

# *sport* **auto**



In 8.22 minutes around the Nürburgring Nordschleife in the BMW M3 with SMG Drivelogic.

## The Nordschleife line

► Bend by bend guide ► Tips from the professionals ► All the facts ► All the info

### Presented by BMW M GmbH



## Coming soon to Michael Schumacher's rear mirror

At auto motor und sport Kart Camp we watch up-and-coming motor racing talent and systematically promote youngsters' careers – some even as far as DTM and Formula 1. This is our contribution to a great passion: motor racing. In so doing, we also ensure that there will be no lack of interesting personal stories and interviews in the future! Further information at: [kartcamp.de](http://kartcamp.de)

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■ Record-breaking: in the past, not only the lap times counted but also the road holding assessment.

# Ready for take-off

The mystery of the Nordschleife can be expressed in precise figures: the lap records reflect heroic feats and technological summits

**T**he rule applies both to racing cars and road cars: nothing reveals more than the lap time on the Nürburgring Nordschleife. Why? Because the speed of a car has to be in its genes: low centre of gravity, pulling power, balanced weight distribution and a perfectly adjusted chassis which can cope with the attacks of this bumpy track.

A glance at the history book of records attests to milestones of racing technology and automobile construction – and demonstrates the state of technolo-

gy as the years passed. Since Formula 1 engines have not been heard at the Ring since 1976, their best time has long been surpassed by today's standards: Clay Regazzoni burned a lap time of 7.04 minutes into the Eifel circuit. The fastest of the fast was Stefan Bellof in 1983: 6.25 minutes in the Porsche 956 for a lap of the Ring in racing trim. In the qualifying, he even made it 14 seconds faster, at an average speed of 200 km/h. All other records pale in comparison, mainly because professional racing has avoided the Ring since then. This is actually a shame, as

shown by the DTM record of Johnny Cecotto in the BMW M3: 8.46 minutes for the 25.3 kilometre combination of Nordschleife and GP circuit.

Because the Ring is no longer used for racing cars, it is now used more by regular road vehicles: Wolfgang Kaufmann squeezed a lap time of 7.32 minutes out of a Gemballa Porsche with over 600 bhp – on regular tyres. But the fascination of a new record will always be there – after all, fast lap times promise fame and glory.

Marcus Schurig



■ Formula 1 record: Clay Regazzoni took 7.04 minutes



■ Fabulous best time: 6.25 minutes for Stefan Bellof in the Porsche 956



■ DTM record: Johnny Cecotto holds the M3 record



■ Road record: 7.32 minutes for the Gemballa Porsche





# „Allow for a safety margin”



Special tip from  
BMW works driver  
Jörg Müller

“Round the fast Hatzenbach curve, you shouldn’t ride too far out to the left – just to be on the safe side. Because of the bumpy surface, a lot cars will tend to displace or even jump.”

③ After a short high-speed passage at just over 200 km/h, we go into one of the technically most demanding sections of the Nordschleife, the Hatzenbach-Geschlängel. Entering this can be treacherous as the pace is reduced in two stages, as it were: in the undulating braking zone at the end of the straight you should brake short and hard and shift down from fifth to fourth gear. At the end of the first left-hand bend there is then the second deceleration for the long double right, taken in almost all cars in third gear and with a fixed steering angle. Since being given a new layer of asphalt, the double right bend has lost much of its horror: many a car used to get stranded in the tyre piles here due to the dangerously slippery surface.



Hatzenbach

0,695 kilometres

BEND WITH  
INCREASING  
RADIUS

APEX VERY  
BUMPY!

① The left bend after the starting line is the first challenge: before the initial braking zone there is a crest where the car can become slightly unsettled. So always brake before or after the crest. The braking zone itself has many small bumps. Because of the narrowing left-hand exit to the bend, it is better to turn in late so as to be able to unwind the steering lock again immediately after the apex and then progressively accelerate out of the bend. In so doing, ride well towards the curb though avoiding any contact. Insensitive acceleration is particularly fatal in wet conditions with rear-wheel drive: this second-gear bend is as slippery as soap. It can be taken in third gear, depending on axle ratio and drive concept, but rear-wheel drive cars in particular will quickly tend to understeer because of the lack of punch.

The data for gears, distance measurement and speed recommendations is based on a measurement lap in the BMW M3 SMG, with a Nordschleife lap time of 8.22 minutes. The ideal line is shown in colour, as in our Formula 1 graphics, the braking zones prior to the turn-in points are marked as double black lines.

② For speed freaks, the first test of courage occurs only 500 metres after the starting line. The ultra-fast Hatzenbach curve is highly demanding. Braking as you approach will be lighter or harder, depending on engine power. When braking, care must be taken to ensure that the car is standing as straight as possible – this facilitates finding the ideal turn-in point. Because this is an off-camber turn with rough bumps making things very unsettled from the apex, the driver has to gently ease the car into the fourth-gear bend. Coming out of it again, ride well out and then accelerate very early. Caution is essential in heavy rain: wide rivulets form right across the track!

Bridge

Crest

Start

HIGH RISK OF  
SLIPPERY WHEN WET!

Hocheichen

1,265 kilometres

Cobble stones

- 1st gear
- 2nd gear
- 3rd gear
- 4th gear
- 5th gear
- 6th gear
- Braking zone
- Turn-in point

TIGHTENING  
BEND!

4

5



**4** Part two of the Hatzenbach-Geschlängel is for drivers with feeling. After accelerating evenly out of the double right, hold your accelerator pedal and your breath: the left-hand kink is taken at the far right-hand edge of the track so as to use a wide radius and under constant throttle, i.e. with a fixed accelerator pedal position. Experienced Ringers will be mindful of the treacherous bump at the apex, largely eliminated since a new asphalt layer was added. The advantage is that you no longer have to clip the inside curb to keep the car stable. Between exiting this bend and going into the final S of the Hatzenbach-Geschlängel, sensitive and carefully controlled deceleration work is required: with soft suspension settings, the car will tend to rock on a fast change of bends. If this tendency is reinforced by abrupt braking, the result is counterswing and departure into the nearby Hatzenbach crash barriers.



**6** One of the characteristic and most fascinating passages of the Nürburgring Nordschleife bears the name Hocheichen: the S following on from the Hatzenbach bends nestles wildly and awe-inspiringly in the topography of the surrounding Eifel landscape. Before the new asphalt was laid, the entrance was so slippery that even experienced drivers frequently misjudged. Even now, especially in the autumn when fir needles cover the track, the run-up to the right kink can still turn into a slide: with road tyres, even 70 km/h could mean the end. Because the right-hand kink leads up to a blind crest which is off-camber from the apex, speed control is absolutely crucial. Here, less is usually more otherwise turn-in understeer can get you into quite some trouble. The broad left arc as you come out of Hocheichen is simply amazing: the steep downhill slope gives the driver a sense of being on an oval race track and you have to really hit the acceleration as early as possible on the long subsequent straight. Racing cars with tight suspension tend to jump and shift a little here. Tip: run wide, even as far as the cobblestones - here you can already change into fourth gear.



**5** The exit of the Hatzenbach passage turns out to be a treacherous stopper at the end of quite a fluid bend combination. The final left corner in particular tightens very nastily. For this reason, speed has to be perfectly regulated coming into this tightening left: either do the brake work when turning into the final S or brake down again slightly before the last left corner. Come out of the bend as far to the left of the

track as possible so as to open the radius for the tight bend. The steering is kept hard down and then unwound so as to be able to gain optimum acceleration and not understeer and clatter up onto the curbs. You then change immediately to the left of the track to position for braking into the Hocheichen bend. The new road surface provides good grip even in the rain.

■ Please work towards your own personal upper limit step by step!



# "The crest is dangerous"



Special tip from  
BMW works driver  
Jörg Müller

"The double  
right at  
Flugplatz has  
be approached  
well over to the  
left, otherwise

your car will jump away  
from you on the crest.  
Better to go in slightly  
slower and then get  
back on the gas more  
quickly – that's the  
quicker way to do it."

② The Flugplatz separates the men from the boys: depending on your car, you will come flying over the crest of the Quiddelebacher Höhe in fourth or fifth gear, brake short and hard mainly to stabilise the front axle before turning in, and allow yourself to fall into the dramatically fast double right kink at high speed. The two curves should be combined to a single bend with a turn of the steering wheel. On the first curve section keep close to the inner curb. Between the first and second curve there is a lengthy bump which gently lifts the car out of its springs for the second section: for this reason, it will tend to drift on all four wheels as you come out of the double right. Here you know you can't go much faster! Be careful in wet weather: deep puddles await you as you exit!



① After the tight and technically demanding Hatzelbach Geschlängel and Hocheichen, we head on for Quiddelebacher Höhe at full tilt. The track is very narrow and uneven and the old surface is very slippery. The bridge over the B 257 is as narrow as the eye of a needle, and cars tend to get caught up with each other here in heavy traffic. If the path is clear, you take the right bend over the bridge from the middle of the track and allow yourself to run out to the left, so as to be ideally positioned for the double right at Flugplatz. The climb to Quiddelebacher Höhe is so steep, it is like going up a take-off ramp. You should always keep left here, overtaking on the right is risky at best: the enormous bump is even higher there, and the ensuing flight therefore longer. Powerful cars should be tempered with sensitive braking on the crest to stop them from lifting off.



- 1st gear
- 2nd gear
- 3rd gear
- 4th gear
- 5th gear
- 6th gear
- Braking zone
- ▶ Position of expert-car
- Turn-in point

Quiddelebacher Höhe

1,950 kilometres

Flugplatz

2,196 kilometres

Cobblestone rumble strip

crest

Bridge

NEVER OVERTAKE  
ON THE RIGHT  
GOING OVER  
THE CREST!



**4** This is one of the Nordschleife's real tests of courage: Schwedenkreuz. At this treacherous crest there is a cross from the 30 Years War - and even today, car, driver and track can find themselves at war with one another at this point. The approach is awe-inspiring: you fly over the first crest at top speed. The car gets lighter, the suspension has to settle a little after landing before you can begin initial braking on the right-hand side of the track. Because you turn in blind for the left-hand bend over the crest, the release point has to be just right: if you turn in too early, you have to make a correction around the apex, if you move away from the right-hand side of the track too late, you will easily find yourself on the soiled outside lane. Taking the Schwedenkreuz bend is always a balancing act because the car is completely derailed on the crest at the apex and thus very unsettled. In order to get the subsequent brake manoeuvre right, do not allow yourself to ride out too far at Schwedenkreuz itself. It is also important to build up gradually to possible speeds: anyone flying into the Schwedenkreuz at 200 km/h should be fully aware of what they are doing!

**ALWAYS BRAKE AFTER THE CREST!**

**Schwedenkreuz**

2,990 kilometres

Crest

Dip

**BEWARE: BIG PUDDLES FROM HERE**

**CAUTION WHEN WET: AQUAPLANING!**



**3** The section between Flugplatz and Schwedenkreuz is often underestimated: the two left curves are quite gentle and the line on the left-hand side of the track and the following dip before the Schwedenkreuz are not a problem if you are familiar with the circuit and conditions are dry. However, this section is hellishly fast - fifth or sixth gear, depending on your car - and the peaceful scenario changes dramatically in wet conditions. The second left-hand bend before the deep dip is particularly nasty in rain: the aging surface causes understeer in front-wheel drive vehicles and sudden oversteer in rear-wheel drive vehicles when you turn in at full speed. At the appropriate speeds here of well over 200 km/h, this kind of stunt can easily end in a write-off.

**Aremberg**

3,345 kilometres

Gravel bed

**5**

Bridge

Manhole cover



**5** The Aremberg bend actually begins in the Schwedenkreuz section: you fly towards the braking point at least 200 km/h, with many bumps making deceleration difficult. Shifting down rapidly on the left-hand side of the track over bumps often causes the wheels to block: so do not brake too late and leave some room at the left-hand side, as most cars tend to shift dangerously when braking here! Although the Aremberg bend has an even radius, the line is quite angular: for this third-gear bend you turn in quite late and hard so as to shift the apex towards the bend exit. The advantage is that you can unwind the steering lock earlier and accelerate out faster, so you can slingshot into the Fuchsröhre.

■ Please work towards your own personal upper limit step by step!





# "Fuchsröhre is tricky"



Special tip from  
BMW works driver  
Jörg Müller

"In the  
Fuchsröhre  
dip you have a  
lot of grip, on  
the rebound  
the car is

suddenly very light. You  
have to take this into  
account when braking  
into the next left-hand  
bend"

**2** The dramatic end of the downward slope goes by the name of Fuchsröhre and is as spectacular as it is fast. In dry conditions, with confidence on the accelerator and not too much power, the bend can be taken at full throttle in most cars – but beware: if you overestimate yourself here, you will end up in the Eifel brushwood. The key to mastering this passage lies in rhythm and faith in your car. Stay well to the right as you approach, then turn in gently – never jerkily. If you want to reduce speed before Fuchsröhre, you should definitely do so before the dip, but never brake in the dip! Always come into the Fuchsröhre in top gear, keep on the inside at the apex of the dip, then allow yourself to ride to the right as you exit. A deep undulation unsettles the car at the braking point – especially dangerous for vehicles with ABS. Since speeds can be well over 200 km/h, it is important to explore potential intelligently here!



**1** The section between the Aremberg bend and the Fuchsröhre looks simple but can be very nasty. The passage dips down a steep slope over bumps, a rough surface makes it difficult to maintain your course at a high speed. Basically, you try to combine the left-right-left



combination into a straight, so you approach the passage from the Aremberg bend on the right-hand side and then speed through on a straight line down to Fuchsröhre. In doing so, you keep close to the curbs but never clip them! It is also important to find a sensible shift rhythm: if you shift up at the wrong time, the car unsettles. This section is tricky in the rain: the surface is as very slippery in the area of the first left-hander! A possible surprise: if you are training in the early morning, watch out for deer crossing!

APPROACH SECTION AFTER  
BRIDGE WELL  
TO THE RIGHT!

**Fuchsröhre**

4,445 kilometres

deep dip

Ramp

NEVER BRAKE  
IN THE DIP!

**4**

Cobblestone  
rumble strip

**Adenauer Forst**

5,095 kilometres

1st gear  
2nd gear  
3rd gear  
4th gear  
5th gear  
6th gear  
Braking zone

Position of expert car  
Turn-in point



Metzgesfeld

5,745 kilometres

NEVER RIDE INTO  
THE BEND  
WITHOUT  
YOUR FOOT  
ON THE  
ACCELERATOR!

Crest

■ Caution: crest! Adenauer Forst is a model of bad visibility.



**4** Spectators stand here for a good reason: after the ultra-fast Fuchsröhre and the fluid left-right combination, a crest at Adenauer Forst blocks the driver's view of the subsequent section. It is easy to overlook the entry to the left bend and clatter straight ahead into the dirt. The left hairpin is easily missed, very slow and also tightens. With rear-wheel drive and a little more smoke at the tyres you can also approach the left hairpin more centrally – which would be a more competitive racing line to block out unwanted overtakers. With more power under the bonnet, the exit is more important than the approach, so approach the right exit bend cleanly in a broad arc on the left-hand side so as to be able to open up the radius and accelerate early. Rhythm is crucial at Adenauer Forst: if you mess up the approach, you have problems exiting since this error will stay with you. This is why it is better to take the initial left more slowly, use the optimum line on exiting and pick up speed early on. Never ride the curb as you come out of this section!

**3** After the Fuchsröhre dip, you decelerate short and hard over the subsequent ramp in order to settle the car and reduce speed for the left-right combination between Fuchsröhre and Adenauer Forst. It is not necessary to shift down before the left-hand bend since rear-wheel drive cars in particular tend to break away suddenly at this point when the clutch is engaged. Instead, let the car roll through swiftly on trail throttle. It is one of the disputed Nordschleife questions as to whether the curb should be avoided completely, clipped or actually ridden. Coming out of the bend, don't run out too far in order to be able to find the optimum approach to the right-hand bend going up to Adenauer Forst – often difficult in the heat of battle. A point of caution: the braking zone has many small ripple marks so never brake too hard. On the fourth-gear right-hander, hug the curb and stay to the right in order to position yourself for the blind and tight left-hand corner at Adenauer Forst.

**5** If you make a good exit from Adenauer Forst, you will not have to fear any overtake onslaughts up the straight to Metzgesfeld. If traffic is light, the left-right curve after Adenauer Forst is combined to a straight. There are two options for the approach to Metzgesfeld: since the turn-in point is hidden behind a crest with a previous left turn, you can keep the line left of centre and take the crest head-on. The advantage is that the car is straight for braking on the bumpy ridge. With a powerful car, this line would be first choice. With less power, you can move over to the right earlier on, but you have to steer slightly left to the turn-in point. The advantage here is that the turn-in manoeuvre for the Metzgesfeld left-hand bend is less tight and hard. If it is raining heavily, small rivulets flow across the track from right to left – very dangerous! The fifth-gear left-hand curve is fast but nice because the radius is very even. If you take this bend perfectly, you finish up exactly on the white sideline as you exit.

■ Please work towards your own personal upper limit step by step!



# "It's better to approach centrally"



Special tip from  
BMW works driver  
Jörg Müller

"Since the  
turn-in point  
at Metzges-  
feld is

behind a  
crest, the

bend should be taken  
lightly from the centre  
and not to the far  
right. This way the car  
is almost straight  
when you begin to  
brake."

**2** The Kallenhard bend takes you blind around a large promontory: you keep left till late here, braking at the last minute and turning in very late. Since the bend tightens like a knot at the exit, set the apex well over to the exit so as to gain optimum acceleration coming out. The first half of the heavily cambered bend is taken on trail throttle: don't start to accelerate again until you can see the curb at the exit, and then only carefully. Front-wheel drive cars will tend to understeer heavily here – dramatically so in rain – while rear-wheel drive vehicles can be beautifully guided out with the throttle. At the exit you will have to move over quickly to the right-hand side of the track.



**1** The left-right combination after the fast Metzgesfeld bend is tricky, starting with the braking. In fifth gear, you enter at speed well over to the right, brake hard and shift down to third gear. The car drifts slightly because there is a slight dip going into the bend. The initial left is heavily cambered, so you take the car in very fast. The radius is relatively constant – which always promotes over-confidence. If you want to get a perfect exit, keep close to the inside curb on the first left-hand corner. The opening right over a crest

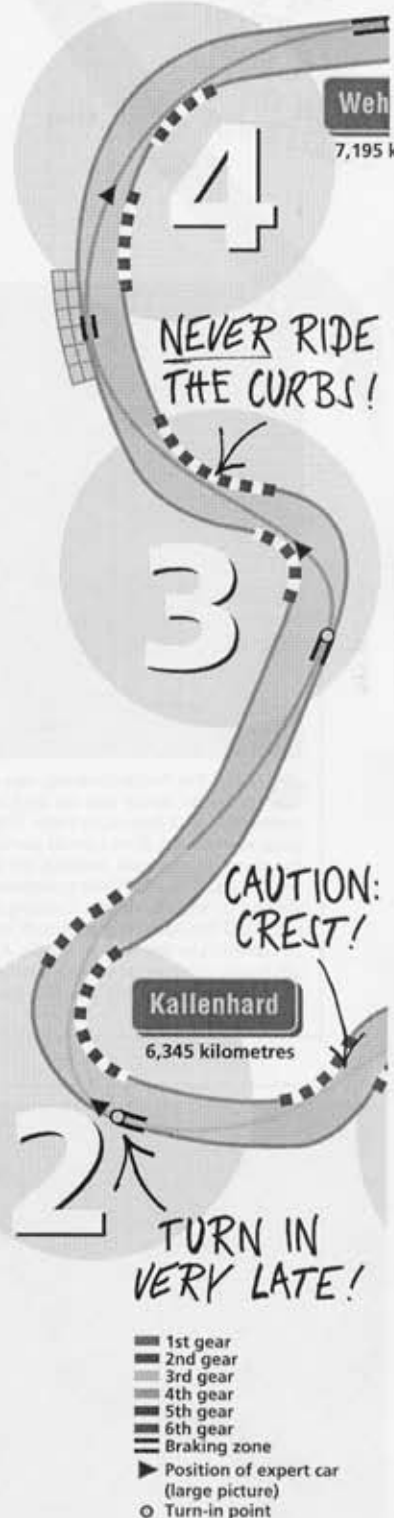


at the end of the combination is tricky: the driver approaches the bend blind and has to make perfect use of the space available. This is why it is a good idea to keep as central as possible so as to be able to open the radius perfectly for the right-hander. Be careful: just before the apex of the right-hand bend there is a large bump which can cause sudden understeer. Inexperienced drivers will tend to release throttle and the load change takes them into the crash barriers. In the rain, all this is even more difficult: even the initial left is very slippery, so never turn in too fast! The second part of the combination is much more awkward when wet as the car has to be settled at constant throttle on the driving line, and abrupt steering movements have to be avoided at all costs. Under no circumstances should you launch into the exit right-hander too fast – you will either understeer and plough into the field or veer off to the right straight into a solid verge.



Blind belief: the exit of the left-right combination before Kallenhard is hidden behind a crest

Please work towards your own personal upper limit step by step!



TIGHTENING  
BEND!

Wehrseifen  
5 kilometres



**3** There are points on the Nordschleife which leave even experienced drivers speechless: the nameless downhill left-right combination after Kallenhard is certainly one of them. Since the car gains speed rapidly after a steep downhill passage, you reach the 5 combination in fourth gear at over 160 km/h. Even though nothing is hidden, it takes a lot of courage to take it at speed: varying surfaces provide changing grip conditions, particularly at the entrance, and extreme caution is required here in rain – also because the track is heavily off-cambered at the turn-in point! The initial left is approached from the far right-hand side, in most cars a dab on the brakes will be required at this point. There is a sudden dip at the apex of the left-hand bend: in cars which are old or have soft suspension, the bodywork will buckle so badly that the doors will even be forced open slightly. The deep undulation on the initial left-hand bend runs through to the right-hand exit bend, where the track again has adverse camber. The result of this tectonic displacement is literally a crest: if you are really going fast, you will actually jump – but the steering wheel has to be straightened up again! A faulty estimation of turn-in speed can have catastrophic results in this section: if the car is not guided perfectly through this fast, narrow passage, the curbs become a series of jumps.

Metzgesfeld

5,745 kilometres



■ Keep on the ball: the left kink at Wehrseifen tightens at the exit, so never go in too fast!



**5** Whether it's the 24-Hour Race or the long distance championship: the Wehrseifen section always attracts lots of fans – and their interest is usually rewarded since many drivers get the speed wrong here and hit the hard little wall at the edge of the curve. In fourth gear, you brake into the first blind right-hand corner on a steep descent keeping well to the outside left. Before turning in, you hit the throttle again and guide the car tightly along the curbs through an off-camber bend. Co-ordination has to be perfect here: if you are still on the brake when turning in or having to take your foot off the accelerator pedal mid-corner, things will look bleak. The car will suddenly unsettle and there is very little space for correction. Since the subsequent left hairpin tightens to the extreme, you will usually take it wide and turn in to the left very late – preferably in third gear, saving yourself a shift during the transverse acceleration phase at the exit. It is unwise to come in tightly on a competitive line since the track slopes off on the inside like a ramp – all your wheels could easily come to a standstill as you brake on the approach. Understeer is the last thing you need as you come out of Wehrseifen – but unfortunately almost all cars do understeer here! So always allow for some room for manoeuvre and don't race too fast into this tight hairpin. Beware: the right curve coming out of the passage towards Breidscheid is dangerously slippery in the wet.

**4** Unfortunately, the triple right before Wehrseifen has seen better days: with the old surface it was a huge challenge – especially in the rain. Since re-asphalting the only remaining challenge is the correct choice of line and the right turn-in point. This is still difficult enough, since this fourth-gear passage takes you around the hill in three blind bends. Many drivers fail when braking on the approach: if you start too late, you will be doubly punished by the undulating surface. Aim for the centre of the curb as the first apex, then move to the outside and come in very close to the second curb. The trick is to sweep through the passage calmly with an almost constant steering angle – then the car lands exactly on the white line on the left-hand side as you exit.





# "Stability has priority over line"



Special tip from  
BMW works driver  
Jörg Müller

"Because of  
the many  
bumps I brake  
into the  
Breidscheid  
bend not to

the far right on the ideal  
line but slightly over  
towards the centre of  
the track. This keeps the  
car much more stable  
when braking"

**2** No sooner have you mastered the lowest point of the Nordschleife in Breidscheid than you are literally catapulted back upwards: the right-hand Ex-Mühle takes you around the hill as if on a ramp. The task here is to find the optimum entry speed: if you overdo it, you understeer and slide up onto the high curb, if you are too cautious, you will hardly make it up the steep climb, especially with a less powerful car. Approach Ex-Mühle to the left of the track, give only a short, hard stab of the brakes, and keep close to the inside curb at the apex. Beware: at the exit, front-wheel drive vehicles will tend to understeer heavily, rear-wheel drive cars will oversteer – so be sure to accelerate early and cleanly, but never too hard.



Crest



**1** The bridge at Breidscheid marks the lowest point of the Nürburgring Nordschleife – and the lowest point of brake performance, since the long downhill stretch from Metzgesfeld to Breidscheid heats up the brakes considerably. This should be taken into account at least in regular road cars when flying towards the bridge – and wall – at 180 km/h. Always brake after the initial slight right-hand bend. Turn in late to the third-gear left-hander over the bridge, approximately when you are level with the high fence on the right. Take the left-hand bend wide, using the entire width of the bridge, and allow yourself to ride well out to the right. Most cars easily understeer in the dry and this tendency is reinforced in the rain. In order to approach the subsequent Ex-Mühle bend as cleanly and as straight as possible, you have to stay on the outside of the bridge in Breidscheid for a long time. A hard bump just after the bridge unsettles the car even more.

BRIEFLY STAB  
ON THE BRAKES  
TO STABILIZE!

Ex-Mühle

8,130 kilometres

- 1st gear
- 2nd gear
- 3rd gear
- 4th gear
- 5th gear
- 6th gear
- Braking zone

- ▶ Position of expert car (large picture)
- Turn-in point

Breidscheid

7,925 kilometres

BE CAREFUL!  
ABS IS POWERFUL!

■ Please work towards your own personal upper limit step by step!

## Bergwerk

9,280 kilometres

TURN IN  
VERY LATE!

Crash barrier

Dip

NEVER  
RIDE  
THE CURBS!



■ Your line on Bergwerk bend will determine your top speed on the long uphill Kesselchen stretch



**3** The left-hand bend before Bergwerk is one of the Ring's more famous corners: Ferrari driver Niki Lauda had his spectacular fire accident exactly here in 1976 – an accident which marked the end of Formula 1 history on the Nürburgring Nordschleife. Christened the Lauda Bend by fans, it requires true courage – especially in a powerful car. In fifth gear at over 200 km/h, you head straight for a huge promontory. The track surface is old and bumpy, the passage itself rather shaded and thus somewhat damp in the morning – so be sure to check conditions on your first lap! Turning in is not a problem since the track cambers heavily at the apex, providing the load-bearing outer wheels with excellent support. Problems often occur at the exit. With plenty of speed, you literally shoot out of the little dip at the apex and the track slopes heavily to the right of centre as you exit, so the car can become extremely unsettled with the wrong choice of line. As you exit, never ride out too far to the right but work some magic to get the car back under control again. Taking this section in a pack or a competitive race is particularly hair-raising. Speed differences on the approach to the Lauda bend can be quite significant, depending on engine size: no more than two cars fit through, but only if the drivers involved know exactly what they are doing and leave space for each other. Due to the high speed, the Lauda bend is very risky in the wet. Be particularly careful as you exit: high speed understeer is no fun here!

**4** The shady Bergwerk bend has a considerable influence on lap times, marking the beginning of an uphill high speed passage at least two kilometres in length. If you make an error on entry, give away space or fail to pick up sufficient impetus, you will lose a lot of time. This is why it is extremely difficult to take the bend cleanly in one and without applying tricks of driving dynamics. Braking on the approach in fifth gear, keep well to the left. The fact that the turn-in point and further course of the track are difficult to judge tend to make drivers brake a little early here anyway. Since the bend tightens up somewhat at the exit, turn in late so as to open the radius for optimum acceleration as you come out. This is not an easy task, since this third-gear bend takes you blind around an enormous promontory, so you don't see the exit until very late. Your main concern at the Bergwerk bend should be optimum acceleration: thanks to positive camber, the driver can start accelerating again well before the apex. But be careful: if you accelerate too hard and too early, you will have to cope with nasty understeer and may have to release throttle again at the exit because of a lack of space. These are precisely the errors which will be punished with a considerable loss of time due to the long straights which follow. Be careful in the wet: this section has been re-asphalted but because it is almost always in the shade, it stays damp longer than anywhere else on the track. In the rain, be even more sensitive with the accelerator pedal or understeer will send you straight into the curb and the crash barrier.



# "Take the bend at speed"



Special tip from  
BMW works driver  
Jörg Müller

"In the left-  
hander at the  
end of the  
Kesselchen  
straight I  
always think I

am too slow. Here you  
have pick up as much  
speed as possible,  
otherwise you lose time"

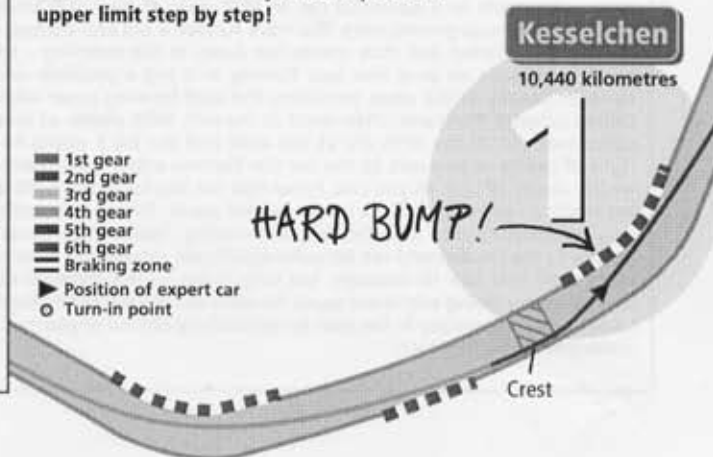
**2** Nordschleife veterans talk respectfully of the guts required to take the super fast left-hand bend at the end of the long Kesselchen uphill straight. Even the approach is quite tricky in powerful cars. At well over 200 km/h, you first have to take a gently curving right-left combination. The asphalt has recently been renewed, so the surface no longer slopes off to the sides as much. The bumps and terrible grip in rain are also a thing of the past. The real test of nerves is the left-hand bend itself: approach on the far right-hand side as the turn-in point comes late – at the end of the cobblestone rumble strip on the right. If your name doesn't happen to be Schumacher, you will enter too slowly: it takes many practice laps to find the right turn-in speed here. The car is carried a long way towards the cobblestone rumble strip on the exit, and there is some slightly adverse camber at the end of the curve, too. In most cars, the driver will brake gently into this fast left bend, in rare cases it will be necessary to change down too. If you position yourself correctly at high speed, you will fly out of this bend only millimetres from the cobblestones on the right hand side – but it is imperative to avoid going over the curb. The rain intensifies the dangers of this bend even further: since the track at entry is off-camber, rear-wheel drive vehicles struggle with sudden oversteer, whilst front-wheel drive cars can be subjected to a treacherous alternation between understeer and oversteer.



**1** The passage after Bergwerk bend looks simple on the map – but it isn't. You take the three wide left-hand bends in fourth gear, ideally with an almost constant steering position up to the so-called dip left. The more power you have under the bonnet, the faster you complete the section – and the more radical the passage changes from the driver's subjective point of view: it might be straightforward to blast through in a Golf, but in a Porsche it will be a test of nerves. The triple left after Bergwerk also has a few unpleasant surprises in store: the section is almost always in the shade and thus dries very late. There are several points to watch on the actual dip left itself: you enter at a considerable pace and you don't see the radius until very late because the fast left-hand bend is hidden behind a high crest. In most cars you will change into fifth before the crest and turn into just after it. The car hits an undulation right on the apex, but all other tectonic depressions have been almost entirely eliminated by a new coat of asphalt. Be careful in rain: there is still a danger of sliding!



■ Please work towards your own personal upper limit step by step!





TURN IN  
LATE!

## Steilstrecke

11,460 kilometres

BEND  
TIGHTENS!

## Klostertal

11,179 kilometres

BLIND  
OVER CREST!

Crest

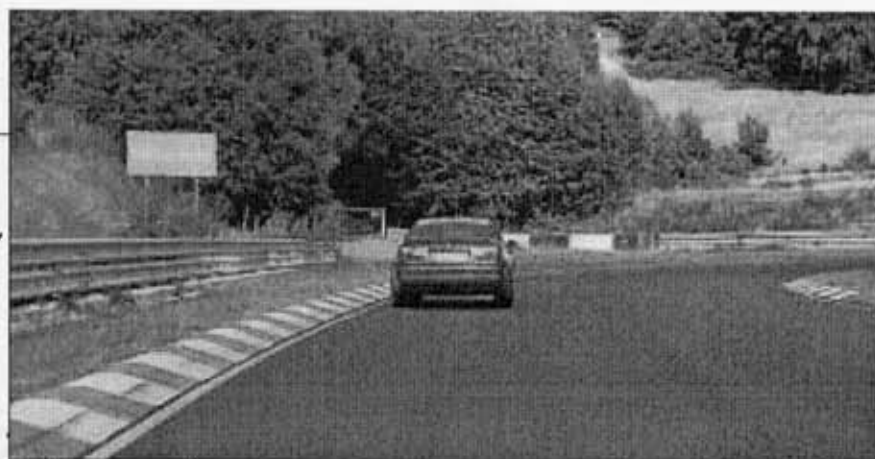
Cobblestone  
rumble strip

Cobblestone  
rumble strip

Cobblestone  
rumble strip

## Karussell

12,040 kilometres



**4** After working your way up Talkessel at more or less full throttle, you enter one of the slowest passages of the Nordschleife: the right hairpin before the legendary Steilstrecke is very narrow at its entrance, the radius of the bend changes from increasing to decreasing – and the fact that you don't see the exit as you turn in is virtually standard on the Nordschleife anyway. In the braking zone on this steep bend, there is also a slight left which is hidden – which is why you either have to correct the steering slightly while on the brake or take it slightly wider from the middle of the track, straighten up and then brake. Since the apex is very late, you turn in late and head for the exit of the U-shaped curb on the inside, from then you can then unwind steering lock and accelerate increasingly. It is better to approach the initial narrow part of the curve more slowly: too much entry speed causes powerful understeer! However, it is important to pick up plenty of speed as you exit for the uphill stretch to Karussell. But beware: if you accelerate too vigorously, you will understeer again – costing impetus and in particular time.



**5** The 180 degree steep Karussell bend is probably the most famous section on the Nordschleife: with at least 30 degrees of banking, the Karussell winds its way through a large spectator area. There are two problems for the driver here: firstly, it is difficult to find the perfect approach and entry, secondly the radius decreases so much in the final third that you are always in danger of being removed from this motor racing rollercoaster. On your approach, use the big larch as your guide: head straight for it and that will give you a perfect position. The choice of the correct braking point depends to a large extent on the driver and the car: many will brake as they come onto the concrete strip, but the reduced friction can mean that wheels block more easily! The second-gear bend does not allow high speed, though the banking does provide solid support for the outer wheels. Be careful on the exit: if you accelerate too much on the bend, you will be forced out in the final third. Be especially careful in the afternoon: a low sun blinds you on the approach.

**3** For many drivers, the Klostertal bend is amongst the greatest challenges on the Nordschleife, despite its peaceful-sounding name. If you head into the undergrowth at 200 km/h here, you will definitely get hurt – a number of tragic racing accidents over the years bear witness to this fact. For the ambitious hobby driver, the classic rule of three applies on the Nordschleife: 1. Familiarity with the track, 2. Ideal line, 3. Speed. This is the only way to get successfully – and safely – faster on the Klostertal bend. On the short section between the last left-hander and Klostertal, first change from the right to the left-hand side of the track. There are no shifts to be made, but initially at least there is some braking to be done: since the turn-in point for the Klostertal right is almost exactly on the ridge of a crest, it is a good idea to stabilise the vehicle slightly with a dab of the brakes. The reason is that many cars will tend to high speed understeer on turn-in because the weight on the front steering axle is reduced. Just a few metres later, the front wheels regain optimum load and traction – but now the bend is heavily off-cambered up to the apex. Depending on the design of the vehicle, this means that you can expect an extra dose of understeer or oversteer after the turn-in understeer. Anyone who is really fast here has probably not braked and has very neutral and hard suspension settings: the result will be a slight four-wheel drift exactly on the white line at the curve exit. The satisfaction of going fast here is enormous – but then so is the risk.



# "The key is organise your



Special tip from  
BMW works driver  
Jörg Müller

**"The left-right passage before the Hohe Acht is fairly demanding: the left-hander has plenty of grip but you lose time on the right-hander if your are incorrectly positioned on for the turn-in"**

**3** At the highest point of the circuit, you theoretically have a great view - though only in your rear mirror and only very briefly, since the bad visibility at the Hohe Acht requires the driver's full concentration. From the left-right combination there is 100-metre straight, then a short and hard brake manoeuvre is required - you will be in third gear here or will have to change down into third, depending on the car. The right-hand bend opens slightly, but tightens again at the very end due to the subsequent minimal left-hand curve. The track layout itself does not essentially pose any problems, and with constant steering lock and a good portion of load on the rear wheels you can take the Hohe Acht in one. Depending on the type of car and its construction principle, you will have to allow for either understeer or oversteer at the exit since there is some adverse camber in the last third. This minor detail can have dramatic consequences in the wet, however: if you apply too much throttle in a front-wheel or rear-wheel drive car here, you can expect a much larger portion of understeer or oversteer. In particular, Porsche drivers with rear engine should be patient: apply careful trail throttle through the bend, and remain cautious even when you think you're there. After all, the off-camber track is only the first stumbling stone, the second one comes in the subsequent left-hand curve: there is a ridge which takes the load off the powered rear axle considerably. Things are complicated by the fact that you will normally shift from third to fourth gear exactly at this point. The interplay of topography and driving dynamics - steering lock, load change, ridge - has plunged many a Porsche 911 driver into a duel with his car. In this kind of duel, it's usually the crash barrier that wins.



**1** Blind corners are treacherous: if you cannot see the course the track takes, you have to know it perfectly. Only then will the timing between turn-in speed and turn-in point be perfect. Also remember: the higher the pace, the more dangerous the whole undertaking. A good example is the fast uphill left after the Karussell. Here's the scenario: fourth gear, over 160 km/h. There is a slight right before the fast left-hand bend: if you come away from the right-hand side of the track too early you will come completely unstuck. To pick up as much speed as possible on the steep uphill stretch and open the radius at the same time, you have to stay right for a long time - almost to the end of the curb. In not-so-powerful cars you can take the left-hander at full tilt, with more power you will have to release throttle or even apply the brakes. Since the exit of the left-hand bend continues in an arc, over-confidence in the right foot is punished by a spell on the grass. Funnily enough, the driver only knows in the last tenth of the bend whether he has done everything right: only then does he see the white of the line and the green of the field. A point of caution: be sure to avoid load change on this bend!

**2** The entry 5 to the Hohe Acht is for precision artists: it is not easy to find the rhythm and the limit here. Because the ideal line of the second section is determined in the first section, the following points must be observed: the left-hand bend has a wider radius than the right-hand arc at the exit. There are also some very nasty curbs not dissimilar to ramps. The problem on the initial left is understeer: on the one hand you want to pick up plenty of impetus as you have a steep uphill climb. If the driver is too fast and thus too far right coming out, he is badly placed for the subsequent right - which climbs steeply. Any error here will cost dearly in terms of speed. The switch from left to right is also tricky: there really is no room for any kind of turn-in understeer here! So it is better to go a little slower into the initial left and take a little extra height into the subsequent right.



# space"

BUMP  
AT EXIT!

4

5

Wippermann

13,740 kilometres

NEVER RIDE  
THE CURBS!

2

Hohe Acht

13,388 kilometres

- 1st gear
- 2nd gear
- 3rd gear
- 4th gear
- 5th gear
- 6th gear
- Braking zone

- Position of expert car
- Turn-in point

1

MAKE A  
WIDE RIGHT  
CURVE!



**5** You only get safely through the blind crest right-hander at Eschbach if you temper your courage with prudence. The recommendation here is to observe the experts at work in the long-distance championships. You will see that there are many lines as there are drivers: nobody dares use the full track width right up onto the cobblestone strip. Drivers say it is not necessary, and that the bend can be taken quickly enough with slicks on the tighter line. They also say that you save yourself the switch from left to right, facilitating braking into the initial left before Brunnchen. Whatever the arguments, you should ideally hit the brakes hard on the short straight coming out of the Wippermann S so as to decelerate into the right-hand bend. Many people brake very late – some waiting for the rise into the right-hander. Others prefer to be back on the accelerator at this point. There are various theories on the choice of entry line here, here Generally, you should keep the turn-in point for later so as to have something in reserve at the exit. The bend leads you round a ridge which is quite impressive, you drive and drive and drive and there's still no sign of the exit. With road tyres, you will need the entire track width. Specialists won't be happy until the car is rumbling across the cobblestones at the exit! Here again: there are as many opinions as there are drivers. In the wet, the entry into the right-hand bend is no longer a problem thanks to the new asphalt layer.



**4** Right, left, right, varying speed, adverse camber, ten possible lines at the exit – there can be now doubt we are talking about the Wippermann S. If you have no power to speak of under the bonnet, the Wippermann S is the benchmark of driving technique on the Nordschleife. The section goes downhill, power is not the main concern, so courage and vehicle control are what count: you can pass a Porsche in something smaller and you'll be grinning from ear to ear. To get fast on the Wippermann S takes many hours of practice. You enter in fourth gear and dive into a dramatic off-camber right-hander, introduced by a short, hard stab on the brakes. The greater the wheel camber angle and the harder the suspension, the more fun it is. You are so fast at the exit that you can hardly stop the car before the next double left! To brake, straighten up briefly and then turn into what is initially a wider, and then a gradually decreasing, radius around the double left. You know you've got it right if you are very close to the curb on the left-hand side of the track as you shoot out. In terms of the choice of line, you should remember that it is important not to ride too far out on the left, otherwise the radius of the exit right is too tight. If you have sufficient height for the last right you save yourself having to clip the cobblestone strip at the right-hand side. Generally speaking, cars with tight suspension don't like the being tortured over the curb anyway but it is alright to try it occasionally with road cars. Taking the wheels over the red and white inside curb on the inside of the bend is recommended, since this dampens the impact of the bump at the apex. If you go into the last right too straight, the steering has to be corrected at the exit – resulting in understeer and a loss of speed.

■ In the Wippermann S-bend, not engine power but courage, choice of line and vehicle control are what counts



■ Please work towards your own personal upper limit step by step!





# "Early acceleration wins



Special tip from  
BMW works driver  
Jörg Müller

**"Turn into the Eiskurve relatively late and hard, straight up the car quickly, then accelerate early and hard, otherwise you will lose precious seconds on the steep uphill climb"**



**1** The Eschbach double left down to the famous spectator point at Brünchen is very attractive from a driver's point of view: you shoot into the braking zone at a good speed on the right-hand side of the track, and the rough, washerboard-like surface requires the driver's attention when braking. The incline tends to make deceleration rather awkward in front-wheel cars in particular. A late turn-in helps catch a perfect exit towards Brünchen. The double left is taken in a broad curve, keeping well away from the inside of the inside curb of the first section. The line should then tighten in the second section so that the driver lands as precisely and straight as possible on the far left-hand side near the inside curb and the cobblestones. This is the only way to position yourself ideally for braking and turning in at the first Brünchen bend. The new asphalt surface has significantly increased the grip on this off-camber turn, but many cars will still understeer annoyingly. Beware: load change should be avoided here so always guide the car on constant throttle around the small hill. Caution in the wet: the braking zone is horribly slippery!

**Brünchen**

14,179 kilometres

2

**Eschbach**

14,015 kilometres

**BREAK HARD  
AT THE  
"ESCHBACH"  
SIGN!**

**2** The first Brünchen bend is not easy – starting with the fact that many are distracted by the many spectators positioned there. You will generally take this right-hand bend in fourth gear and fail to see the braking and turn-in point at the last moment: the left-hand corner before it goes around a promontory and also heads steeply downhill. There is also heavy off-camber from the turn-in point to past the apex, with a radius which is slightly tighter than the previous bends, so errors are common. Be careful when turning in just after the cobblestone rumble strip on the left-hand side: be sure to get back on the throttle since load changes are not uncritical here due to the tilting track. From the turn-point, front-wheel drive cars understeer irritatingly and detour into the dirt at the bend exit will be met with much ooh-ing and aah-ing from the friendly spectators. Lap times are not particularly helped by such stunts either.

**3** On the second Brünchen bend, the track goes up steeply like a ramp and should be taken with plenty of impetus and not much power – which is difficult because you can't see the exit and you tend to misjudge the entry speed. Generally, the driver brakes hard coming into this third-gear right-hander so as to be prepared for a slightly tightening exit. Understeer is just what you don't want, though cars do just this from the apex because the load on the front wheels is lost on the crest. The driver needs to be sensitive to find optimum traction when accelerating out – you literally wait for the right moment to apply your right foot. If you handle things correctly here, you will be on the cobblestone rumble strip or on the flat curbs at the exit – not a problem as long as it is not raining! In the wet, try to vary the line by keeping left of the ideal line, there is a lot more grip there!

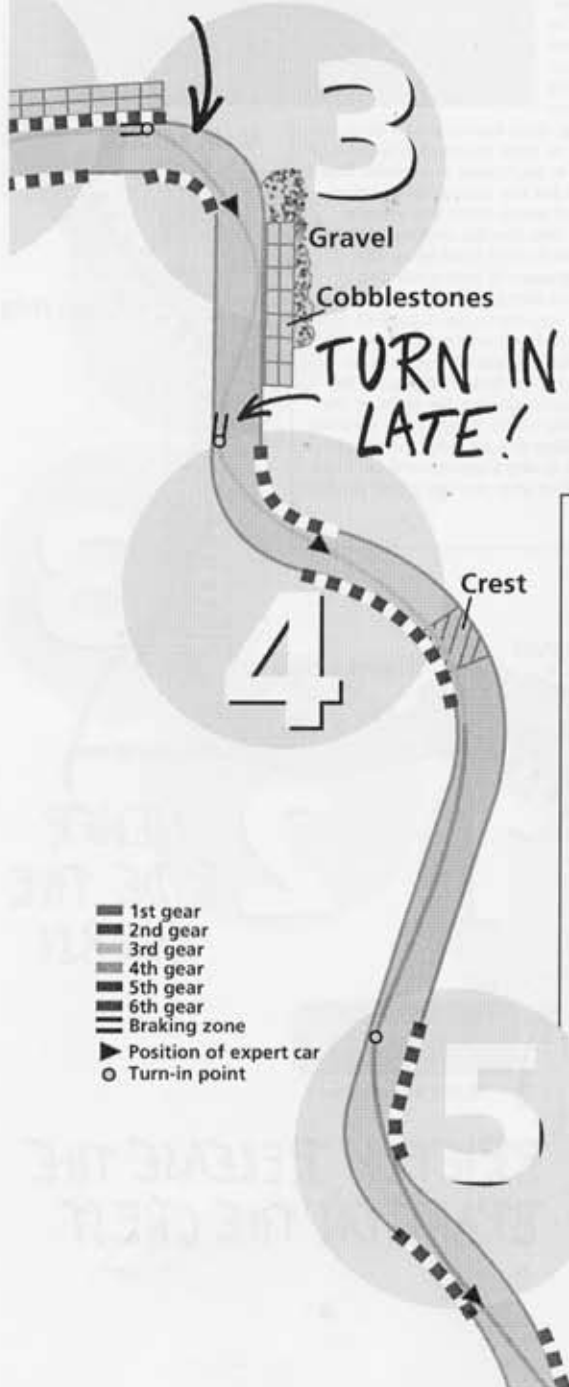


# time"

BE VERY CAREFUL  
IN THE WET!



**4** The passage around the so-called Eiskurve is an oddity from the history of race-track construction. It has an awe-inspiring layout: off-camber track, ramp-like incline and a crest at the exit which makes you feel you are speeding straight into the sky. Coming into the Eiskurve from Brunnchen, change from the left to the right of the track and brake hard and short into the third-gear bend. Be careful in the afternoon as the glare from a low sun is horrendous! It is a good idea to turn in late and hard, unwind the steering early and gradually accelerate since the uphill climb is steep. On the left-hand bend, get away from the inside curb early near the apex and head directly for the apex of the following right-hand bend. This second part of the left-right combination is not a real bend but more a right-hand border to the left-hand bend. However, don't underestimate the exit: if you throw yourself into Eiskurve too quickly, you will be punished by understeer and land on the not exactly flat curbs of the subsequent right. The name Eiskurve (= 'ice bend') refers more to the fact that the moisture there freezes over more quickly than elsewhere, but the principle can easily be applied to the characteristics of the bend in rain, too: the entry really is as slippery as ice, heavy understeer can cause the car to take a hard ride across the curbs at the exit. In rain, remember to reduce the turn-in speed and accelerate sensitively!



Tricky: the left-hand bend before Pflanzgarten is bordered by a curb



**5** Some people might be wondering why this light downhill left-hand bend before Pflanzgarten deserves special mention in our little Nordschleife guide. People shooting round the Ring in a 100-bhp car will not doubt that this bend can be taken at full tilt. Drivers of 200 bhp may still agree, but they will secretly be a little mystified at the boast. With 300 or 500 bhp, full speed is no longer a consideration. This cheeky curve becomes a real corner the more power you have and the higher your approach speed – and not a bad corner at that. Once the driver has put the car into 4th gear after the Eiskurve and thrown himself blind over the subsequent crest, the track heads just as fast downhill, pushing up the speedo considerably. You could be travelling at least 180 km/h when you come into this nameless left-hand bend, depending on power. At the moment you want to turn in, the track off-cambers slightly. This can cause sudden oversteer in rear-wheel drive cars, front-wheel drive vehicles tend to understeer in reaction to the topographical layout here. The bend doesn't really tighten, but the exit is bordered by a high curb which follows a slight right-hand arc. If you are not out to try some flight stunts before the Pflanzgarten crest, you are advised to keep well away from this curb. Things get very tight here in heavy traffic since only one car fits through this narrow passage. The latent tendency to understeer or oversteer at the entry to the left-hand curve is intensified when the track is wet: 100-bhp drivers will notice that full throttle has no effect at all here.

■ Please work towards your own personal upper limit step by step!



# "You have to brake in two



Special tip from  
BMW works driver  
Jörg Müller

"Many drivers approach the Pflanzgarten wrongly: you have to keep

to the far left on the crest. I brake in two stages: a light dab before the crest and a harder one after the jump over the ridge"

**1** The Nordschleife is famous for its big jumps, such as those in the Pflanzgarten area. The double right starts with a rough hop – right in the braking zone of course. But even the approach should be treated with care. You come rushing down the hill in fourth gear and a long dip in the initial right curve causes a catapult-like vertical movement just before the braking point – which can reduce the load quite dramatically. The braking is in two stages: an initial short and powerful stab just before the jump, then harder and a little longer after the landing. Beware: be sure to take the crest straight and avoid any hectic steering movements! In particular in vehicles fitted with ABS, take painstaking care not to hit the brakes on the crest when the weight has been transferred away from the wheels. Otherwise you will trundle right down into the dip without any braking power to speak of! On a dry track with road tyres, the main problem at Pflanzgarten is understeer: if you enter too fast, it is impossible to keep a tight line along the right-hand curb – but this line is very important if you are to get a perfect exit to the left-hand bend. There are two fixed points at Pflanzgarten: when turning into the bend, keep close to the curb of the first right bend, then move away from the inside edge so as to be able to work your way along the curbs on the far right at the exit. If you are well practised on this line, there is very little steering on this section. Important: always stabilise the car with the throttle! Be careful in rain: the entry in particular is very slippery, and very sudden oversteer is common due to a lack of grip and excessive turn-in speed!



Main service point

Cross ridge

**2** If you think the worst is over, you've got another thing coming: after Pflanzgarten, there is an enormous ridge embedded in a fast left-hand curve whose exit is completely hidden from the driver's view. If you hit this exit left too fast and don't notice your error until after the crest, craning your neck, you will induce a fatal load change with a lift at a speed of some 150 km/h. This is why the left-hander after Pflanzgarten is a good example of the old rule of the ideal driving line: when you have two successive bends, the ideal line of the second bend determines the ideal line of the first bend. In other words: in order to make a good job of the left going over the crest, you have to make compromises coming out of Pflanzgarten. The ideal turn-in point for this left-hand curve would theoretically be to the far right of the track – but even the best intentions won't get you out there. So try to get as far right as you can. Depending on car and grip, the driver will have to release the throttle briefly for the left-hand bend with road tyres. This minimum speed reduction should be taken care of before turning in so as to be back on the accelerator when you go over the crest to stabilise the car. Coming out of the left-hand curve, the professional will run well over to the right. If you overdo it, you will tend to land on the rough cobblestones – which is exactly what you should avoid, as some cars tend to react sensitively in their steering and suddenly displace. Be careful in rain: always apply the throttle round this left-hand bend.

Gravel

Slight ridge

Cobblestone

NEVER RIDE THE CURBS!

Crest

Pflanzgarten

15,355 kilometres

BRIEFLY RELEASE THE BRAKE ON THE CREST





# stages"

KEEP WELL AWAY FROM  
THE COBBLESTONES

Cobblestones



**5** It has already been indicated many times that in this small curve area of the Nordschleife, the character of your engine capacity is dramatically changed with added weight. This also applies to the section behind the large volatile hills in Pflanzgarten, but is especially important for your exit here: the driver is lucky when he passes the main post, and then he reaches a long drawn right bend. With 100 or 200 PS, one can breeze through it. With 300 or 400 PS, it suddenly becomes very risky, at least with street tyres. The reason for this: the long right curve veers you on the winding exit towards the right, thereby limiting the approach on the following cautious left curve. Yet, what is cautious of speeds clearly over 200 km/h? If there is any struggle in this area of the right exit, as there nearly always is – something that definitely has to do with this, is the lack of respect many drivers have of this passage. Meaning that the changes on the attempted speed has not only to do with the car, but also has something directly to do with the driver. If he passes the beginning of the main post with 160 km/h and increases his speed later to 180 km/h, he also raises the speed in the following stretch. It has been numerous recommended, and reiterated just as much, that the driver bear in mind the section from the large volatile hills until the aforementioned right bend. The one turning point for the right bend yields itself after the car passes the main post. There is not much moving room here, and many come in mediocre conditions, cornering sharp on the right bend and steering in. Be careful on the cobblestones at the exit: many cars stiffly hook themselves in and in the blink of an eye end up on the far right. In rain, deep puddles lurk at the exit – despite the setting up of new drains!



**3** The big jump after Pflanzgarten is legendary: it was here that Stefan Bellof destroyed his Group C Porsche, while Harald Grohs always went over the inner curb intentionally to give the photographers a big, spectacular jump. An urgent plea: avoid stunts like these because speeds are high and the exit zones very tight! The big jump also involves a slight left curve which doesn't exactly make things easier. Cars with tight suspension tend to bounce after landing, those with soft suspension will trundle far over to the right after the crest. The Pflanzgarten jump is a test for the chassis. Depending on gear ratio, you arrive here in fourth or fifth gear, turn in just after the marshal observation point on the right and pull the car with throttle over the mighty ridge. It often depends on the driver whether the car unsettles or not. For example, if you fly over the crest of the hill at full throttle you can be sure of unsettling after landing. So it is better to give three-quarters throttle and avoid difficult steering manoeuvres. Everything must be light and gentle, then the car will remain calm and stable. Unwind the steering a little on the crest so as to keep as straight as possible. On the steep downhill passage after the jump, pull the car over to the left of the track again so as to position yourself for the following super-fast right-left-right combination. A gentle, rounded driving style is required in the dry, but sensitivity is required in the wet here too.



**4** There is nothing more awe-inspiring on the Nordschleife than the nameless right-left combination after the big Pflanzgarten jump: doing almost 180 km/h you dive into a long, blind right-hand curve from out of the dip – and suddenly a curb suddenly extends into the middle of the track from the left. You shudder to think what might happen if you were to arrive here at the wrong angle. The description of the driving line does not reflect the drama of this passage in any way: you turn in gently in the dip, guide the car precisely round the inside curb up the hill, move away from the right-hand side of the track late, straighten up the car and literally fly over the asphalt notch which marks the transition from the right-hand to the left-hand curve – almost exactly at the level of the main service point. The section is very narrow, only one car fits through. It is ultra-fast, but precision work is required as there is no room for error. Heavy traffic here is precarious. When wet, the new asphalt covering slightly reduces the risk.

■ Please work towards your own personal upper limit step by step!



# "It's better to be a little slower"



Special tip from  
BMW works driver  
Jörg Müller

**"In the S combination before Schwalbenschwanz, it's better to take**

**the fast right curve a hint more slowly so as to get perfect positioning for the subsequent left – all in all this is by far the quickest way."**

**1** After the ultra-fast passage following Pflanzgarten, the driver can expect a highly technical section before moving into the grand finale on the Döttinger Höhe. The S-shaped combination before Schwalbenschwanz is not easy, particularly the right curve at entry: the first task is to locate the correct braking point as you shoot into the braking zone at well over 200 km/h – and what is more, it happens to be hidden behind a bumpy ridge. This ridge also curves gently to the left, so many amateur drivers end up here craning their necks and looking puzzled. The white marshal's point on the right-hand side of the track offers initial orientation: you should start braking just across from here – which will result in the car getting very jumpy due to the undulations in the track surface and therefore difficult to control. Still at a very high speed and in fourth gear, there is then a fast right curve, with a large bump near the inside curb once again causing the vehicle to unsettle. In theory, the driver should approach the subsequent left-hand bend from the far right-hand side – but in practice, it is rarely possible because the long drawn-out right-hander will tend to dump him in the middle of the track. In damp weather conditions, braking in cars equipped with ABS is particularly tricky.



**2** The ingredients of the left-hand bend before Schwalbenschwanz taste like well-spiced chili – extra hot: hard change of speed, blind bend over a crest and danger of glare from the sun setting. All this provides a pleasing challenge to the specialist and alarms the newcomer. The turn-in point for this third-gear passage is the key to success: since you usually approach the previous right-hander centrally and brake hard, the key question is "Where do I turn in?" The confusion is exacerbated by your position on the track – in a kind of no-man's-land. There is no standard formula for orientation here, but if you trundle through the bend a metre or so beyond the apex, at least you know that you have turned in too late again. The penalty is felt at the exit, which has a slightly decreasing radius. If the driver is too fast, he has to release throttle at the exit and either loses a lot of speed or slams up on the curb – or else the car ends up on the little gravel area as a result of load change.

**3** Although the banking at Schwalbenschwanz is much less marked compared to that at Karussell, caution is nonetheless required: the left-hand bend over concrete slabs has got many an expert into trouble. The two problem zones are the entry and exit: as you brake on the approach, you tend to be too late on the brake, the car drifts slightly on the slightly sloping track and a multitude of tiny undulations make braking difficult. At the end of the curb you move away from the right-hand side of the track and allow the car to follow the positive camber, only using the slanting lower concrete lane. At the exit, many try to show off and move away from the dip too early only to leap in huge hops over the concrete ridge towards the outside. This is not a good idea: whether front-wheel or rear-wheel drive, the drive shafts will not handle this kind of treatment for long. So it is better to follow the obvious lane and exit the concrete slabs centrally – this is kinder both on the hardware and your nerves.

5

Döttinger Höhe

17,250 kilometre

4

Galgenkopf

16,887 kilometres

Dra



- 1st gear
- 2nd gear
- 3rd gear
- 4th gear
- 5th gear
- 6th gear
- Braking zone
- Position of expert car
- Turn-in point



**4** The name says it all: at Galgenkopf (= 'Gallows Head') cars frequently get executed - though people thankfully don't any more, as in the Middle Ages. The following tips will help you go easy on your vehicle: approach this blind right-hand bend well over to the left of the track, brake short and hard, then turn in gently at the end of the left-hand curb - usually in fourth gear, occasionally even in third. Be careful as you turn in: there is a recess which lightens the car somewhat, an effect which is repeated just after the apex when the car goes over a crest. It is an elementary rule that no space should be wasted on the inside of the bend: so approach the apex close to the curb then ride immediately towards the exit. You will see if you have done it right at the last minute when the white track border marking appears in your field of vision. At Galgenkopf you need practice and a good sense of speed: if you are too fast coming in, you will be mowing the lawn at the exit and a monumental spin will take you onto the steep right-hand verge. If you enter the bend too carefully, you will lose a lot of speed since this right-hander goes up quite a slope. In the wet, the lack of grip is alarming: both the entry and the exit of the Galgenkopf bend are treacherous! Be sure to reduce turn-in speed, avoid hard load changes and if necessary take the car down a gear for this passage.

MAKE FULL USE OF  
THE TRACK WIDTH  
AT THE EXIT

TURN IN AT THE  
END OF THE CURBS!

Concrete slabs

Crest

Schwalbenschwanz

16,635 kilometres

■ Please work towards your own personal upper limit step by step!

Cobblestone rumble strip

CAREFUL: EXTREME  
RISK OF DAZZLE  
IN THE AFTERNOON



**5** If a long straight follows on from a bend, you should pick up as much speed as possible - or so the theory goes. But the gods of racing put sweat before success: the last right-hand curve before the long Döttinger Höhe is a real beast. After coming through Galgenkopf, the driver speeds towards the next marshal's point bearing the number 186, turns in when almost precisely level with this sign - and holds his breath until the exit. He will only find out at the last moment whether or not he has done everything right. What is more, bumps will shake his faith in his own driving skill now and again, and the track has considerable adverse camber on the turn-in. If you misjudge here, you will produce stunt-like spins rather than top speed. On the subject of turn-in: in a powerful car, you have to release throttle quite a way beforehand, but be sure to be sensitive otherwise you will unsettle the car unnecessarily in the turn-in phase. However much you practise, you will always have the feeling at the exit that you could have taken the bend a little faster. In the rain, a steady hand is required: turn-in oversteer at excessive speed is particularly unpleasant!





# "It's better to stay below the ideal line"



Special tip from  
BMW works driver  
Jörg Müller

"When I approach the Antoniusbuche, I never take the right-hand side

because the car always jumps too much over the bumps. In most cases you can easily take the fast left-hander from the centre of the track or even from the far left without losing speed"

**1** For all those who really have some power under the bonnet, the left-hand bend at Antoniusbuche is a veritable nightmare: the approach speed is so horrendously high, depending on your car, that you can hardly draw on experience. If you have ever come flying into this blind left-hand corner under a prominent bridge in a 600 bhp Porsche with road tyres and travelling at about 300 km/h, you know that at jumbo start speeds braking is obligatory! What is more, rough bumps to the right of the track centre on the ideal line unsettle the chassis considerably, making it extremely difficult to find the exact release point located in the area of the rescue access road on the right-hand side of the track. The turn-in phase is the critical point here, the rest almost takes care of itself with a constant steering angle and a calm hand. In heavy traffic, the drastic narrowing of the track as you approach the dip can be worrying: what's going on beyond the bridge? Four small cars in a slipstream duel? Two of which are just about to swerve out? With less power, the whole thing is much more relaxed, you can even shift the turn-in point to the left-hand side of the track and you still have enough space. This passage is truly dramatic in a powerful car and heavy rain: you start hesitantly, increase speed, get confident – then suddenly you feel the front axle losing load minimally over the crest and the car begins to understeer. The Nordschleife raises a warning finger once again!



Hohenrain

20,235 kilometres

3

**2** The second big dip on the Nordschleife is no less of a challenge than its famous brother Fuchsröhre: you shoot into the deep dip at well over 200 km/h after Antoniusbuche, at the same time the track width narrows drastically. Only one car can possibly fit through this fast left-right-left behind the dip. As you approach the dip, keep well over to the right. Finding the braking point for the fast uphill left is tricky: with less power under the bonnet, the driver doesn't brake until after the dip, just going into the climb; in a powerful car he will have to brake more heavily in the dip.

The left-hand bend, still taken in top gear, has an interesting element of surprise: just at the apex there lurks an extended dip which you literally fly over at the limit – a real test for both driver and chassis. The subsequent bend up to the Hohenrain chicane offers a phenomenon which is actually rare for the Nordschleife: you can take it faster than you think – the surface is even and provides excellent grip. The Tiergarten passage rewards an unruffled driving style: if you avoid superfluous steering movements and hectic changes in throttle and load, you will keep the car stable – keeping your line through the left-right-combination as straight as possible will also help here. Be careful in heavy rain: between the two Tiergarten bends, large rivulets flow from right to left across the entire width of the track!

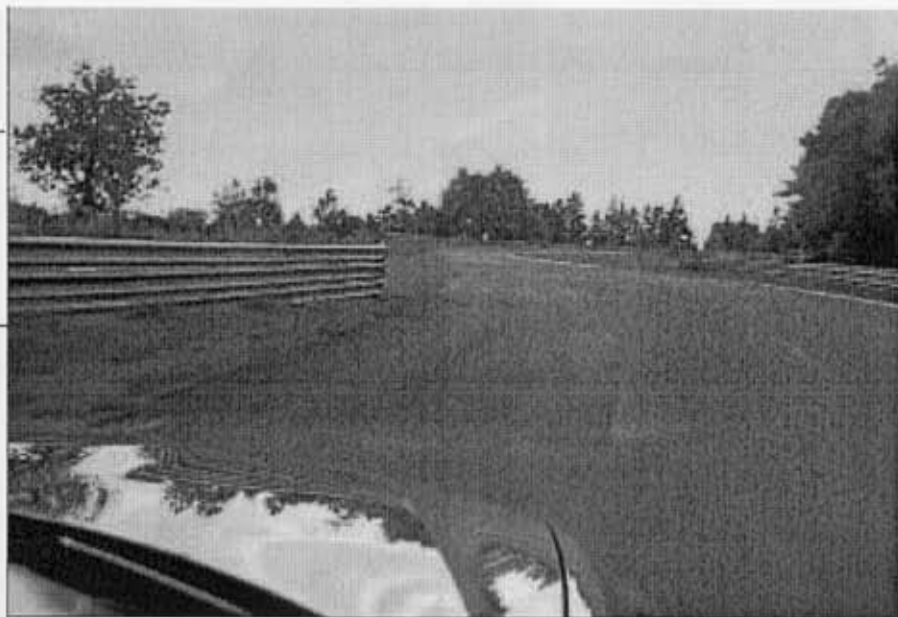
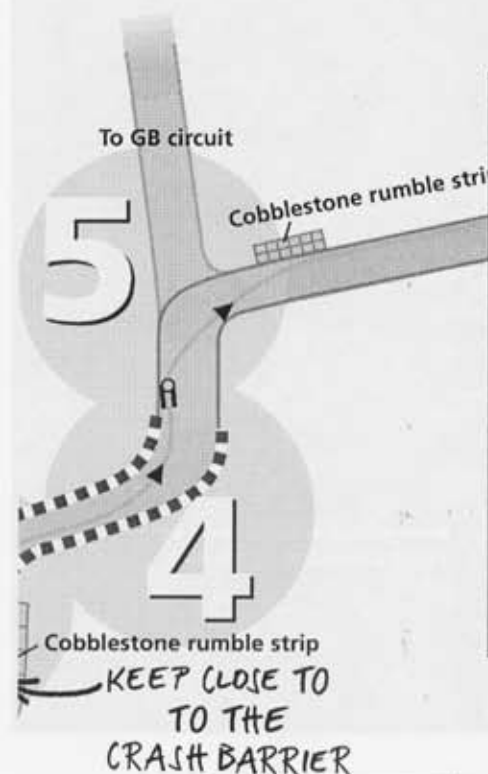


Tiergarten

19,788 kilometres

BEWARE:  
DEEP  
UNDULATION

Bridge



**3** The approach to the Hohenrain chicane starts with a little short-cut: since a service road leads up to the race track on the left, you aim exactly for the crash barrier which separates the service road from the actual track. "Aim for" here means that there should be virtually no more than a hair's breadth between your outside mirror and the crash barrier. Since the surface in the braking zone has many small undulations, particularly towards the end, drivers of ABS-equipped cars should exercise caution. The ABS regulation will often set in just before turning in, unsettling the car's response and extending the braking distance unexpectedly. Here you brake in a straight line between the crash barrier as your aim point and the entry to the third-gear right-hand bend towards the left of the track, turning in late so as to gain height for the subsequent left-hander. It is a matter of taste as to whether or not you clip the curb with your right-hand wheels: the red-and-white curb markings are low enough to allow this. It is much more important not to approach the subsequent left too sharply: at this point, you are at the beginning of a succession of three relatively tight bends and you should thus try to position yourself ideally for each subsequent bend.

■ Please work towards your own personal upper limit step by step!

- 1st gear
- 2nd gear
- 3rd gear
- 4th gear
- 5th gear
- 6th gear
- Braking zone
- Position of expert car
- Turn-in point

**4** The left-hand bend at the exit of the Hohenrain chicane is important in two ways. If you are doing the Nordschleife including the Grand Prix track, the third-gear left-hand bend takes you back out on to the start/finish straight. Since there is a slight uphill climb here, be sure to pick up plenty of impetus here and keep the steering as open as possible so as to make use of the entire track width and accelerate quickly and early. If you are keeping to the old Nordschleife, you must change quickly to the left of the track coming out of the left-hand bend so as to gain extra space for the tight right-hander taking you back to the start/finish straight of the old Ring. So the tactical approach for the last three bends is to approach the left-hand bend not too sharply but in a wide arc from the right of the track, not running out to the right as usual at the exit but calculating your radius so that the turn-in point for the next bend is well over to the left. Be careful as you take this bend: you come round the left-hand bend fast under load, tighten the radius so as to get over to the left again and then release the throttle abruptly so as brake into the next bend. This heavy load change can unsettle the car considerably.



**5** What is conventionally referred to as the last bend of the Nordschleife is narrow and slow – fairly uninteresting compared to many of the fast and furious corners the Ring otherwise has to offer. But be careful: the list of the luckless who have landed in the old pit walls to the derision of others is suspiciously long. You see the exit of the right-hand bend fairly late through the high crash barrier on the inside of the bend – this makes it difficult to set the turn-in point and judge the correct speed. Since the bend tightens slightly and turn-in understeer gives most drivers a false sense of security, the surprise comes at the exit. The situation can usually be saved by slightly opening the steering and then unavoidably running over the cobblestones on the outside edge of the track – at least as long as conditions are dry. In the wet and with sporty use of the accelerator in a rear-wheel drive car, you turn suddenly towards the pit wall. Even front-wheel drive cars respond to load change from throttle release with abrupt understeering. Therefore to be on the safe side, the classic rule for amateurs applies: enter slowly, exit fast.

**Antoniusbuche**

19,456 kilometres

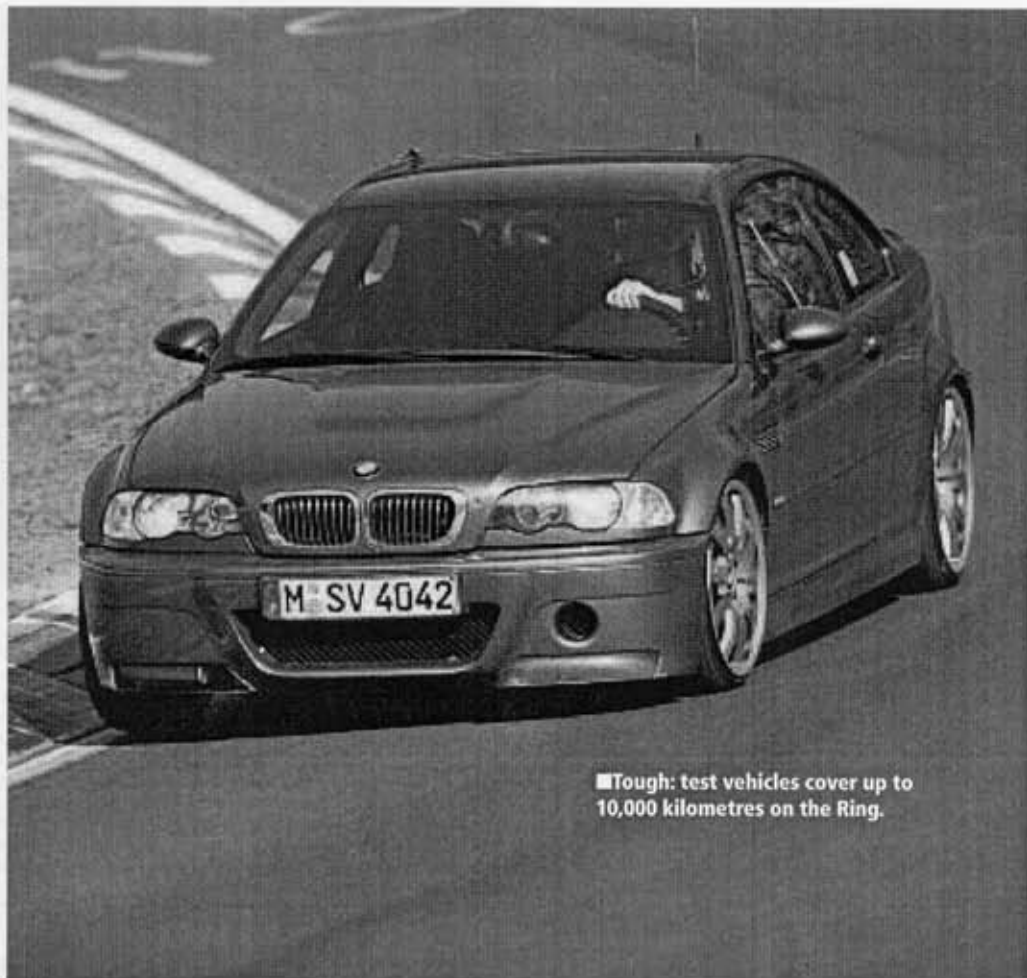




■ Günther Warthofer co-ordinates testing work in Nürburg.



■ Test driver Michael Martini starts the data recording system



■ Tough: test vehicles cover up to 10,000 kilometres on the Ring.



# Test side story

All prototypes are given the final touches at the BMW M Test Centre – at the Nordschleife

It could be mistaken for extreme arrogance: a 7 Series BMW with full trim shoots at racing speed over the little jump at Pflanzgarten, all four wheels lift off the ground and the car disappears at full tilt and with screeching tyres towards the double right. Is this a business manager letting off steam? If so, wouldn't he have been better to do so in an M3 CSL?

The head of the BMW M Test Centre at the Nürburgring, Günther Warthofer, is eager to explain: "Most people regard the Nordschleife as a race track, but the manufacturers use the unique layout of the track here as a test circuit. Lap times are rarely of interest. What we do here is put the components through their paces."

Since the circuit simulates the aging process of cars in fast motion, the engineers speak of the fast-motion factor of the Nordschleife: "Wear and tear of vehicle components is very much higher on the Nordschleife than in normal road traffic. This enables us to gather a large amount of data and information within a short time," says Warthofer. "The variations of the track could have been designed especially with the industry's needs in mind: high suspension rebound rates, hard braking manoeuvres, top speed, uphill and downhill stretches, angled position at Karussell. It has everything."

In order to plan and implement tests, BMW runs its own Test Centre in Nürburg:

"Our job is to test serial production cars and prototypes of the M GmbH on the Nordschleife. Every car – from Mini to Rolls Royce – has to complete a set distance on the Nürburgring," explains Warthofer.

The Test Centre co-ordinates the schedule based on the availability of the circuit for the so-called industry pool. This pool is an association of all the major automobile and tyre manufacturers who run their tests here together from early April until the end of October.

In order to allow vehicle maintenance to be carried out, the Test Centre has a spacious workshop and several offices.





■ **Quality assurance:** in the Test Centre workshop, all components are subjected to a careful check.

Three questions to Adolf P. Prommesberger, Managing Director of M GmbH

## "The Nürburgring is a must"



■ **Adolf P. Prommesberger**

**?: What is the role of the Test Centre at the Nürburgring in testing vehicles of the BMW M GmbH?**

**Prommesberger:** The Test Centre has a very important role to play because it provides us with a link between our development operations in Munich and the Nordschleife. Our engineers and test drivers can work professionally on the prototypes and standard models here – they have a 'home' close to the test circuit.

**?: Are good lap times on the Nordschleife one of the M GmbH's official development objectives?**

**Prommesberger:** Good lap times on the famous Nordschleife are important to us because to

get a good lap time requires an appropriately designed and very sporty car. The Nürburgring provides all the factors relevant to regular road traffic but in fast-motion – stress levels might be anything from 8 to 30 times higher than on normal roads, depending on the particular component. Every BMW has to pass this test!

**?: With the M3 CSL, M GmbH presents a purebred sports car. How important was the Nordschleife testing in this case?**

**Prommesberger:** For our sportiest M3 model, the Nordschleife testing was absolutely crucial: this car was virtually 'born' here – like all M vehicles. In order to reliably test all road situations, especially longitudinal and transverse dynamics, the Nürburgring is a must for BMW M models – especially the M3 CSL. Anyone who has ever driven this fascinating sports car will know what we mean.

"At peak times we have up to 40 engineers working on anything up to 10 vehicles at a time. The planned extension is now urgently needed because the engineers have to communicate via laptop with their colleagues in Munich – so we need additional office capacity," says Warthofer.

The everyday routine of the test drivers has little to do with the admiration of outsiders: from eight o'clock in the morning until six in the evening, they rattle off the test program in several vehicles – sometimes covering more than 500 kilometres a day. "Drivers are changed at every fuelling stop, and the condition of the tyres and brake system has to be checked."

The day is far from over at 6 pm: this is when the cars are taken for an all-round check on the ramp in the Test Centre. "Mechanics and engineers trace sources of error and document the condition and wear-and-tear of compo-

nents in so-called 'lifecycle files'. These show in detail when the component was installed, how many kilometres it has covered on the road and on the race track," explains test manager Warthofer. This kind of testing can take up to four weeks, with cars covering distances of up to 10,000 kilometres.

Dry conditions are preferred for this work. Warthofer says: "Our test program allows for about 15% driven in the wet." And it would be very wrong to assume that only the suspension is tested on the Nordschleife. "Priority is given to all-round vehicle tests, individual component tests are rare. The strain on engine, trans-

mission, body, chassis and brakes is particularly tough," he says.

The job of test driver is carried out by engineers and professional testers such as Michael Martini, who used to drive the BMW Ring taxi. Before engineers drive they have to pass an internal BMW Nordschleife driving licence.

Computer systems are now used both in the test cars and in the Test Centre: a data recording system in the vehicle with over 40 sensors records all the relevant parameters such as temperatures, pressures and driving dynamics figures. Every car is also fitted with a transponder system which transmits the location and number of laps and kilometres to the Test Centre. It also sounds a warning signal if a change of driver is due.

This kind of high-tech was unknown in the early days of Nordschleife testing. As Warthofer says: "The old test drivers can still remember doing laps in the Isetta." In those days they had to buy a regular ticket, just like the tourists. *Marcus Schurig*

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