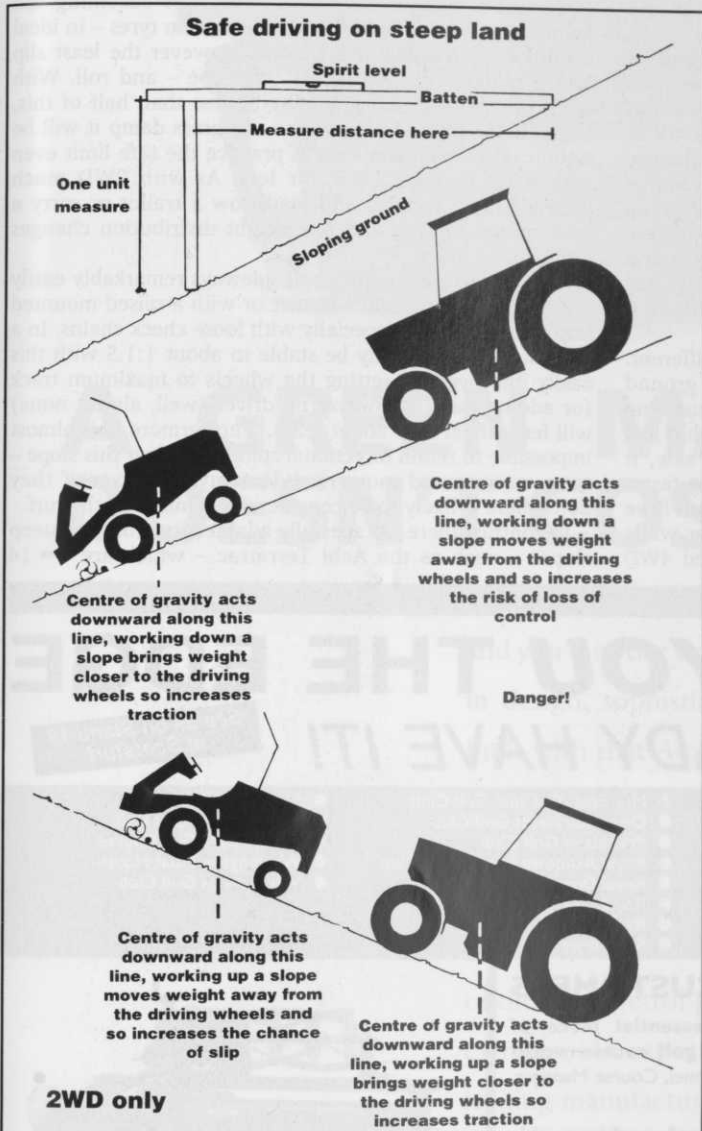


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7 → Banks running into ponds or bunkers may be more of a problem and deserve more respect – even if the only real danger is of having to walk home to the gibes of your mates! Nevertheless it is extremely dangerous to be complacent: tractors can run away or be rolled over remarkably easily given the wrong set of circumstances and similarly applies to other mowers and turf machinery.

Two wheel drive machines should be safe on slopes of up to 1:6 in all but exceptional circumstances, however in dry conditions a well balanced machine will operate on a slope of up to 1:2.5 – in any direction including cross-wise – although this may feel very uncomfortable. Speeds must always be reduced when operating on sloping ground, thus allowing the operator more reaction time and minimising the danger of speed related control loss occurring. Working on a → 12

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11 ➔ slope, especially across it, is safest with the wheels (front and rear) extended to the maximum. Greater safety comes from vehicles with all wheel braking, but only a few machines are so equipped, most having braking only on the drive axle. Be especially wary of transmission brakes. Some trailed gang mowers can be obtained with braking – such systems need to be hydraulically integrated with the tractor brakes rather than of the over-run type – and many modern tractors have a plug-in hydraulic brake coupling. Heavy (ballast) rollers are notorious for pushing a tractor and causing a jack-knife and roll-over.

Realisation of how gravity works on a vehicle (and its load) on a slope will help the greenkeeper to understand where and why the main dangers occur. Basically operating up and down slopes causes the centre of gravity to transfer the machine's weight alternatively from and away from the drive axle. When operating with mounted implements this is further varied according to the load being carried on the linkage – with spreaders and sprayers weight will gradually reduce as spreading progresses and this may reduce traction. Lifting mower units may also effect stability – for better or worse – according to the situation.

With four wheel drive the situation is radically different. Not only is there almost double the (controlled) ground contact area but operating either up or downhill causes no loss of weight from drive axles – thus no measurable loss of traction. As a result 4WD *should* be twice as safe, it isn't! When control is lost the consequence will be faster and more violent. Four wheel drive machines seldom have any more braking than 2WD so they are only safer while 4WD is engaged. Some tractors have badly located 4WD

engagement levers which can be accidentally knocked out, while some (worn) levers drop out of gear in set circumstances. In addition some early hydraulic engagement systems return to 2WD upon loss of pressure, however this is caused, be it due to stopping, stalling, low engine revs or very low oil pressure. True hydrostatic drive should give the best control as this keeps almost equal braking on all wheels, however hydrostatic drive is seldom the favoured system on hills because of its lesser efficiency – you need plenty of revs to move at all.

The other danger with 4WD is that of becoming too ambitious. Four wheel drive – with traction tyres – in ideal conditions will tackle a 1:1 slope. However the least slip and it is likely to turn across the slope – and roll. With worn or turf tyres the grip may be less than half of this, whilst if the ground is hard and the grass damp it will be significantly less again – so in practice the safe limit even with 4WD may be 1:2.5 or less. As with 2WD much depends upon weights and load: tow a trailer or carry a load on the linkage and the weight distribution changes radically.

Agricultural tractors will roll sideways remarkably easily if driven too fast round a corner or with a raised mounted implement or load, especially with loose check chains. In a tilt test the tractor may be stable to about 1:1.5 with this easily improved by setting the wheels to maximum track (or adding duals), however no driver (well, almost none) will feel safe at over about 1:2.5. Furthermore, it is almost impossible to retain directional stability at over this slope – most tractors and mowers slide away, and even if they don't there is likely to be considerable damage to the turf.

In contrast there are specially adapted 'tractors' for steep slopes – such as the Aebi Terratrak – which are ➔ 14

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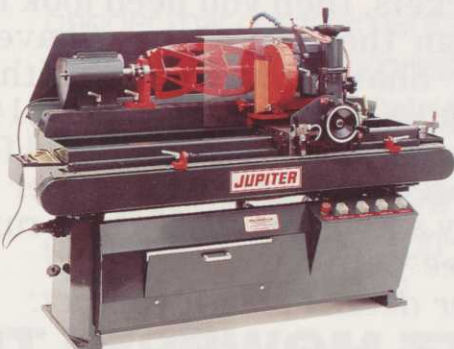
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12 → designed with particularly low centres of gravity and wide track width as well as a low driving position. Such specialist machines are too expensive for the limited areas of steep bank on most golf courses, however there are a number of contractors using them on motorway and reservoir banks and it may be cost effective to bring one of these in occasionally.

Less expensive are a number of pedestrian machines and while these may be less popular with staff they must be safer and more efficient than most other options. Some of the essential requirements for slope work are a low centre of gravity, good balance, independent wheel drive/brakes, wide set wheels and/or dual/cage wheels, slope adapted engine (so that oil keeps circulating) and a dead-man stop control. These requirements restrict the field but then only such machines are designed to operate at the more extreme angles in the region of 1:2 or more and to do the work by the hour without damage or danger. More restricting may be the choice of cutting units – very few machines offer a full range including cylinder, rotary and flail – the most usual ‘head’ being a reciprocating cutterbar. For slopes of up to 1:2.5 many conventional pedestrian mowers will often suffice, however the operator must be vigilant and the machine must not be so heavy that he has trouble controlling it.

For smaller areas of extreme slope

the use of hover mowers has been general, the advantages being the two-stroke design giving lighter weight and no lubrication or fuel supply problems, with many manufacturers now supplying extension handles. In practice greenkeepers tie a rope to the handle and use the machine in this potentially dangerous way. A safer option is to use a brush cutter, preferably of the knapsack type, with the appropriate grass head and skid or height support.

In the end, no matter how pleasing a course may be to view or play, it is vital that it can be maintained with complete safety – even if this means capital investment to set it up ‘right’.



■ The author, Hugh Tilley, is a journalist who specialises in amenity and turf machinery. He used to be a specialist instructor on “safe driving on steep land” with the Agricultural Training Board and maintains that most unplanned events – i.e. going out of control – should be totally predictable.

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