html
Then take a gander, and then get back to us about what direction you'd like to see this page head. For you see we're just getting started, and as this is a club page, everybody can have a voice. The most painless way to do this is to e-mail me a plain text file at jameslux@whidbey.com. If you're into pain you can send it snail mail to my mailbox: James Lux, 113 Park Ave., Langley, WA 98260

What are we looking for? Info on Z's for sure. If you have a hot tip, we'll enter you in our contest and the winner will receive a trip to the Bahamas, a free ZCCW T-shirt, or a dozen doughnuts. To qualify for a prize, you must be between the ages of 35 and 36. Prizes awarded are determined by club officers on or before August 31, 1999. You may be invited to represent the club at the the Democratic and Republican National Conventions. All promises are void.

What else? We want to maintain a small but healthy want ad section. If you have parts you want to dump, let us know. We'll put 'em in every month at NO CHARGE! You can't beat that. And we'll be looking for Z trivia questions, a kind of Stump-the-Members thing.

Another upcoming newsletter/Web page addition will be a Featured Member section. If you want to compose your own piece about your car or any Z driving experience, that's cool. If you don't like to do that writing stuff we'll do a short, painless interview after a meeting. We'll think up the questions. We want to gradually cover everybody so don't think you can avoid the spotlight. You'll be able to recognize our reporter by his thick glasses, indeterminate accent, and hairy feet.

One thing we'll be doing for sure is putting a copy of the current newsletter up on the Web page. That means that the quality of lies we tell will have to take on a new level of sophistication. It also means that nearly any ZCCW'er with something pithy to say about Z's can have the satisfaction that their words will be emblazoned across the electronic universe because we're linked into other Z related pages. Anyone searching the Web for Z stuff will sooner or later trip over an organization of Z fanatics living on the placid shores of Puget Sound, State of Washington, country of the US, North America, planet Earth, seventh solar system, twenty-first galaxy, 5876th time warp. Whew!

So saddle up partners, here we go!

–James Lux

A Message from the President:

What comes after Z?

As many of you already know, the last Z to be delivered to the US showed up on our shores last month. After 26 years the Z has come to an end (at least for now) which makes the existence of clubs like ours all that more important. Continued support from Nissan for parts and service for the Z is more likely to continue as long as clubs like ours remain visible and their members continue to take pride in their cars.

So why is Nissan giving up on the Z? Well, according to information on their web page (http://www.nissanmotors.com/ztribute/), it's because the public has lost interest in sports cars.

To quote:

"One of the Z's most enduring qualities has always been its ability to re-invent itself according to the changing tastes of sports car lovers. As the Z car has always been a reflection of the times, so too are the Nissans of today. As a car company, Nissan has always been driven by what our customers want. In the late 60's, it was a different kind of sports car. In the 90's, it's sedans and family vehicles."

Excuse me!!! PathFinders and Maximas are nice cars, but to say there is no longer interests in sports cars... I don't think so! Maybe the current 300ZX is suffering from lack of sales, but it's probably more because it's missing the "affordability" mark rather that a lack of interest in sports cars. Look at how many new Mazda Miatas you see running around. So let Nissan know what you think. Tell them what kind of sports car you would like to see them produce that is worthy of the "Z" label. Tell them you want the Z back!!!

You can do this by sending a letter to:
Mr. Yoshikazu Hanawa, President
NISSAN MOTOR CO. LTD. OF JAPAN
17-1, GINZA 6-CHOME, CHUO-KU
TOYKO, 104-23 JAPAN

(Put sixty cents postage for the first ounce and forty cents for each additional ounce.)

ZCCW Officers Elections:

It's time again to think about staffing the club's officer positions. At the next meeting (Sept. 28), we will be accepting nominations for President, Vice President, Secretary and Treasurer. At the October meeting, we will (after accepting any last minute nominations) elect officers for those positions.

Think hard about considering one of these positions. The club needs to have members take an active role in order for it to succeed.

– Paul Richer

ZCCW Newzletter

A monthly (usually) publication of the Z-Car Club of Washington

Editor: .....James Lux
Graphic Artist .....Michael S. White

Submissions:
USPS: .....ZCCW Newzletter
.....113 Park Avenue
.....Langley, WA 98260
EMAIL: ..... jameslux@whidbey.com

Subscriptions:
To get a subscription, join the ZCCW! Membership application found on mailing wrap and on our web site.

ZCCW Mailing Address
ZCCW
3624 132nd Ave SE
Snohomish, WA 98290

ZCCW Executive Board

President: .....Paul Richer
Vice President: .....Mark Mullen
Sec/Treas: .....Tim Nevins
Newsletter: .....James Lux

ZCCW Web Site

http://www.sos.net//home/mswhite/zccw/ZCCW.html
Webmaster: .....Michael S. White
EMAIL: ..... mswhite@sos.net

Tell a fellow Z enthusiast about

Announcing: Something to do with your Z!

The 16th Annual Snohomish Classic Car And Hot Rod Display. Sept. 29, 1996 10 a.m. - 4 p.m.

Location: First and side streets, Snohomish, Washington

Guaranteed First street parking for the first 150 pre-registered cars, but you gotta arrive by 11 a.m.

PRE-REGISTRATION DEADLINE: September 16, 1996

REGISTRATION FEE: Pre-registration fee $15, after deadline $20

REGISTRATION CHECK-IN: Begins at 8:30 a.m.

INFORMATION: 360-568-2526

Display day drive-thru check-in at First St. and Maple. Enter at Lincoln and First St. We request all entries use either the Second Street Snohomish entrance from Highway 9 or take the 3rd exit off Highway 2 to the East Snohomish, Second Street Entrance. All entries will receive a registration packet including a T-Shirt and Dash Plaque. Extra T-Shirts can be pre-ordered at a reduced price of $12 each and will be included in packet. Display day, T-Shirts will be sold at $15 each.

Judging will again be done by display participants. This year, a new category for Foreign Cars has been added. We will again be awarding People's Choice and "Fun Classes" awards. Judging ballots will be provided in entry packets. Judging must be completed by Noon. Cars arriving after that time will not be judged.

ENTERTAINMENT: 50-70'S Music - On Foot Poker Run - Face Painting - Car Bash - Games, Prizes and lots more fun for the whole family!

Don't be afraid of being the lone Z. President Paul and Roger Sawyer will be there to ensure Z's are represented.

Z Car Brake Systems and Modifications

Whoa Nellie!!

by Steve Golik of the Smoky Mountain Z Car Club.

(President Paul sent this handout distributed by Steve Golik at this year's National Z Convention, and it's so good we're making it this months newzletter centerpiece.)

The Datsun/Nissan Z/ZX car remains one of the most frequently owner-modified sports cars ever produced. Typically these modifications involve increasing the output of the engine or improving the handling of the car. Both basically have the same end result: making the car go faster. Often overlooked are the brakes. I am a firm believer in that a vehicle that is faster than stock should also be able to stop just as good as stock-if not better.

All brake systems use friction to stop the vehicle. The kinetic energy of the moving car is converted to another form of energy, mainly heat. Recall from basic physics that the kinetic energy of a moving object is proportional to the mass (or weight) of that object and the square of the speed of that object. When the speed is doubled, four times the kinetic energy is developed. However, moving automobiles also have rotating parts namely wheels, tires, axles, drivelines and even brake rotors and drums. Strictly speaking, the additional kinetic energy stored in each of these rotating parts must also be absorbed in the brakes.

The brake system must perform the following tasks:
* It must be massive enough to absorb the heat produced by braking.
* It must capable of dissipating this heat.

Ideally a braking system should absorb most of the heat in its components and not at the tire/road surface interface. Think of a wheel that is locked during hard braking. All of the energy must be dissipated by the friction of the tire against the road surface.

As braking components absorb heat, the temperature of these parts increases. What determines the amount of temperature rise is the mass (or weight) of these components. Larger brake parts will have a smaller temperature rise than smaller components for the same amount of heat absorbed. This is why large road vehicles and race cars have large brake rotors and calipers (or drums). They have more kinetic energy to be absorbed as heat by the braking system. This is one of the reasons that high performance sports cars utilize large diameter wheels. Larger rotors and calipers can then be fitted more easily.

The maximum temperature of the brakes must be controlled to prevent the complete destruction of the brakes or structural failure of the mounting brackets. However, long before this will happen the brakes will fade or the brake fluid will boil. If the brake system is properly designed the only factor determining the stopping limit is the load on the tires and the adhesion between it and the road. The "60 to 0" stopping distance tests often featured in automotive literature are not a good relative measure of a braking system since this distance is mainly determined by the weight of a vehicle, the grip of the tires it is using, and the condition of the road surface. It can be, however, used for evaluating changes made to the braking system of a single vehicle.

Weight Transfer

A moving vehicle's inertia force acts at its center of gravity point. All the inertia forces on the individual parts of the car added together are the same as a single inertia force acting at its center of gravity. Since a car's center of gravity is above the road surface, the inertia force from braking tries to load the front tires and unload the rear tires. This effect is called weight transfer. Weight

Continued next page

added to the front tires is subtracted from the rear tires. The total weight of the car does not change.

Because weight transfer loads the front tires, additional friction forces are developed by the front tires (before they skid). To counteract this force, the front brakes must produce more braking force than the rear brakes. This is why the front brakes on cars are typically larger than the rear brakes: they must dissipate more energy.

Greatest vehicle deceleration occurs when both front and rear tires reach their traction limit. Tires develop maximum grip just before they lock. A locked, skidding tire actually has less grip.

One complication affecting weight transfer is that it depends on the degree of braking. This dynamic loading/unloading of the tires will cause the rear wheels to lock before the front during hard braking. For maximum deceleration of a vehicle on a given surface, all wheels must be on the point of maximum grip. However, the point of wheel lock is determined by the tire load, adhesion between the tire and the road surface and the condition of the road surface. A way to cope with the changing conditions affecting wheel lock is to fit an anti-lock system to the vehicle.

ABS Systems

Anti-lock brake systems work on the principle of measuring the deceleration of a sensed wheel and if it is above a certain value, that is, if the wheel is at the point of locking, the braking force to that wheel is reduced. The wheel then speeds up and then the braking force is re-applied and the cycle repeats. Anti-lock devices give improved stability during emergency braking and will help to give the shortest braking distance without loss of control over a wider range of road surface conditions.

Components

Calipers

The front brakes on all Z cars are disc brakes. Disc brakes have several advantages over drum brakes, primarily in regards to cooling. Disc brakes have increased resistance to fade because the friction surfaces are exposed to air. The rotors also have a larger swept area than a drum brake so there is more surface area. This allows more heat to be dissipated. The rotor expands with heat, moving closer to the pad surface, unlike drum brakes which when heated move away from the brake shoe. The piston seal automatically adjusts the pad-to-rotor clearance. Disc brakes do not have the servo action that drum brakes do so they are not as sensitive to changes in pad friction.

There are two types of disc calipers: 'fixed' and 'floating'. The fixed type was used on the 1970-78 and the 1990 and later Z cars. Fixed calipers have either two or four pistons that push on the pads. A fixed caliper is more rigid and usually has more mass so it can absorb more heat. Fixed calipers have more balanced pad wear than floating caliper designs.

The floating type caliper uses one or two pistons on the inboard side only. The hydraulic pressure forcing the piston and inboard pad towards the rotor also forces the piston housing in the opposite direction which forces the outboard pad against the rotor. There are advantages and disadvantages to using floating calipers. A floating caliper has the piston and fluid chamber inboard so it can be cooled by the air flow better so there is more margin for fluid boiling. There is also less potential to leak. Wheel packaging is better, especially for large offsets (front wheel drive vehicles).

Some disadvantages of floating calipers are pads that may wear at an angle because of the less rigid mounting and increased tendency for "squealing".

Rotors

Rotors (or discs) come in two varieties: solid and vented. Vented rotors feature internal passages through which air can circulate, and are superior to solid discs in terms of heat dissipation. Vented rotors are also more massive and can absorb larger amounts of heat. Vented rotors are the optimal solution for front brakes.

Drum Brakes

The first generation Z car (1970-78) had drum brakes at rear, this being common practice on passenger cars built before 1980, as drum brakes do allow a relatively simple hand brake mechanism to be used. The arrangement used on the Z cars is referred to as a "leading-trailing" type of drum brake.

Because the friction surfaces are inside the drum, air circulation is poor so drum brakes suffer more from fade than disc brakes do. Drum brakes can be designed with some degree of 'self-actuation' or servo action which makes them nonlinear, and therefore more sensitive to changes to the friction coefficient of the brake shoe.

Drum brakes require adjustment of the shoe-to-drum surface distance as wear occurs. Fortunately, in Z cars, the rear drums brakes automatically adjust themselves whenever the parking brake in engaged.

Lining Materials (Pads and Shoes)

The coefficient of friction (u) between the lining material and the rotor (or drum) is defined as ratio of the force applied to the pad (or shoe) to the friction force developed. The higher the friction coefficient, the higher the friction force. Most pad materials range from u=.25 to u=.45. The force applied to the brake pad is simply the hydraulic line pressure times the area of the piston. So by changing the diameter of the piston the force can increased or decreased.

There are several types of friction material available: organics; semi-metallic; carbon-kevlar; and carbonmetallic. Organics are referred to as 'soft' pads, and the metallics are often called 'hard' pads.

Master Cylinder

The braking process is initiated and controlled through the master cylinder. The DOT (Department Of Transportation) stipulates that passenger cars must be equipped with two separate hydraulic circuits. This is satisfied by using a master cylinder designed as a tandem unit by using a 'floating piston'. If there is a leak in one of the circuits, there is extended pedal travel which alerts the driver to the problem.

All Z cars use a hydraulic system to operate the brakes. Pedal force is applied to the hydraulic fluid through the pistons in the master cylinder. This force creates pressure in the fluid. The fluid pressure is the force acting on the piston divided by the

Continued next page

area of the piston. A smaller piston thus gives a higher pressure. However, fluid displacement is the area of the piston times the distance it moves. So if a smaller diameter master cylinder is used, greater movement is required at the pedal.

Brake Booster

All the Z cars use a vacuum booster located behind the master cylinder to reduce the pedal effort. Disc brakes lack the self-energizing feature of drum brakes and need some power assist except on very small vehicles. Because intake manifold is highest when the driver lifts his foot off the throttle, vacuum in the booster is maximum when the brakes are applied. Since the extra force developed by the booster is proportional to the area of the diaphragm in the booster, a larger diameter booster will produce more force.

All the booster does is amplify the driver's foot pressure. It's gain should be kept low for a more precise and sensitive control of braking. Boosters reduce the response time of the braking system and they are rarely used on race cars.

Proportioning valve

As mentioned earlier, a moving vehicle undergoes weight transfer during braking. However, this weight shift is not a linear process. Its magnitude increases as a function of vehicle deceleration.

To counteract this, the braking force should be applied to each wheel in proportion to the weight (or load) on it and correct brake balance means that front-to-rear braking forces are proportioned so neither front nor rear wheels lock first. One way to accomplish this is to reduce the rear brake pressure relative to the front brake pressure.

A hydraulic brake system has a certain ratio between front and rear brake line pressures. If the master cylinder has equal sized pistons for the front and the rear (like a Z car), then equal pressures are developed when the brake pedal is pushed. If this is plotted on a graph, a straight line is produced. However, this is not what we want! We need to gradually reduce the ratio between front and rear hydraulic pressure as the degree of braking is increased to automatically account for weight transfer.

Brake Fluid

Brake fluid boiling point is a very good comparison for evaluating regular or "glycol" (glycol is actually short for polyglycolether) based fluids because it roughly represents the conditions under which glycol turns compressible. It is a very poor comparison for evaluating silicone based fluids because they turn compressible at a lower temperature than that at which they boil.

Glycol based brake fluid is hygroscopic, i.e., it absorbs water from the surrounding atmosphere, and it starts adsorbing water as soon as you put it into your car's brake system. The brake fluid reservoirs on top of the master cylinder are vented to the atmosphere. Moisture can also enter the brake system through the rubber seals and hoses through a 'diffusion' process.

As glycol brake fluid absorbs moisture the result is a lowering of the boiling point of the fluid and also a greater chance of corrosion of the brake system components. The boiling point of glycol brake fluid typically decreases about 100 degrees after 6 months, and another 25 to 50 degrees after another 6 months. The DOT ratings were supposed to simplify choosing a fluid, but they do not take into consideration the compressibility of a fluid, nor it's affinity to absorb water.

The big advantage of silicone fluid is that it doesn't absorb water so corrosion of brake system parts is greatly reduced or even eliminated. It also won't damage your paint if it gets spilled accidentally. However, not absorbing water can be a disadvantage because if there is water trapped in the system, it will settle out in the lowest points, causing rust or possibly freezing.

One of silicone fluid's supposed advantages is a higher dry boiling point. What is not generally publicized is that unlike glycol based fluids, silicone fluids become compressible independently of boiling, and at a lower temperature than they boil at. Thus, the higher dry boiling point is merely a technicality that doesn't actually offer much in practice. At elevated temperature, silicone fluid has four times the compressibility of glycol based fluids leading to increased pedal travel and a spongy pedal.

Modifications

Brake modifications can be roughly divided into different areas

1. Increasing brake torque.
2. Reducing fade.
3. Miscellaneous items, such as reducing system deflections and adjusting brake balance.

Often, increasing brake torque will result in higher pad and rotor temperatures, so reducing fade is very important.

Brake Torque

By examining some of the equations we can gain some insight into possibly improving the performance of a braking system. In a moving vehicle that is coasting (no power applied to the wheels) the wheels are turned by their contact with the road surface. This produces a twisting motion or torque on the axle: torque = F_v*u_t*R...where F_v is the vertical force on the wheel, u_t is the grip (coefficient of friction) of the tire, and R is the rolling radius of the tire. To counteract this torque the brake must produce a torque in the opposite direction. If the torque produced by the brake is larger than the result in the above equation, then the wheel locks. This is not what we want. What we want is have the brake torque equal to that produced by the motion of the rolling wheel. This will give us maximum deceleration.

The brake torque can be calculated by: brake torque = F_f*R_e....where F_f is the friction force and R_e is the effective brake radius. The friction force produced by the brake F_f is equal to the hydraulic pressure times the area of the brake piston times the coefficient of friction of the brake lining. The brake torque can be expressed as: brake torque = P*A*u_l*R_e....where P is the hydraulic pressure, A is the area of the piston, u_l is the coefficient of friction of the brake lining, and R_e is the effective brake radius.

Since the hydraulic pressure is a function of how hard we press down on the brake pedal, brake torque can be increased

Continued next page

by pressing down harder on the pedal. However there are limits to which the hydraulic pressure can increase. Leaks and excessive deflections in brake lines and calipers will result from excessive pressures. What is desired is to have a large value of brake torque without having a large value of pressure. In other words, the remaining parameters in the equation must be increased.

The piston area could be increased by going to a caliper with a larger diameter piston, but what is usually done is to add more pistons. Going to a 4 piston caliper will increase brake torque. In addition, the pad area can also increase, which has further benefits. Increasing the effective brake radius means increasing the diameter of the rotor. This usually entails increasing the wheel diameter as well. The pad coefficient of friction can be increased by going to a different (soft) pad material. However, this may increase the possibility of pad fade.

Fade

Recall that braking is the transfer of the kinetic energy of a moving vehicle to heat energy. This heat build up will eventually result in a decrease of braking force. This is called fade. There are three types of fade: Pad fade; Fluid fade; and Mechanical fade.

Pad fade is when the friction coefficient of the pad drops as the pad/rotor interface temperature increases. The leading theory is that the pad begins to "out-gas" at high temperatures and this acts as a lubricant. Pad fade can be reduced by either using a pad that can handle the higher temperatures, a so called "hard" pad and/or reducing the rotor temperature rise. This can be accomplished with a more massive rotor, a rotor with more surface area, or a vented rotor. Vented rotors are hollow and have air channels which greatly increase the surface area that is exposed to the airflow. They are also more massive than a solid rotor of the same diameter. This means that they can absorb more heat. Using ducts to channel air to the rotor surface will also reduce it's temperature rise. One often overlooked cooling aid is changing to a wheel with a more open spoke design. Also, an aluminum wheel conducts heat better than a steel wheel and will help conduct heat away from the hub. Increasing the pad area will also reduce the pad temperature level. However, unless the piston area is likewise increased, the braking torque will decrease.

Fluid fade occurs when the brake fluid starts to boil and becomes compressible. You can distinguish between pad fade and fluid fade because when the fluid boils the brake pedal becomes soft or mushy. The brake fluid expands and can spill out the tops of the reservoirs. With pad fade the pedal feel remains hard, but the braking force decreases. The best way to reduce fluid fade is to use a fluid with a higher boiling point. Other less common methods are an air duct pointing at the caliper and the use of a poor heat conducting spacer (ceramic, for example) between the pad and the caliper piston.

The only example of mechanical fade that comes to mind is the classic one concerning the drum brake. When heated, the drum expands and moves away from the shoe, reducing the braking force.

Other Brake System Improvements

In addition to increasing brake torque and reducing fade, there are other objectives to be considered when brake improvements are sought. Reducing system deflections will reduce pedal travel, increase driver "feel" and improve the dynamic response of the brake system.

One source of deflection is the flexible rubber lines which connects the steel brake lines on the car's body to the brake components mounted on the wheel. The answer to this is to install stiffer hoses. Steel-braided teflon-lined hoses are stiffer than the fiber-reinforced rubber hoses. They are usually smaller in diameter, and this fact also reduces hose swelling.

Other causes of deflection include fluid compression, firewall flexing behind the master cylinder, caliper deflection and brake pad compression. Surprisingly, on some brake systems the major cause of deflection is the compression of the pads!

Adding a brake balance adjustment will allow you to get the full benefit from any brake modification, as it will allow you some limited control over the point where the rear wheels will lock. An adjustable proportioning valves can perform this function.

Levels of Modifications

With all the above considerations in mind we can now start to discuss brake system improvements. In order of complexity and cost, modifying your Z car brakes can be divided into a "Three Stage" approach. One modification you should not do is to install a larger vacuum booster. This will only make it easier to lock up the wheels and almost guarantees that will happen in a panic stop.

Stage I

The easiest way to upgrade your Z car braking system is to install a performance set of brake pads. Repco Metal Masters (they are actually semi-metallic) are the most popular choice for a street driven car. For a competition (or a very hard driven street car) use carbon-kevlar pads or carbon-metallic pads. Carbon kevlar pads from are available from Porterfield Enterprises (800-537-6842). Porterfield recommends the R4-S compound for the street. Carbon-metallic pads are available from Superior Friction (408-436-1101) or Dando's (800-918-6363). However, you should be forewarned that both these carbon compound pads work best when they are hot and have poor grip when cold! Installing them on the rear will reduce the effectiveness of the parking brake. Also, they throw off a lot more brake dust and are harder on rotors.

Changing the brake fluid to one that has a higher boiling point is next step. Although this subject is not without some controversy, the general guidelines are as follows:

Continued next page

240 Trivia:

How many turns do you make with the steering wheel from lock to lock with the stock rack and pinion and steering knuckles?

Answer: Next Page

For street cars: use a DOT 4 fluid. This will give you some margin even when the fluid has absorbed some moisture. Change it at least every two years. The Castrol LMA fluid seems to be available in most locations. If you can boil fresh Castrol LMA, then try ATE SL. This DOT 4 fluid is original equipment on a lot of European cars. You can find it at dealers. There is now available a DOT 5.1 fluid, Motul 5.1 which would be the best fluid for the street, but availability is limited.

For competition cars: Ignore the DOT ratings!! Use a the fluid with the highest DRY boiling point you can find or afford and change it often! Serious racers will change their brake fluid before every race. Ford Heavy Duty Fluid has an excellent boiling point (somewhere between 500 to 550 degrees), is readily available and is very cost effective. Other suitable fluids include AP 550 (550 degree boiling point), and Motul 300 or Wilwood 550 (both are 570 degrees). Motul 600, AP 600 and Castrol SRF all have a boiling point close to 600 degrees. The price of these fluids seems to increase exponentially with their boiling point.

Show cars, restorations or "garage queens": For cars that don't see much road use and will never see any serious driving, silicone fluid (DOT 5.0) works fine and is highly recommended.

Stage II

There is a 4 piston caliper that will bolt on to the 1970-78 Z cars utilizing the stock solid rotor. This caliper was used on the 1979-85 Toyota four-wheel-drive truck. It requires some slight trimming of the backing plate (if you are going to retain this) and some re-bending of the 'S' shaped brake line. You can also obtain the R4-S carbon-kevlar pads for this caliper from Porterfield.

The Toyota 4 piston calipers have unequal diameter pistons. This is done to better equalize the temperatures across the surface of the brake pad. Normally the trailing edge of a brake pad runs hotter than the leading edge.

Because slightly more fluid displacement is required for the Toyota calipers, pedal travel is increased. To solve this, change the master cylinder to one from a 280ZX. This master cylinder has a larger bore diameter (15/16 inch vs. 7/8 inch). The reason that there is interchangeability between Nissan and Toyota is that a single company, Sumitomo, made the calipers for both Nissan and Toyota.

Another 4 piston caliper is available for the 1970-78 cars from Nissan Motorsports, but it has equal sized pistons and is a lot more expensive than the Toyota calipers.

Adding air ducts from an opening in an air dam is an effective way to cool the rotors. You can buy high temperature silicone duct hose from Racer Wholesale or Pegasus Racing, but it is fairly expensive. You can also make them out of 4 inch dryer duct hose or the black corrugated plastic irrigation pipe. Mount the ducts so that they are well supported with brackets. Point the duct at center of the rotor if you have a vented rotor. If you have a solid rotor, aim the duct so that BOTH sides of the rotor will receive some airflow. This will prevent rotor warping. Make sure the ducts can't come loose and jam the steering. You can also improve the cooling of the rotor by removing the sheet metal baking plates. These are installed mainly to keep water and debris off the rotor.

As mentioned above you can also install braided steel brake hoses. These are available from several vendors, including Motorsport Auto and Jim Cook Racing.

On the 1970-78 Z cars, the rear drums can be painted with a thin layer of glossy black to reduce their temperature.

Stage III

Replacing your stock rotors with cross drilled rotors: There are pros and cons about using cross drilled rotors. You will have to make your own decision about using these. You can actually reduce the rotors surface area if the holes are too large! Make sure the holes are no larger than 1/4 inch in diameter. Cross drilling rotors offers these advantages: 1) Increases the surface area of rotor, provided the drilled holes are not too large; 2) Reduces pad fade by giving the gases released from the pad someplace to go; 3) Clears any water from the rotor surface faster.

Disadvantages of Cross Drilling: 1) Rotor will tend to develop cracks at the drilled holes because of the machining process. Stress relieving or annealing after drilling will help. 2) The mass of the rotor is reduced. 3) A sudden rotor failure will be more dramatic. 4) The balance of the rotor may be affected if the hole pattern is not symmetrical.

Alternatives to cross drilling are dimpling and slotting. Dimples made with a 1/8 to 1/4 inch ball end mill in the surface of the rotor will give you some limited benefits of cross drilling but will reduce the crack formation. Slots cut across the rotor surface with a .060" ball end mill will help with pad fade and again will reduce the crack formation.

Adding an adjustable proportioning valve involves some degree of complexity, so it is considered a Stage III mod. Adjustable proportioning valves are available from several suppliers (Porterfield, JFZ, Tilton, Arizona Z, etc.). Catalogs which cater to the hot rod crowd are also a good source.

Replacing the rear drums of the 1970-78 Z cars with the 1979-81 280ZX rear calipers and rotors. This can be accomplished by either purchasing an entire kit from Jim Cook Racing (800-527-1440) for $780, or you can purchase only the brackets for $179. Another source for adapter brackets is Z-Quip (404-502-0602), price is $125. You must remove the rear stub axles to make this conversion. The proportioning valve must be replaced with the 280ZX one as well.

Continued on next page

240 Trivia:

Answer: 2.7 turns for the 240, and 2.9 turns for the 260 2+2.

What's the easiest way to quicken the steering ratio?

Answer: Next Page

Arizona Z (602-844-9677) sells a front brake kit for the 1970-78 Z car which utilizes an aluminum 4 piston caliper and a 11.5 inch diameter, 1.25 inch thick vented rotor for $749. They also have a rear kit which features an aluminum 4 piston caliper and a 11.75 inch diameter, 0.81 inch thick vented rotor for $799.

Top-End Performance (818-764-6768) has similar kits for the 1970-78 Z cars using JFZ components. Their front 12 inch diameter vented rotor kit sells for $850, and they also have a 11.38 inch diameter front rotor kit for $750. For the rear they have a 12 inch diameter vented rotor kit for $850, or a 11.38 inch rotor kit for $775. They also sell a rear kit with solid rotors for $475.

Design Products (714-892-1513) also has kits for the 1970-78 Z cars using Wilwood components. Their front 12.18 inch diameter vented rotor kit goes for $865, and their 11.4 inch diameter vented rotor kit sells for $755. At the rear they offer a 11.4 inch diameter vented rotor kit for $795 or a 10 inch diameter solid rotor kit for $395.

Two notes on the last three brake kits mentioned: There are no provisions for a parking brake with the rear kits. Also, you must use 15 inch or larger wheels, but this is no guarantee that you will not have interference problems.

For the 1990 and later 300ZX's you can replace the brakes with the ones from the Skyline GTR. The vented front rotor is 295mm in diameter (stock is 280mm), 32mm thick (vs. 30mm) and is cross drilled. The vents are different from stock in that they have fins in the center that scoop air which is vented through the drilled holes to dissipate heat. The front caliper is also replaced, but uses the same size stock pads. These calipers are thicker than the stock ones and will just touch the stock wheels. However, a couple of swipes with a file on two or three of the raised letters of the calipers will eliminate the interference problem. You also have to remove the front backing plate behind the rotor by breaking it off its spotwelds. The rear rotors are also replaced by a drilled disk but you keep the stock caliper and pads. The Skyline GTR kit is available through Steve Millen (714-540-9154) for about $2000.

Steve Millen also sells a Brembo kit for about $2500. The kit only replaces the front brakes, and requires going to 17 inch wheels for clearance.

Several companies (Grip, Euro, Porterfield and Brembo) offer 'sport' rotors, which are OEM spec rotors that have been cross drilled.

On the 1990-91 cars you can add a set of plastic air deflectors. These deflectors route the oncoming air to the inside of the rim for better cooling.

ClaZZified:

For Sale: four 7.5 by 16" Centerline billet aluminum mags with Yokohama A008 RSII's. Tired of being four seconds off the autocross pace? Here's the quickest to run with the pack. $600. Jim 360-221-3170

Poly bucket seat. Cheap way to keep your butt from sliding around when you're bookin'. $50. Jim 306-221-3170

Parts for sale such as a Kaminari rear wing $250.00 I also have a some what rare Skarab Z rear wing $100.00 I have alot of misc. parts, if you need something in particular you can call (206) 803-6865 ask for Lenny or Email me at drums@serv.net

1973 240Z, pro-installed 300hp Chev 350, TH700R4, sweet custom exhaust, cruise, AC, Konis suspension, 205/55VR16 on Enkeis, Momo wheel, Recaros, AM/FM stereo cassette, incredibly beautiful bodywork/finish, Guards Red, fast, tight, thrilling! $17,000 or best offer. 360-748-3824 Chehalis, WA Thank you--Jeanne Nygard. Email: Nygard@localaccess.com

'74 260Z, white (early model). Good body and interior. Runs Good. New tires. $2500 or best offer. Call Kia (206) 258-1847

Z parts for sale for 71-81 cars. I have just about all the parts for the cars except bumpers, seats and carbs. I am in the Tacoma, WA area. Email Ron at RMillik@aol.com

'79 280ZX 2+2 for parts. Every thing is there and I have taken some of the parts off already. All is for sale. Email Mike at martinmi@ieway.com

I need some interior parts in tan/brown for a 77/78 coupe. In particular, I need the driver side windshield post trim, the passenger side strut tower seat belt cover, and the right rear interior trim panel. Thanks. Email Ron at RMillik@aol.com

I am looking for a set (6) of L24 Connecting Rods. I need these quickly. Thanks. Email Mark at mcmjkm@ix.netcom.com

Wanted, 70-78 Datsun Z. Willing to trade '87 Suzuki GSXR 750 for car of equal value. Call Chester (206) 353-0536 after 5:00

Looking to pep up your L24 240? For Sale: L28 with early SU's complete with: 6 into 1 equal length headers, 2.5" exhaust complete to tailpipe; 5 speed transmission; carbon kevlar clutch, throwout bearing, needle pilot bearing, resurfaced flywheel, alternator, and breakerless Datsun distributor. All for $600. Go for a complete, running swap instead of piecemealing. In the car and running now. Drive it! Will help you swap out. Will also sell newish three-row radiator with electric fan for the above with the sale for $125. Jim 360-221-3170

Don't you wish you'd sent in your own classified? Here's the address: e-mail to: jameslux@whidbey.com Or snail mail to: James Lux, 113 Park Ave, Langley, WA 98260

240 Trivia:

Answer? Install shortened steering knuckles. You can get them from Nissan Motorsports.

Double bonus 240 trivia question: How many turns lock to lock with the shortened steering knuckles installed? Think twice.

Give this application to another Z enthusiast!

ZCCW Application for Membership

Annual dues $20
:Prorated by quarter for NEW members ie
[Jan - March $20] [April - June $15] [July - Sept $10] [Oct - Dec $ 5]

:To join, fill out application and send with payment to
Z-Car Club of Washington
SE 60th Place 11707
Bellevue, WA 98006

Name: _____

Address: _____

City: _____

State: _____

ZIP: _____

E-Mail: _____

Z-Cars Owned: _____

_____

Z-Car Club of Washington
132nd Ave SE 3624
Snohomish, WA 98290

:TO