



## Supplementary guidance – Electric vehicles

The prime IAM objectives of safe, progressive, legal, smooth, and economic driving must all be demonstrated by the Advanced EV Driver. However, there are some important differences when driving an EV, and it is essential are all readily achievable in this vehicle, although it is essential to understand the technology, and adapt your driving style to the unique aspects of the gearless direct drive electric motor, the associated regenerative braking effect, and the importance of energy recovery.

### **Pre-drive and POWDERY**

All our IAM principles can be applied directly with one exception, that is range planning. We should expect the associate to identify the available range and availability of a 'range extender' motor/generator if fitted.

Introduction to the vehicle. There some important features that should be identified *by the Associate*:

- Drive – 4WD, FWD, RWD ? (remember that regenerative braking only works on the driven wheels!)
- Regenerative braking:
  - Fixed or adjustable/selectable.
  - Note regen braking will be applied to the driven wheels only.

### **Cockpit drill**

The cockpit drill on start-up will be very like any other highly instrumented vehicle, with the instrument panel giving you an array of information, and warning lights that should be observed and checked for normal modes before setting off.

The start-up procedure is rather different from an internal combustion engine or hybrid vehicle because effectively you are just switching the machine on. However, there are various interlocks between the foot brake and transmission selection, and the function of the parking brake. The parking brake is electronic usually, and auto releases as you depress the accelerator to start moving (either forward or reverse). This effectively prevents rollback.

For a GAM/IAM observer, it would be very important to ensure that an IAM associate is fully conversant with the functionality of the controls, and can explain these effectively for the benefit of an observer or an examiner during an IAM Advanced Driving Test.

### **Driving the car**

The system of car control applies of course (IPSGA).

Whilst we want to our associate to demonstrate an ability to "make safe legal progress", we should expect them to drive economically. What's different in an EV?



We need our associates to adjust and learn/demonstrate some new rather different driving skills, consistent of course with IAM objectives.

- The moving friction brake test. This is especially important because it is possible to drive an EV without any significant use of the friction brakes. This means that the discs rust and become coated with road grime. Best practice includes brake cleaning en route to a run. This generally means driving power on and braking at the same time to clean the discs and check for straight pulling.
- Continuing with braking, the single aspect of an all-electric vehicle that is quite unique, and has to be mastered, is the braking effect due to electrical regeneration for slowing down. Regen braking occurs in many EVs (but not all) when you reduce the pressure on the accelerator. The best way to describe this is 'one pedal driving'.
- The foot brake provides frictional braking effect on all 4 wheels, through standard pads and discs, and is clearly intended only to be used to provide more aggressive braking or to hold the vehicle stationary on foot brake.
- During normal driving, progressive braking is achieved through reducing the pressure on the accelerator pedal. You can bring the vehicle to a complete halt or almost a halt, at a Junction for example, simply by progressively reducing the pressure on the accelerator. This is completely different from the approach you would adopt in a manual, automatic, or hybrid transmission car. In all those cases you would normally remove pressure from the throttle, and progressively adjust the pressure on the brake to slow down or stop for a hazard. It takes quite a while to develop this rather different skill of delivering all the speed control through one pedal.
- There are many situations in a conventional manual, automatic or hybrid car, where, on approaching a hazard, we simply 'come off the gas' to slow a little. In an EV with regen braking, you need to come off the accelerator sufficiently to slow just enough. Much more judgement is required.
- There are some safety systems that are a little different on an EV i3. The frictional brakes have a normal ABS system. This gives the normal kick-back felt through the brake pedal, and the vehicle being readily controllable. The regenerative braking system (on the on the front only, rear only or 4 wheels), is also provided with an anti-lock function, but you don't get the same feedback.
- Clearly an advanced driver would be expected to understand their car's accelerator functionality, and carefully control the deceleration before a bend and apply slightly leading accelerator opening (power ON) through the bend, and progressive acceleration once the hazard has been cleared.
- **Temporary STOP drill.** As for any vehicle, a safe drill should be adopted and described. Typically, it might be as follows: When stopped, and you wish to remove your foot from the friction brake, to prevent brake lights shining in the face of the driver behind, or to rest your foot the procedure is extremely simple because the parking brake is an auto-release type. Having come to a halt (mostly on regen braking), apply the foot brake, then apply the parking brake, and remove your foot from the foot brake leaving the vehicle in drive (D). With your foot off the accelerator, there is no drive against the brake. Moving off simply requires pressing the accelerator pedal progressively.