Turnkey Instruments Ltd



SkidMan
Accident Investigation Instrument

SkidMan is the most up to date and cost effective tool for accident investigation and reconstruction. It can be used single handedly, and test and investigation costs are reduced dramatically when compared to other techniques.

SkidMan is portable, easy to use and produces a hard copy of the test results on a built-in printer. Its memory can store up to fifty sets of results which can be downloaded to a computer for further analysis with the **SkidCALC** program. All results are time and date stamped and the printout can include vehicle and examiner identification entered via the keypad or a barcode.

SkidMan is small enough to sit on the passenger seat or in the footwell and its automatic tilt compensation simplifies instrument placement whilst ensuring accurate results. The skid test is initiated at the touch of a button. The instrument automatically senses when the vehicle starts to decelerate and when it stops and will display the average and peak deceleration. Applied pedal force or brake line pressure can also be recorded and used to determine the brake reaction time.

Accurate, easy to use, and gives printed results

- Automatic compensation for vehicle suspension dive
- Tactile keypad with audio feedback for data entry
- Clear multi-line liquid crystal display with backlight
- Built-in 40 column dot matrix printer with graphics
- 50 test memory for off-line printing and downloading

Interface available to transfer results to your PC

- Links directly to **SkidCALC** Accident Investigation Calculator
- Re-charge battery from AC mains or vehicle power

Built to last in a tough metal case

- Measures just 14 x 22 x8 cm
- Weighs only 2.75kg
- Leather carrying holster

A quality professional product from the leading manufacturer of brake test retardometers

1-2 Dalby Court, Gadbrook Business Centre, Northwich, Cheshire. CW9 7TN
Tel: +44 (0)1606 44520 Fax: +44 (0)1606 331526
Website: www.turnkey.tel

SkidMan for Accident Reconstruction

SkidMan is the most up to date and versatile instrument available for brake and skid testing, road traffic accident investigation and reconstruction, and vehicle safety inspections. It is portable, easy to use and produces a hard copy of the test results on a built-in printer. The internal memory can store up to fifty sets of results which can be subsequently downloaded to a computer. All results are time and date stamped and additionally the vehicle and examiner identification can be included via a bar code scanner or the keypad.

How does it work?

SkidMan is the modern day equivalent of a pendulum style retardometer. It contains a solid state accelerometer and an accurate crystal controlled clock. During a brake or skid test the accelerometer measures the deceleration (g-force or drag factor) experienced by the vehicle 400 times per second with an accuracy of better than 2%. The output is read by a microprocessor and stored in the internal memory for automatic analysis at the end of the test. Normally groups of ten measurements are averaged to give an effective storage rate of forty samples per second. However, to study high speed phenomena, **SkidMan** can be set via the keypad to store results at the full four hundred samples per second. At the end of the test the average g-force is calculated from the stored results and printed out together with a graph of the g-force as a function of time.

In use the **SkidMan** is simply positioned on the passenger seat or in the footwell of the vehicle. Velcro strips on its base secure it to cloth upholstery and carpets, alternatively it can be restrained using the passenger seat belt. The measurements are commenced automatically either by triggering from a touch sensitive pad fitted over the brake pedal or fully automatically by sensing sustained deceleration over 10% g. In the latter case, the instrument is able to differentiate between braking and rough gear changes by checking the deceleration is sustained for at least 1/2 second using a cyclic memory (the test start is taken as the first crossing of 10% g).

If the pedal pad is fitted, the instrument can be used to determine the reaction time of the braking system.

In addition, a pedal force of a hydraulic/air line pressure transducer can be connected to the instrument. In this case the instrument will record and print the pedal force applied or brake system line pressure during the test.

Easy to use

Control and setting of **SkidMan** is via a seven button keypad.

The instrument is fitted with a two line alphanumeric liquid crystal display. This is used to prompt the user for command entry via the keypad to indicate results and to give any error messages. The display can be backlit so that it may be read in poor light conditions. **SkidMan** is powered by an internal rechargeable battery. When fully charged this will power the instrument for at least twelve hours testing and printing. The battery voltage and charge rate can be shown on the display. The instrument is supplied complete with an A.C. mains powered battery charger. A lead to recharge the instrument from a car cigarette lighter is available as an optional extra.

SkidMan is supplied complete with a removable leather carrying holster.

Built-in Printer

SkidMan contains a miniature dot matrix impact printer capable of printing text in forty columns and graphics at 240 dots per line. Printouts of the tabular results are obtained by pressing the [Print] button on the keypad. Graphical printout is optional with the display prompting the user with each graph option in turn. If required the instrument can print out all its stored results in one go. The printout will not fade and duplicate copies are produced automatically.

Performance

Typical results from side-by-side tests of the **SkidMan** compared to Pendulum Meter and Chalk Gum (calculated from speed and distance) are given below

Test	Pendulum	Chalk Gum	SkidMan
1	66% g	70.0% g	64.9% g
2	65% g	65.0% g	65.6% g
3	65% g	66.0% g	64.5% g
4	71% g	67.6% g	66.1% g
5	64% g	67.1% g	66.1% g
6	65% g	62.8% g	66.1% g

As can be seen, these results show a very close correlation with the **SkidMan** of the order of 2%. This is well within the variations normally associated with this type of test.

A sample of the printout can be found at the end of this document. The graph shows exactly what is happening when a vehicle is stopping including brake modulations on Anti-lock Brake Systems.

Computer Interface
With the **SkidMan** PC-link, all stores results can be transferred into an IBM compatible computer via a USB port. Various software packages written by experienced Accident Investigation Specialists are available to analyse the results on the PC.

Cost Effective
SkidMan is a fraction of the cost of comparable instrumentation. Since it can be used single handedly, test and investigation costs are reduced dramatically when compared to other techniques.

The SkidCALC program has been designed and developed to be fully compatible with the SkidMan electronic retardometer manufactured by Turnkey Instruments Ltd.

It enables a standard PC running Microsoft Windows to communicate with the **SkidMan** instrument to analyse and copy onto disk all data recorded and stored by the instrument during tests. This prevents the **SkidMan** internal fifty test memory becoming unnecessarily clogged through too many tests being stored. It also prevents test results being lost by accidental over-writing or erasure by operators. Communications are very simple and require only an interface lead between the computer and **SkidMan** together with this user friendly program.

If a portable laptop computer is used, then the whole procedure can be completed in a matter of minutes whilst still at the accident investigation site. This creates a readily accessed record of the tests which can be further analysed at a later date in the comfort of the office. Alternatively, further analysis of the results and calculations can be made whilst still at the scene of the incident. This provides the ultimate tool for those dealing with and investigating the incident. With in a matter of minutes of carrying out the very simple tests using **SkidMan**, invaluable information can be produced about accident vehicle to vehicle or vehicle to pedestrian speeds and movements. Figures for many possible scenarios based on variations in the accident data in relation to the scene can be obtained. This provides vital information to an investigator who may wish to put questions, based on results of the tests and evidence collected at the scene, to persons involved in the incident whilst it is still fresh in their minds.

The results of the tests and any calculations made are then stored in the computer for further calculations, or printing off in hard copy form for file presentation purposes.

This provides the investigator with a unique facility for storing ALL DATA obtained at a scene or in relation to an incident. This may include measurements of the scene obtained via a TOTAL STATION CAD SYSTEM, together with the final plan, test carried out at the scene, calculations made relating to the incident, plus the completed statement or report relating to the incident produced on any standard Word Processing package.

With **SkidCALC** just ONE operator can carry out an in depth investigation into an incident in a greatly reduced time compared to normal methods, and produce accurate results in a form which is readily understood and well presented.

SkidCALC uses an easy to follow MENU PROMPTING AND SELECTION SYSTEM and minimal keyboard skills are required. Movements between the menus and calculations are made with the computer mouse. The operator simply works through the program by selecting appropriate boxes on which the prompt commands are visible. This reduces to a minimum operator error and cuts down the time spent learning the procedures of the program.

By capturing data already stored in the **SkidMan** instrument, errors are reduced to a minimum. The only keyboard entries required of the operator are input of measurements or other data obtained at the scene, together with the desired captions and variables to be used in the calculations.

The **SkidCALC** calculations are based on the conventional Newton's Laws of Motion formulae used in Accident Investigation and Reconstruction Techniques. Some examples of these are:

- **Speeds when skidding to a stop (all or partial wheel locking)**
- **Speeds when skidding and impacting at speed**
- **Critical speed calculations**
- **Pedestrian speeds / times / distances**
- **Slight line calculations in relation to times / speeds / distances**

- **Momentum exchanges**
- **Vector calculations**
- **Projectile and throw calculations**

All calculations use S.I. metric units. However, to assist in court presentations, calculated speeds are listed in Metres per Second and Miles per Hour. If required kilometers per Hour may also be specified.

To examine various “What If?” scenarios, **SkidCALC** enables ranges of tables of data to be produced. For example, distances for speed ranges of say 15 to 50 m.p.h. in 5 m.p.h. increments.

The results from **SkidMan** tests can be presented as a Deceleration against Time graph. There is also a facility for parts of the graph to be clipped out, used in separate calculations and then linked together again. This is invaluable when tests and accident skids are made over road patch repairs or into Shell Grip surfaces. This enables TWO OR MORE surface frictional values to be analysed and identified from only skid test and used in calculations.

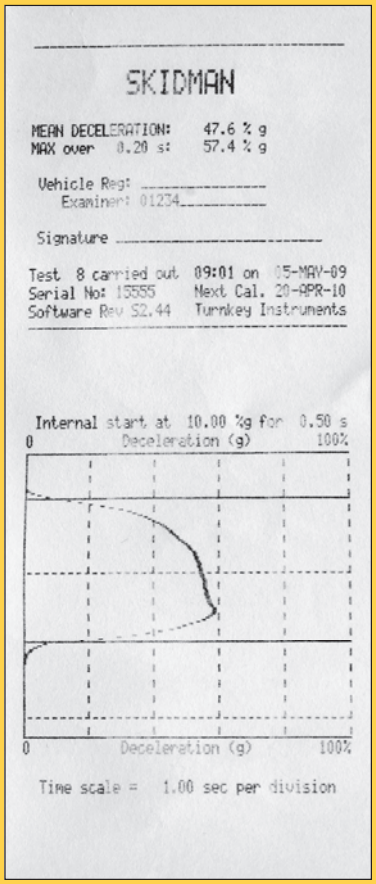
SkidCALC also has a built in Scientific Calculator which can be accessed via a visual display button on the screen. In the unlikely event of a formula not being available through the menu system, additional calculations can be made with this calculator without the need to leave the program.

To comply with the Disclosure of Evidence Rules, all calculations carried out using **SkidCALC** together with data stored or retrieved from **SkidMan** are printed onto hard copy in an easily understandable form for presentation on a file and to the courts. This eliminates the need to copy pages of hand written, barely legible notes!

SkidMan Technical Specification

Measurement accuracy	better than 2%, resolution 0.1% 40 or 400 samples per second
Measurement range	0 to 150% g (g=9.81 m/s/s)
SkidMan printer	40 column dot matrix type with graphics
SkidMan display	2 line alphanumeric LCD with backlight
Internal memory	battery backed CMOS RAM
Real time clock	months and leap years adjust automatically
Computer link	serial RS32 compatible. Memory saves results of upto 50 tests for transfer to **SkidCALC**, PC database or spreadsheet
Start trigger	automatic 10% g or brake application
Battery	re-chargeable, operates for over 12 hours from full charge. display shows battery voltages and warns when re-charge required
Charges	unregulated 12 volt DC 600mA from AC mains or car cigarette lighter
Keypad	tactile feed with audio feedback. Full alphanumeric entry for examiner and vehicle identification
Pedal force transducer	detachable with auto-zero

Product development is continuous and Turnkey Instruments reserves the right to make alterations in specification and manufacture without notice.


SKIDMAN

MEAN DECELERATION: 47.6 % g
MAX over 0.20 s: 57.4 % g

Vehicle Reg: _____
Examiner: 01234_____

Signature _____

Test 8 carried out 09:01 on 05-MAY-09
Serial No: 15555 Next Cal. 20-APR-10
Software Rev S2.44 Turnkey Instruments

Internal start at 10.00 %g for 0.50 s
0 Deceleration (g) 100%

0 Deceleration (g) 100%

Time scale = 1.00 sec per division

Sample Printout