

Getting Better at Motorkhana

Having carefully studied my "Getting Started in Motorkhana" document and carried it out in full, you would have competed in an event or two now and decided that you don't want to come nearly last, here's a few things which will help you to get better and maybe pick up a few trophies.

Improving the Driver

To start with, you won't be doing handbrake turns. It takes some practice to complete a turn and then, in a couple of seconds, accelerate, steer the car to the next flag, apply some steering lock, in a manual rear drive car depress the clutch, pull the handbrake, control the slide and apply some power towards the next turn.

Instead, practice remembering where to go and taking lines which get you more quickly around the course. Where possible, take a wide entry to a flag and exit with a wide line too. This maximizes your mid corner speed. The test won't always allow you to do this but use the space which is available.

Driving forward, use first gear unless the engine spends a lot of time at peak revs. 2nd gear won't give good acceleration off turns. In addition, engine braking will help to slow you for the turns - see How to Handbrake Turn below. If it's an auto, make sure it is locked in Low (there may be a Hold button).

Once you move on to handbrake turns, don't overdo it. It looks neat to drive in straight lines linked by tight turns, but it's rarely the fastest way. An exception might be a car with good traction and power - like a special on racing tyres on bitumen - which you would drive straighter.

In a rear drive car, too much sideways motoring is a recipe for slow times and smashed flags. It's fun to hold the car in a rear end slide for a while, but while the tail of the car is going sideways, you aren't accelerating, just wearing out tyres. Look at how straight World Rally Champion Sebastian Loeb comes off the turns in his World Rally Car.

As in any sport, get plenty of practice or compete often. Try to learn from your mistakes. Watch the best drivers to see what they do differently and ask them for advice.

Keeping fit isn't very important as motorkhana is not physically arduous, but it might give you an edge. Avoid sedatives (including large doses of alcohol!) for a day before an event - they will ruin your timing and judgement.

Improving the Car

I'll assume you are driving a more or less standard road car. You didn't need to modify it to motorkhana but there are a few little things you can do to it to make life easier.

- Fold in the external mirrors so they won't knock flags
- If there are reversing tests and the seats' headrests come off easily, remove them
- Make sure the handbrake works. It must easily lock the rear wheels on bitumen at about 30 kmh (check when no-one is driving behind you!). If it won't lock both, read the later section - Fixing the Handbrake
- Disable the handbrake ratchet by taping the button in or inserting a pin in the mechanism and securing it
- Get some old wheels and tyres to use in bitumen motorkhanas so you don't wear out your good tyres. Replace the driven wheels or all four.
- Try different tyre pressures. If your car, like most, has tubeless tyres, I can't recommend less than 30 psi on any surface. If you have tubes, slightly lower pressures will usually be better on dirt or grass - say 22 - 28 psi, and much lower on mud - say 10 - 15 psi. On bitumen or concrete, try a bit more than road pressures - say 35 psi, though a bit less in the driven tyres may give better traction off the turns.
What's best on any given surface depends on the car, wheels and tyres, whether tubes are fitted, and how you like the car to handle

- Don't carry unnecessary weight. Arrive at the event with about 10 litres of fuel in the tank. Take out the spare tyre and jack, any tools, etc. - it all slows you down. The exception is a rear drive car on a slippery surface like mud or wet grass where more weight at the rear will help traction.

As you get keener, there are a few other things which might help. But note well, in the early stages, you can save much more time by improving the driver than by modifying the car:

- Improve the engine performance but not too much. You need smooth instant response from low revs to accelerate out of turns and after changes from 1st to reverse and vice versa. A few more bhp or kW at high revs won't deliver much, if any, improvement in your times.
- Buy some decent tyres for dirt and grass. They'll be safer on the road too. Most events won't allow you to use winter treads, rally tyres or hand grooved tyres. There are plenty of arguments about whether to use wide or narrow tyres. I usually fall into the wide-is-better group, but don't make the steering too heavy - you will need to be able to steer fast when you get it wrong!
- Stiffer suspension - better shocks, stiffer springs, stiffer sway bars, etc. - will help if done moderately, but don't go too far. A very stiff car will be twitchy and have poor traction on uneven surfaces. Lowered suspension will help on bitumen but may not work well on dirt if there isn't enough bump travel left.
- Fit a limited slip differential (LSD). In a front drive car, this will have to be set to a low torque or the car will be nasty to drive. In a RWD car, a welded diff (planet gears welded to the carrier) is a cheap way to get the right effect, but causes tyre scrubbing on the road, so a limited slip diff or a locking diff is preferable.
- Buy a better car.
 - It's hard to motorkhana most All Wheel Drive cars (such as WRX, EVO, etc.) well, especially on bitumen. You may have to be brutal to get the tail sliding the way you want it. But there's no harm in trying it out, to see if you can make it work.
 - Some modern cars will fight you if you attempt a handbrake turn or front throw. Traction control, stability control, ABS, etc. can get confused and make the car do funny things. Some people have been known to pull a few fuses to disable these features but the car's computer might respond by shutting down or severely slowing the car. Try one of these before you buy.
 - Front wheel drive (FWD) is generally more successful than rear (RWD) but the addition of a Limited Slip Diff (LSD) or a locked or locking diff will even things up a lot.
 - Small is better. If the classes are based on wheelbase, choose a car with short overhangs and not too high or wide. A Ferrari Enzo at 2 metres wide is a handful on a tight slalom.
 - You want a torquey, responsive engine which will do at least 50 kmh in 1st or reverse. If it does over 70 in 1st or reverse, it may be too sluggish out of slow turns. A "cammy" engine with weak low speed response makes motorkhana much more difficult.
 - It should be easy to change from 1st to reverse and back.
 - If it's an auto, beware of tall gearing and a loose torque convertor which allows the engine to drop to idle when you back off and then takes a while to develop useful drive when you get back on the power. Some autos don't do this.
 - Some electronic throttles are sluggish and slow to respond to a prod on the accelerator pedal. Once again, try before you buy.
 - In my opinion, the fastest road car available and legal is a 1400 cc Mini Moke with half roll cage, no hood, alloy wheels, light bumpers (not the Californian type bullbars), a hydraulic handbrake and the right gearing. But I may be wrong |:<

How to Handbrake Turn

In a front drive car:

- approach a flag in first gear, about a car's width to the side of it if there is space
- slow to the right speed - you will find this from practice but it's probably about 20 – 30 km/h
- staying off the accelerator, turn towards the flag as if to drive past it with a small clearance
- pull the handbrake on just before you reach the flag
- the rear of the car should slide
- straighten the front wheels to point where you want to go and accelerate, even if the back is still sliding

- if the rear slide is excessive, apply opposite lock i.e. steer away from the flag you are rounding.
- note I haven't mentioned the clutch - you don't want to touch it except to stop or change gear

In a rear drive car:

- approach a flag in first gear, almost a car's width to the side of it if there is space
- slow to the right speed - you will find this from practice but it's probably about 20 – 30 km/h
- staying off the accelerator, turn towards the flag as if to drive past it with a small clearance
- depress the clutch pedal and pull the handbrake on just before you reach the flag
- the rear of the car should start to slide
- increase engine revs and raise the clutch pedal
- the back of the car should continue sliding under power
- point the front wheels where you want to go and accelerate, trying to minimize wheel spin
- if the rear slide is excessive, apply opposite lock i.e. steer away from the flag you are rounding. You might need to do this very soon after raising the clutch pedal, especially if you have a limited slip or locked differential

Fixing the Handbrake

If the rear brakes are discs:

- replace or repair any worn parts including rotors, pads, levers, etc.
- deglaze the rotors and pads being careful not to re-profile the pads
- adjust the cables, making them even so both wheels lock
- lubricate any levers or pivots (but not the rotors or pads!)
- new pads work better than old ones, once bedded in
- a few brake specialists can supply softer, grippier pad material - but it wears faster
- if it still won't work well, consider fitting a hydraulic handbrake from a rally shop or making one yourself using a remote reservoir type master cylinder. This also allows you to put the lever in a more convenient position near the steering wheel. In a registered road car, keep the standard one as well to satisfy the parking brake legal requirements

If the rear brakes are drums:

- replace or repair any worn parts including drums, pads, levers, backing plates, etc.
- deglaze the drums and linings being careful not to re-profile the linings
- adjust the cables, making them even so both wheels lock
- lubricate any levers or pivots (but not the drums or linings!)
- new linings work better than old ones, once bedded in
- a few brake specialists can supply softer, grippier lining material - but it wears faster
- a common mod on Minis is to lengthen the levers which project through the backing plates
- if it still won't work well, consider fitting a hydraulic handbrake from a rally shop or making one yourself using a remote reservoir type master cylinder. This also allows you to put the lever in a more convenient position near the steering wheel. In a registered road car, keep the standard one as well to satisfy the parking brake legal requirements

Generally speaking, a mechanical handbrake will work better with the hand lever as low as possible with no slack in the cables, as you will be able to pull harder with a straighter arm. But some work better with some slack in the cables.

How to do a Rear Throw

A rear throw such as the first turn on the Hopkirk and Paddy tests is a handbrake turn combined with a gearchange from first to reverse. For those tests, I aim straight at a spot about 4 or 5 metres to the left of the centre of the space I want to reverse into. Different cars and surfaces will require a different aim point.

I accelerate straight and hard for about 10 metres and then do a handbrake turn to the right. Once the rear is sliding around, I change into reverse gear and try to reverse before the rear finishes sliding. Done right, this will leave me accelerating into the field garage in reverse without the car having stopped.

The above generally applies to all FWD cars. I'm no expert on RWD cars in motorkhanas, but the principles are very similar.

How to do a Front Throw

A front throw such as the final turn on the Hopkirk and Paddy tests is the opposite of a rear throw. In a FWD car, it involves reversing at about 30 km/h, making the front of the car slide around the rear, making a gearchange from reverse to first and continuing in first gear.. For those tests, I aim straight at a spot about 3 or 4 metres to the right of the centre of the space I want to drive forward into. Different cars and surfaces will require a different aim point.

I accelerate hard for over 10 metres and swing the steering wheel to the right. I accelerate in reverse during the start of the turn and give the front brakes a jab to help the front to break loose (but many good drivers don't touch the brakes). Once the front is sliding around, I change into first gear and try to drive forward before the front finishes sliding. Done right, this will leave me accelerating into the finish garage in first without the car having stopped.

The above generally applies to all FWD cars. I'm no expert on RWD cars in motorkhanas, but the principles are similar, but don't accelerate in reverse during the start of the turn. RWD specials will use the "fiddle brake" to help start the front slide.