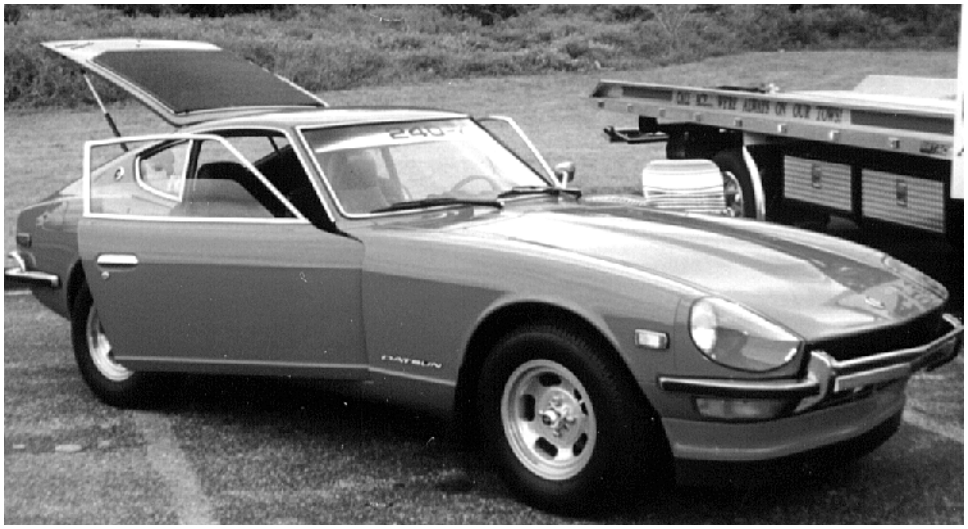
Z-Car Club of Washington
18505 Alderwood Mall Pkwy. Suite #
1-419
Lynnwood, WA 98037-8013

TO:

Don't forget to renew your membership for 1999!

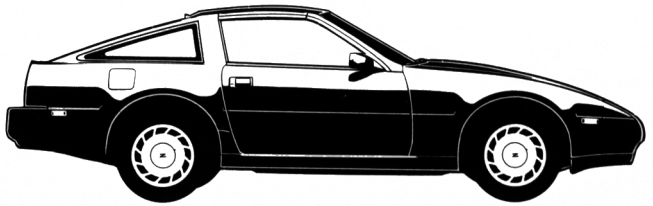


The NewZletter

of the Z-Car Club of Washington

Vol. XXXII, No. I February, 1999

Next Meeting: Red Hook Brewery • Woodinville • 27 February 1999



Nissan 300 ZX 2-Seater

– What's Inside –

Prez Sayz

Wow! An "era" has come to an end. For anyone who has not been attending the last couple of general meetings, we now have a new President – Mark Hostetler.

To that end, this will be the last Prez Sayz column that I will be writing.

I shall continue serving the Club as its Secretary, publishing The NewZletter, and working on the website.

Since I will no longer be in a Presidential capacity, I am hoping to get a publishing schedule for The NewZletter so that everyone should have the opportunity to receive it well before the meeting.

Plans are in the works for the gathering of upcoming articles in a wider variety of subjects. One of the areas that we have been lacking – while it being an area of Club membership that has been expanding – is articles on the '90+ 300ZX. Gregg Kerber has graciously helped out tremendously in getting the ball rolling by submitting a multi-part article on these Z's.

Anyone that has a particular subject that they would like to see covered, I would ask that they please let me know. I am hoping to make The NewZletter bigger and better than it has been for the benefit of the Club's membership.

Mark, I wish you the best of luck as our new President and look forward to the upcoming direction that you will guide us toward!

Z-Ya,

Michael S. White

Car Club Association ™

Member

The NewZletter

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

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ZC Z CW — Z-CAR CLUB OF WASHINGTON

ZCCW Membership Application

Annual dues: Individual = $25; Family = $30; Associate = $15*
First year membership dues prorated if joined after first 1/2 of the year for new members. i.e.:

Individual:	[January – June $25.00]	[July – December $15.00]
Family:	[January – June $30.00]	[July – December $20.00]
Associate:	[January – June $15.00]	[July – December $10.00]

Note: The membership year runs the calendar year (January-December). All memberships received prior to December will expire on December 31st unless it is indicated on the membership application that the membership application is for the remainder of the present membership year and for the next complete membership year. For timeliness issues, all new membership applications received in December need to be for the following membership year.

*Associate membership is for those whom it would not be feasible to be able to attend any meetings or events. Associate members in the United States will receive the printed version of The NewZletter

To join, fill out application and send with payment to:
Z-Car Club of Washington
18505 Alderwood Mall Pkwy. Suite # 1-419
Lynnwood, WA 98037-8013

☐ New Member?
☐ Update/Renewal?

Membership Type
☐ Individual
☐ Family
☐ Associate

Name(s): Birthdate(s):

Address: City:

State: ZIP: E-Mail:

Phone:

Z-Car 1: Color: Year: Model:

Z-Car 2: Color: Year: Model:

Z-Car 3: Color: Year: Model:

What area(s) of the club are you interested in?

Technical/Mechanical: Showing my Z(s): Rallying:

Cruises: Autocross: Other:

Classifiedz

Do You Have Z Parts or Z's For Sale?

Are You Looking For That Certain Part or Z?

Advertize them here in The NewZletter!

Call Michael at: 360.856.5185 or email: mswhite@sos.net

Parts for sale. 240Z: chrome plated steering gear housing, side rods and compression rods. $25.00; 4-sp transmission (includes shift lever, clutch cylinder etc) $25.00; pressure plates (2) $5.00 ea.; clutch/brake pedal assembly. $10.00; half shaft (1). $5.00. 260Z: elect fuel pump assy. $5.00; Jim Phelps, Arlington, WA, 360-435-6845 <JimTrish@world-net.att.net> .

For Sale, set of 7.5 by 16" Centerline aluminum wheels with Yoko 225/50-16's. Wheels need cleaning but no dings or curb rash. $600. Consider part trade for band saw or wire welder. Located Seattle area. Don't want to ship them. Can deliver as far south as Portland, OR. Jim 360-221-3170, <jameslux@whidbey.com>.

Wanted: I am looking for a 3-piece rear spoiler for my 280z, locally only please. Contact Shawn at <vman@seanet.com>.

Parting out 71 240Z. Dismantled, no body parts except rear hatch. Brad 425-745-5482

I have a 1977 Datsun 280Z, new deep red paint, stick shift, original motor, this car has not been driven since new paint in 1990! Needs to be buffed out. Fabric cover included. Multiple sclerosis has stopped any hope of completion. Needs most everthing but paint. Have owned it since 1981. Will sell cheap. Good start on a project Z. My loss can be someone's gain. Located in North Seattle/Shoreline. (206) 363-2884

'71 240Z for sale. Recarro's - need seat covers. Racing steering wheel. $7,000+ invested in front end rebuild, tranny, rear-end, radiator, brakes, etc. Have receipts for work done. Still needs some work. Comes with extra parts. Will let go for $1,900. Runs good. Pete Rossi 425.831.5850

'73 240Z Project Car - not a parts car. Body good, paint mostly good. Engine runs, not driveable. $750 obo. Adrian 425.453.9552

Ready for a transplant? '81 Maxima engine/tranny. New injectors. $500obo. Adrian 425.453.9552

'77 280Z Runs Great. An attention getter - a real eye catcher. $3,000 obo. Call 253.520.9034 evenings or weekends.

I have 30+ Z cars from 1970-1986 that I am parting out. Reasonable prices. Call Ron @ 253.843.2813 or <rmillik@nwrain.com>.

I am selling my 1983 280ZX. I have spent many dollars and hours fixing it up

(and loved every minute of it). Here is a partial list of the upgrades done to the 280ZX since March 1997: Replaced Rear deck seal, Replaced various lights, taillight lens, Complete lube job/oil change/radiator flush, New spare tire and cartridge/rear wiper fixed, brand new struts and shocks (and 4-whl align), Body work (rust prevention, scratch removal, dings fixed), brand new paint job (very nice too!), New clutch, master and slave cylinders, Recovered various interior panels with new vinyl, Brand new carpet installed, Repaired Air Conditioning (IT blows very cold), Replaced alternator, starter, and fuel injectors, New spark plug wires, various screws, plastic pieces, and emblems to perfect the interior of the car. Make offer to Greg by e-mail <kelly@lightningweb.com> or phone (206) 213-0964.

1971 240Z. Build date 9/70. 89,000 miles. New paint, chrome exhaust. Everything original except new items listed above. Mint condition. Second owner - have owned since 1974. Estimated value by

Z-Sport is $6,500. Contact Gary by phone after 4:00pm at 425.338.4194 or by email at <gwfrancois@aol.com>.

Basic Electricity, Part II

From the December 1987/January 1988 issue of the Z-Club Bulletin

We concluded last month's "Basic Electricity" article talking about circuits and their operation. We'd like to continue as promised with part two of our mini-series.

This month we deal with shorted circuits, current and voltage measurements, and some specific electrical components.

Short Circuits

If we believe everything we hear, all the defects are shorts. "There must be a short," the technician says. Nothing can happen other than a short?

In this circuit we've been working with, the wire from the battery to the switch may rub against the frame (ground) and the bare wire may touch the frame. If it does, the wire is said to be shorted, the circuit has a short.

If you operate the switch but the switch does not open in its off position, the switch is shorted. If rust forms across the contacts of the bulb's socket, the socket is shorted.

But if any of the connecting wires break so that current cannot flow, there is an open. If the lamp's filament burns out, there is an open. If one of the intercell connectors of the battery breaks, there is an open. If the battery connection is corroded so that current can't get through it, there is an open.

Not all circuit defects are shorts.

Current Measurement

If we had wired up this combination of circuits on the bench, we would want to actually make measurements of the current and voltage. To measure the current an ammeter is connected in series with the circuit must pass through the meter. To find the total drain on the battery the ammeter is connected in the line at point A of fig. 9. If the meter is of the clamp on type, it can simply be clamped over the line coming from the battery. If the meter has two leads that must be connected into a break in the line, we'll probably disconnect the line at the battery and connect the red (+) ammeter lead to the post of the battery and the black (-) meter lead to the connector we removed. Of course, we could instead connect the ammeter at point B, right? I hope you agree, because the current coming in is the same as the current going out.

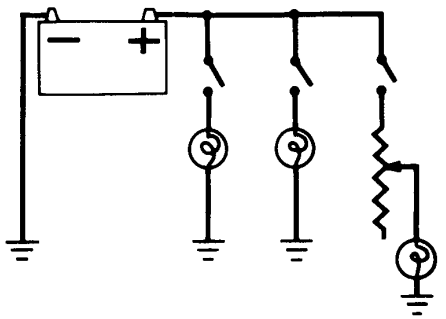


Figure 8
By varying the resitance of the rheostat, the brightness of the lamp can be changed.

By hooking up the ammeter into either of those points the current of each of the individual series circuits can be determine by turning each switch individually. But if we wanted to measure the current of one of the series circuits regardless of what the other circuits are doing (and sometimes we might want to do that, the meter will be connected into point C, or into the ground line at D.

An important point about connecting and ammeter into a circuit is to get the polarity, regardless of where it's connected. The red (+) lead of the meter must connect to the line coming from the positive post of the battery, and the black to the line going to the negative, that is, to ground.

Test meters take many different forms. An engine analyzer might have separate meters for amps, volts, and ohms. A starting-charging system tester might have a combination current-volt meter. The most common hand-held meter is a combination Volt-Ohm-Ammeter that's called a VOM. The M stands for milliamperes (0.001 amp), but there is usually a separate connector that allows the meter to measure up to 30 amps. If the meter has a pointer that moves over a fixed scale, it is called an analog meter, whereas the one with the flashing numbers is called a digital meter.

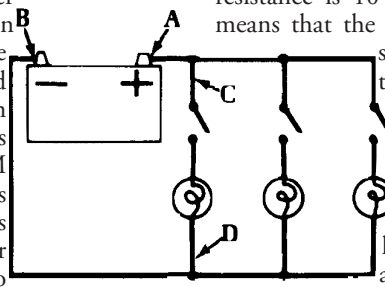


Figure 9
Points of current measurement with the ammeter. If the ammeter is not of the clamp-on type, the wires (connections) must be broken into so that the ammeter is "in series" with the circuit(s) being measured.

Meters vary in accuracy. And there are times when high accuracy is needed, and times when it's not. If you have an old meter hanging around, don't throw it away. But if you are going to buy your first meter, the extra cost for one of higher accuracy will pay off.

Voltmeters vary not only in accuracy but also in sensitivity. The sensitivity is determined by the amount of power that the meter absorbed from the circuit that's being measured. We don't think of a meter as a power-using device, but there is some energy required to move the pointer on the analog meter or to change the numbers of the digital meter. The power required is expressed as the resistance of the coil of the meter and any associated calibration resistors, or the resistance of the input circuit of a digital meter. For example, an inexpensive analog VM might have an impedance (another word for resistance) of 2000 ohms per volt. Just a few years ago a good meter had an impedance of 20k Ω/volt. Read that as "twenty thousand ohms per volt." Ω is the symbol for ohms.

Since the computer came to the automobile, we hear talk of a "10 megaohm" voltmeter. That means that the internal resistance is 10 million ohms, and further means that the meter draws and extremely small amount of power from the circuit that the meter is trying to measure. So what?

Most circuits in the car carry comparatively high power, from about half an amp to about two hundred amps. The power is taken from those circuits by a 20k ohm meter is too small to have any practical effect on the circuit and the meter's reading will be correct. But the solid-state circuitry of computers uses very low power, like a few milliamps (thousands of an amp or 0.001 amp). Using a 20k ohm meter on such a circuit robs enough power to give an incorrect reading, and may in some cases damage a computer or one of its sensors. So if the car manual or other instruction says to use only a 10 megaohm voltmeter, the least expensive way to go is to use a 10 megohm voltmeter.

Ammeters for measuring large currents, above 10 amps, usually come with a shunt which is a calibrated resistor of very low ohmic value. It produces a certain voltage drop, in millivolts (0.001 V), according to the amount of current passing through it. The actual meter is a sensitive voltmeter which can read the very small drop, but is calibrated in amperes.

The shunt is actually a metal bar, usually brass. And you might say, "This is a calibrated resistor?" You'll remember back a ways, we said that every wire has some resistance, very small, but for the shunt it's carefully calibrated.

Voltage Measurement

Dyno Day Results

by Gregg Kerber

Combined event - ZCCW & Pacific Northwest Camaro Club (PNWCC)
Saturday, January 16, 1999; Temp: mid-40s; Barometer: 29.3 in Hg; Elevation: 200ft.; Dynojet Model 248H; Austin's Performance, Tacoma, WA

Name	Car	RWHP @ RPM	Torque @ RPM	Club	Comment
J. Greenwood	'94 Z28	402	na	PNWCC	Lingenfelter built small block
M. Sorger	'71 Z28	350	na	PNWCC	12.1 Second 1/4 mile car
G. Kerber	'91 300ZXTT	324 @ 5400	367 @ 4400	ZCCW	High flow intake, cat back exhaust, ECU
M. Arnstein	'91 300ZXTT	302	na	ZCCW	Dual high flow intake, cat back exhaust, ECU, larger turbos, intercoolers, and injectors, NOS (not used during test). Note: Mike's car was experiencing problems that lead to lower than expected RWHP numbers.
L. DeCamp	'69 RS	302	na	PNWCC	Turgo charged small block
D. Berry	64 Chevy II	295	na	PNWCC	Fresh motor
M. Buhite	'94 300ZXTT	295	na	-	High flow air filters in stock air box, cat back exhaust, HKS EVC, HKS blow-off valves, larger intercoolers, AT.
S. Besser	'65 Malibu	256	na	PNWCC	
E. Groo	'95 Z28	256	na	PNWCC	
R. Williamson	'93 RX-7	245	na	-	High flow intake, cat back exhaust, HKS EVC. Note: top speed run on dyno resulted in 172 MPH.
C. Holmes	'97 SS	242	na	PNWCC	
T. LeCocque	'69 CV	241	na	PNWCC	
L Froggatt	'92 Z28	220	na	PNWCC	
D. Perry	'69 Camaro	214	na	PNWCC	
S. Maxwell	'68 327	210	na	PNWCC	
P. Richer	'71 240Z	200 @ 4300	280 @ 3500	ZCCW	377ci small block Chevy (400 block with 350 crank and 305 heads)
D. Kehoe	'69 Camaro	199	na	PNWCC	
J. Boemler	'93 300ZX NA	191 @ 6100	177 @ 4600	ZCCW	High flow intake, cat back exhaust, ECU, headers.
B. Perry	'91 Pickup	160	na	PNWCC	
M. Mullen	'77 280Z	157	na	ZCCW	Various engine mods
C. Guy	'73 Cougar	142	na	-	
J. Davis	'70 Nova	DNF	-	PNWCC	

—Z

The most-used instrument in electrical system diagnosis is the voltmeter, which tells us that electrical pressure is available at a certain point.

While the ammeter is connected in series with the other elements of the circuit, the voltmeter is connected in parallel, that is across the component to be measured. This measures the electrical pressures across the device. Let's connect the voltmeter across the switch as shown in point A of fig. 10. With the switch open, the meter will read 12 volts if the lamp is not burned out. When the switch is closed the voltmeter will drop to zero. If the switch contacts are dirty, they can cause a resistance which will cause a voltage drop and therefore a reading on the voltmeter.

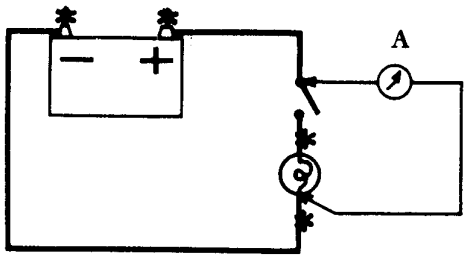


Figure 10
The voltmeter connected as shows in the test. Asterisks show other points the meter might be connected to in looking for system faults.

We will, however, connect the voltmeter in series in certain situations. Before replacing an electrical component that isn't working, we want to be sure that there is voltage at the input of that device. So we'll disconnect the plug or wire terminal from the device and measured voltage at the plug insert or terminal. The red (+) meter lead will connect to the plug or terminal and the black lead (-) to ground. A meter reading of 12 volts shows that there is pressure ready to push current through the device if the circuit within the device is complete. But because the device didn't work before the plug was disconnected the internal circuit is not complete. We say it has an open, sometimes said to be open-circuited. Nevertheless you see that the voltmeter was connected in series.

You might be asking at this point, "What if there had not been a reading on the meter?" That would indicate an open somewhere upstream in the circuit, either a broken wire or a switch that was not making contact.

More Circuit Elements

Switches

Figure 11A is the symbol for a signal pole switch, or more simply an on-off switch. A double pole switch as in fig 11B will actuate two circuits with one throw of the switch. The contacts might be worked by a battle handle such as the common "toggle" switch. The headlight switch is a push-pull switch where the contact surfaces on this sliding portion connect together two or more fixed contacts. The ignition switch on most cars is also a push-pull switch, worked by a rod from an arm so that the rotary motion of the key is changed to a linear push-pull motion. To switch accessories the designer might use the toggle, push-pull, or rotary switch according to how he wants it to fit into the general layout of the panel and the mechanisms the switch needs to work with.

Figure 11A
A single pole switch. The common on-off switch.

Figure 11B
A double pole, single throw switch off and on two individual circuits with a flip of one switch.

The one critical aspect of the switch is its contact rating. The size of the contacts, and to some extent the material of the con-

tacts, affect the amount of current (the amperage) that can be switched by those contacts without causing severe arcing and burning of the contacts. Of course, such arcing and burning will limit the life of the switch, sometimes to only one operation.

We don't often need to worry about rating of a replacement switch because we'll get the switch to fit a particular car and it will be a dealer-only item. The manufacturer of that switch will see that the contact rating is correct for the application.

But when adding accessories we need to be careful about picking a switch if one is not furnished as part of a kit, or not recommended by the instructions with the accessory.

Let's take a simple example. We'll add a couple of utility lights to a pickup truck. Both lamps will be controlled by the same switch. The light assemblies we've chosen have #4419 sealed beam bulbs. Information on the box says that each bulb draws 2.7 amps of current. Rounding that off to 3 amps and doubling gives 6 amps. Adding a safety factor to give a little longer life, we'll use a 10-amp switch.

Arcing across the contacts is affected by the amount of current being switched and also by the type of circuit being switched. If the switch is going to control a motor, such as a rotating beacon or a coil, a little extra must be added to the contact rating. The manufacturer's recommendation may at first seem too high. It's not. And of course, to large never hurts the circuit, as long as there's enough mounting room.

If a switch has been overloaded, that is, the contact rating has been exceeded, due to a short tin the wiring or in the controlled service, the switch may burn to the point of not making contact. A more sneaky problem is the switch whose contacts get dirty or slightly burned because of arcing over a long time. Whatever part of the contact is still making a connection might allow some current through but not enough to work the device controlled by the switch.

Capacitors

Also called a condenser, a capacitor has two unique properties.

- It can temporarily store a charge of direct current.
- It allows AC to pass through it while blocking the passage of DC.

The capacitor is made up of two plates separated by a special insulator called a dielectric. In the most familiar automotive type, the plates consist of two long strips of foil separated by the dielectric. This combination is tightly rolled and placed in a small round can. One of the foils is connected to the case, which often has a bracket that attaches the assembly to the ground. The other foil connects to a pigtail coming out one end of the assembly. If a DC voltage is placed across the case and the pigtail lead, the condenser becomes "charged," that is it will store a charge of current in the plates. This charge can be measured with a meter, but we'll see only a momentary upswing of the needle because the capacitor "discharges" very quickly.

The amount of current that the capacitor will store depends upon the size of the foils and is called the "capacity." Capacity is measured in microfarads, sometimes called "mikes" for short. It will also have a voltage rating, but the units cataloged for auto work will assume a 12-16 volt rating and the rating may not be listed.

The ability to conduct AC is put to use in the auto to bypass (short out) electrical noise. This noise is often a very high frequency AC called RF, which stands for radio frequency. Of course that kind of noise is often heard on one of the radio bands, AM, FM, or CB, and is said to be RFI, radio frequency interference. RF is generated when coils are switched. Typical coils that are switched are ignition coils and alternator field coils. Alternator field coils are switched by the voltage regulator.

designers and engineers were satisfied that they had produced a world class sports car that could meet the various market demands around the world. This is supported by the fact that there are eight different specifications for spring rates, damper type and setting, tire size and type, and electronic control of Super HICAS. Another example of unique market-driven specifications can be seen in the Turbo model. The US version is a 2-seater while the European markets were given a 2+2 version.

So the 300ZX was ready. The US launch was scheduled for the 1989 Chicago Auto Show where it was labeled a 1990 model. When it went on sale in May 1989, only the normally aspirated 2-seater was available. The 2+2 followed in June with the Turbo in September. Australia was introduced to the 300ZX (non-turbo) in November and the Turbo 2+2 model made it to Europe in spring 1990.

Initial production was set at 5000 units per month, with more than one half destined for the US. The car was an immediate hit around the world. The automotive press got right to work comparing it to cars such as the Porsche 944 and the Corvette.

Motor Trend magazine named the 1990 300ZX Turbo their Car of the Year and said 'Dollar for dollar, the 300ZX is the best damn sports car in the world'.

Car and Driver magazine named the 300ZX one of its Ten Best Cars every year of its production. Writers were quoted as saying " How could anyone resist a package that looks this good and performs this well."; "For the purest kind of driving satisfaction on the perfect road on the perfect day, the Nissan 300ZX Turbo gets our vote as the perfect car."; "The 300ZX Turbo puts 300 horsepower at your disposal and presents that power in a package so pleasant to occupy that we found ourselves saying over and over that we could not believe a high-performance coupe could be this good and the smooth. Believe us, it can."; "There's so much to like about this car that finding a starting point is easy. You can start anywhere.".

The 300ZX was so well designed and accepted that it remained basically the unchanged for each of its model years with only minor cosmetic, engine, suspension, and brake changes. Its popularity spawned many "copies" by other car manufactures (Mitsubishi 3000GT/Dodge Stealth, Mazda RX-7, and Toyota Supra). This, however, saturated the market for sport coupes. This, coupled with the fact that mini vans and sport utilities were becoming increasingly popular prompted Nissan to stop exporting the 300ZX to the US after the 1996 model year. Another reason for the demise of the 300ZX in the US was new federal emissions regulations (OBD II) that would have driven the cost of the Turbo model up even further. Nissan still produces the 300ZX in Japan. The 1999 model received many exterior body changes.

There are rumors that a new "Z" car is slated for the US market in the 2000 model year. It has been reported that it will be heavily based on what made the original 240Z a success story.

Stay tuned...

References:

Hutton, Ray. Nissan 300ZX - The Enthusiast's Companion. Motor Racing Publications Limited, 1990.

Car and Driver: Jan. 1990. Vol. 35, No. 2; Jan. 1990. Vol. 35, No. 5; Jan 1990. Vol 35, No. 7; Jan. 1991. Vol. 36, No. 7; Jan. 1992. Vol. 37, No. 7; Jan. 1993. Vol. 38, No. 7.

Road & Track, December, 1989, Vol. 41, No. 4

–Z

Quick Bits

February General Meeting

The next general meeting of the Z-Car Club of Washington will be on Saturday, 27 February at 3:30pm at Red Hool Brewery in Woodinville.

Dyno Day Results

Gregg Kerber

Attached [Page 16] is a list of all the cars that participated in the dyno day at Austin's in Tacoma on the 16th. It was a very good day to be a car person. Lots of variety in the cars. Thanks to all that participated. There is interest in another dyno day later this year. I would encourage others to attend. It doesn't cost very much and you may learn something new about your car.

Wiper Speed Solution

c/o Stan Wada

This is a posting from the 510 list that may apply to the old problem with our Z wipers. Couldn't hurt.

<<You may remember the post by Chuck about his experience with the wiper motor and proper grounding. I bought a grounding strap and connected it from the ground on the wiper motor to the firewall to see if that would improve wiper speed as Chuck had seen.

Results, yes, there is an improvement. It's not modern-day-car fast, but it is noticeably faster than before. And there is an actual difference between slow and fast. Fast is now an option! It's worth a shot if you think your wipers should be clearing rain faster than they are...>>

On the horizon...

With all the talk about the new Z, look to upcoming issues of The NewZletter for the skinny – straight from Nissan – on what may be coming our way...

By putting a capacitor across those devices, the RF is shorted to ground to prevent its transmission along wire that act as antennae.

Electricity and Magnetism

Some other circuit elements require an understanding of a facet of electricity that seems mysterious but the results of which we see every day. Bear with us while we explain it. It's difficult.

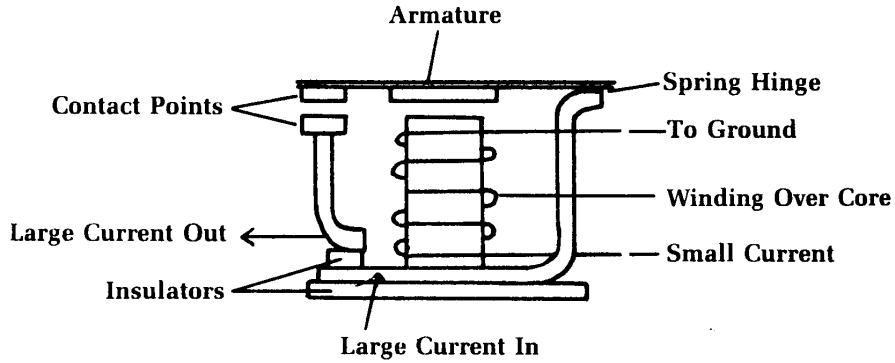
- Whenever there is a movement of electricity, magnetism is produced.
- Whenever there is a movement of magnetism near an electrical conductor, electricity is produced in that conductor.

So, when current is flowing through a wire, that wire has a coating of magnetism around it. That coating is called a "magnetic field." The strength of the magnetic field m(the thickness of the coating) depends on the amount of current flowing through the wire. The wire that simply connects the switch to a lamp has a magnetic field around it but is so small that we can ignore it. But let's take a few hundred feat of wire, say 20-gauge wire, with enamel insulation instead of a heavy plastic or rubber insulation we normally see on the wire. Wind a bunch of turns of the wire around a pencil so that we have a coil about 3/4 inch long. If we connect the ends of the coil to a battery we find that we have a fairly strong electro-magnet that can pick up and hold a small steel washer. What happens is that the very small magnetic coating around each of the individual turns combines to produce one big field around the coil. But even this field is kind of loose and sprawling. So let's remove a pencil from the core of the coil and insert a piece of soft iron. A cap screw of the right size will do okay. This will concentrate the magnetic field more tightly. Now when we energize the coil by connecting it to a battery, we'll find that the electromagnet will do its work more efficiently and be able to pick up a bigger steel washer than it did with the pencil core.

This electromagnetism is the basis of not only motors but also a couple of other gadgets we find around the car called relays and solenoids. No, we haven't forgotten about the other half of magnetism, the moving magnet. We've just postponed this discussion for a while.

Relays

A relay is a remote controlled switch that works on the principle described above. An electromagnet, similar to the one we made, is used to pull down a steel plate which is hinged and also spring-loaded to normally keep the plate away from the core of the coil. On one end of the plate, the one away from the hinge, is a contact point. Underneath the point but not touching it is mounted another contact. When the coil is energized, the steel plate, now called the



A typical relay allows a small current to control the flow of a larger current.

armature, is pulled down toward the coil core and the points are in form contact.

The idea here is that the coil can be designed to need a very small current in order to pull in the armature. But the contacts operated by the armature can be large and capable of switching a high current. So a small switch in the drivers compartment can switch a very large current in the engine compartment.

The two most common units are the horn relay and the starter solenoid (relay).

In the horn system, the horns themselves draw comparatively large current. Instead of running two heave wires up the steering column and having a big switch on the steering wheel, there can be a flimsy switch on the wheel that can be operated by a touch at the top, bottom, side, etc.

There is another benefit to this system. A heavy wire from the battery must run to one of the contacts, so let's connect one end of the relay coil to that same heavy wire. For the coil to become energized, its second end only needs to be grounded. So only one small wire goes up the steering column and the steering wheel switch connects that wire to ground to operate the horns.

Relays can have various contact arrangements. The one used in the horn circuit is a normally open (NO) contact set, because the contacts are open until the coil is energized. Some circuits use normally closed (NC) contacts or both NO and NC. Other relays might have two or more than one cicruit can be switched from one source.

The starter solenoid is a form of relay. The switch that sends the current to the starter motor must be very large to handle the heavy current the starter needs. Certainly a small-sized, easily operated key switch can't do the job. So let's use a relay. Except in this case we'll call it a solenoid because its action is just a little bit different. Instead of the core of the coil being solid (remember the cap screw we used?), the solenoid is hollow. A plunger, spring loaded at one end of the hollow core, will be pulled in to center itself in the core when the coil is energized. The total movement of the plunger can be quite large compared to the small movement of the armature type relay. Of course we have to pay for this greater movement. The coil must be bigger and the current must be greater, but that greater current is still within the capabilities of the key switch.

Many starters have the solenoid mounted on or in the starter assembly and the solenoid will do two jobs. First, the long movement of the plunger will move the drive assembly into engagement with the flywheel of the engine. Second, the final bit of the plunger's movement will push a large copper disc into firm contact with two heavy copper studs, forming the large switch that carries starter current.

In the case of the solenoid being mounted away from the starter, that totally smaller unit just moves the copper disc against the contact studs. This small solenoid is more often called "the starter relay" not to be confused with the "starting relay," an armature type used on foreign cars.

—Z

on this very demanding circuit. They also drove Porsche 944s and 928s at high speed on the Autobahn. They were then sent to Laguna Seca and Willow Springs in California for further training in a different environment with different target cars.

The goal of the chassis and suspension was to provide a blend of world class handling and stability, and a comfortable ride. It was decided at an early stage that MacPherson-strut front suspension and semi-trailing-arm rear suspension would not be good enough for the new 300ZX. Nissan was developing other powerful front engine, rear drive cars - the 200/240SX, the new Skyline, and the Infiniti Q45 - all of which faced similar challenges. A multi-link rear suspension was suggested similar to that being used by Mercedes Benz. This suspension first appeared on the ARC-X and Mid-4 concept cars and made its production debut on the 200/240SX in 1988. The 300ZX took this suspension layout one step further by using a Cray X/MP supercomputer for complex mathematical solutions. This helped narrow the choices down to a few options to be built as prototypes. This prompted the development of the STB, or Suspension Test Bed. This was a vehicle that resembled a dune buggy in appearance, but the similarities ended there. The STB consisted of three modules - a turbocharged V6 and front and rear suspension modules. The suspension modules could be changed or adjusted very easily for different geometry, wheelbase, track, and weight distribution. The STB was also used for durability testing on open roads to avoid spy photographs. The final configuration for the 300ZX was a multi-link set up front and rear. Further road testing of the chassis and suspension would be done with a prototype chassis with previous generation 300ZX body panels tacked on.

Although all-wheel drive and active suspension were rejected for the 300ZX, engineers decided to incorporate rear-wheel steering into the new car. They called it Super HICAS (High Capacity Actively Controlled Suspension). In short, it is a limited rear steering designed to improve stability and behavior in high-speed swerve maneuvers. It was specified for the Turbo model only.

All told, the UZ program took three years to complete and involved 190 prototype cars and 1.25 million miles of testing. In fact, the European-spec 300ZX Turbo lapped the Nurburgring in 8 min 40 sec - 6 seconds faster than Porsche's top test driver could manage in a 928GT. In the end, the

The all-wheel drive technology in the Mid-4 was considered but decided against because improved tire technology and good weight distribution would provide adequate traction. Besides, the all-wheel drive system would have added two inches to the hood line, which was deemed unacceptable by Nissan.

So Nissan went to work developing concepts for the new 300ZX. Hundreds of sketches and renderings were developed. From these, 11 were selected and worked into 1/5th-scale models. From these models, three were selected and built as full-size mockups. Of these three choices, the final choice was the most radical design. It was chosen because it placed the driver at the center of the car between the front and rear wheels. The steeply raked windshield and unusual head lamps added to its personality.

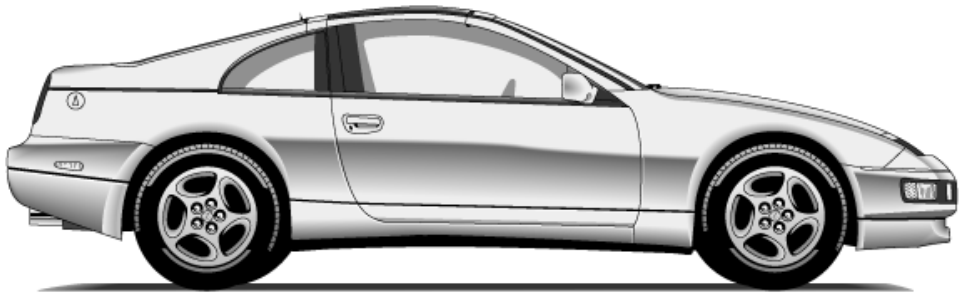
The windshield and the head lamp design posed some challenges of their own. Ferrari and Lamborghini produced cars with windshield rakes less than 25 degrees, but with distortion as a consequence. Nissan achieved a 26-degree rake without distortion, which was quite an accomplishment. For the head lamp design, the supplier developed a new glass-pressing process.

Good aerodynamic performance was also a primary goal for the 300ZX designers. Many hours were spent in a wind tunnel to achieve a target coefficient of drag (Cd) of around 0.3 without impacting the styling of the car. A Cd of 0.31 was achieved for the normally aspirated car, but the higher performance levels of the turbo car would require a lift coefficient close to zero, front and rear. To achieve this, a deeper front apron and rear spoiler were specified, at the expense of a slight increase in drag. While accepting the functional requirement for the turbo model, designers preferred the form of the non-turbo car. The 300ZX Turbo ended up with a Cd of 0.32.

Originally, a convertible version was not considered. Removable roof panels were accepted which resulted in the side windows having no upper frame. Two-seater and 2+2 versions were planned all along. Designers once again achieved success by having a close visual similarity between the two versions (the 2+2 added 5" between the trailing edge of the door and the rear wheel arch).

Inside the car, ergonomics was addressed from a clean sheet of paper. Large, easy-to-read analog gauges were employed with all essential switchgear placed at the driver's fingertips. It was decided that the steering column and instrument pod would be fixed with careful attention to the placement of both in relation to the driver.

As a part of the "clean sheet" design approach, Nissan decided to have an extensive overseas test program (a first for Nissan). The reason was to be able to test their new flagship car in the environments it would be driven in. To test the 300ZX with adequately trained drivers, Nissan sent a select group of test drivers to the ADAC Rennsport race driving school at the old 14-mile Nurburgring in Germany. There they developed their judgmental skills by driving a variety of high performance cars at the limit



1994 Nissan 300 ZX® 2+2

1990-1996 Nissan 300ZX

By Gregg Kerber

"Finally, a Japanese sports car that can run with the big dogs".

"A world class sports car".

"One of the most alluring cars to appear on the U.S. market in years".

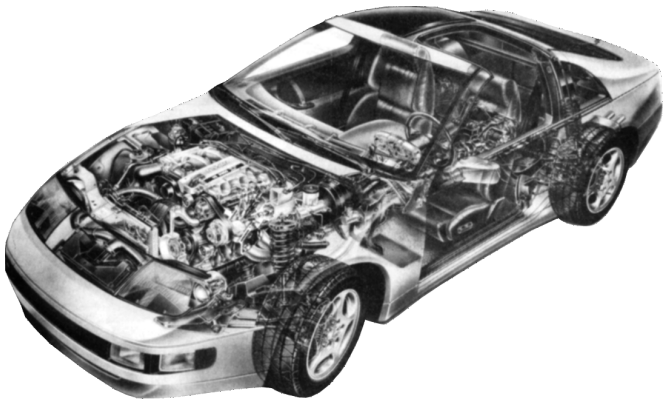
These are just a few of the accolades written by the automotive press regarding the Nissan 300ZX upon its debut in 1989.

The 1990 through 1996 300ZX (Z32) is the 4th generation of the famous Nissan "Z-car". The first generation was the 240Z which first appeared in 1969. The 260Z and 280Z followed completing the very successful run of the original car. The second generation was the 280ZX in 1978 and was a move away from the traditional sports car theme to a personal luxury GT. The third generation became the 300ZX (Z31), appearing in 1983, was a further development along these lines.

In 1986 Nissan changed direction due to a sagging market share in their domestic and foreign markets. Yutaka Kume, an engineer in charge of research and development, took over as president in 1985 and promised Nissan's image would change. His aim was to be the number one automobile manufacturer in advanced design and technology. The 1987 Tokyo Motor Show provided many concept cars that represented the future of Nissan. These cars included the ARC-X (a predecessor to the Infiniti Q45) and the Mid-4 sports car with a twin turbo charged V6 and all wheel drive. Many of the features from the Mid-4 are found in the 300ZX.

The 300ZX started out as "Project UZ". The basic premise was to return to the ideas that made the original 240Z a sensation 15 years earlier. This was easier said than done given the ground rule to make the "world's best sports car". The mid-engine design of the Mid-4 was scrapped for the UZ project because it was considered to appeal to a smaller cross-section of potential buyers than a front engine-rear drive layout. The other important consideration was to offer a 2+2 version. Nissan considered the Porsche 944 Turbo as a target, but did not want a Japanese "copy" version.

To achieve their goals, Nissan estimated the new car would need 250-300 bhp. The choice was between a new, or heavily revised (from the Z31 300ZX), V6 around 3 liters, or the recently developed 4.5-liter V8 slated for the Infiniti Q45. They decided on the V6 because it was more compact allowing a lower hood line and most sports cars did not exceed 3-3.5 liters. So a new development program was started on the VG30 which ended up as virtually a new engine. The choice of the V6 meant they could offer a normally aspirated and turbo charged engine.



ZCCW Automotive Activities

February

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28						

March

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

April

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24/3
1	25	26	27	28	29	30

February 27
ZCCW General Meeting - 3:30 - Red Hook Brewery in Woodinville

March 27
ZCCW General Meeting - 3:30 - Lake Washington Grillhouse & Tap Room - North end of Lake Washington.

April 24
ZCCW General Meeting - 3:30 - Location TBD

What's Coming Up...

May 22
ZCCW General Meeting - 3:30 - Flying Pig Pub & Brewhouse - Everett

June 26
ZCCW General Meeting/Picnic - 3:30 - Flaming Geyser State Park

July 31
ZCCW General Meeting - 3:30 - Red Hook Brewery - Woodinville

August 20-22
5th Annual Pacific Northwest Z-Car Gathering/Meeting of the MindZ - Port Townsend, WA

September 25
ZCCW General Meeting - 3:30 - Lake Washington Grillhouse & Tap Room - North end of Lake Washington.

October 30
ZCCW General Meeting - 3:30 - Location TBD

The ZCCW draws its calendar information from many sources. If you would like to be one of those sources and have automotive events that you would like to have included, email Michael at mswhite@sos.net.