



THE DRIVER FATIGUE STUDY: DETAILS OF
THE SIMULATED JOURNEY AND AMENDMENTS
TO THE COMPUTER PROGRAM

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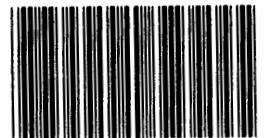
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THE STUDY:
SIMULATED
EXPERIMENTS TO
DETERMINE THE
EFFECTS OF
STRESS ON
PERFORMANCE

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SPONSOR:

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NIPR:

Dr. G.K. Nelson (Director)

Mr. D.J. Buttress

Mrs. S.D. Horsman

Miss S. Thamm

Mrs. S. Steenkamp (Typist)

NRIMS:

Dr. D.H. Martin (Director)

Mr. P. Roets

Mr. H.P. Gorringe

SUMMARY

This report deals with details of the simulated journey which is the basis for the Driver Fatigue study (Project no. 9015,4). Several amendments to the computer program specifications stated in an earlier report (PERS 288) are described in detail.

OPSOMMING

Hierdie verslag handel oor besonderhede van die nagebootste reis wat die basis van die bestuurdersvermoeidheidsprojek vorm (projeknummer 9015,4). Verskeie wysigings van die rekenaarprogramspesifikasies wat in 'n vorige verslag (PERS 288) vermeld is, word breedvoerig beskryf.

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1. INTRODUCTION

This report is a sequel to PERS 288: "Computer programme specifications for study of driver fatigue" (Connell, Denton and Buttress, 1979). A detailed description of every computer-controlled event in the eight-hour simulated journey from Johannesburg to Durban is provided, and amendments and additions to the specifications outlined in PERS 288 are discussed in detail.

Several amendments to the original specifications have been made. The most important concerns the sampling of analogue data. In PERS 288 the amount of magnetic tape required for file markers, inter-record gaps, etc. was considerably underestimated, and thus an over-optimistic calculation of the amount of analogue data which could be stored was made. The amount of data collected per subject (4,03 MBytes) would have required a considerable amount of computer processing, and this would have been prohibitively expensive.

In the light of the above, the following changes have been made with respect to the sampling of analogue data:

- (1) continuous storage of analogue data has been made contingent upon certain environmental events and driver violations only, and will occur for relatively short periods of time. These records will be used later to drive the pens of a recorder or X - Y plotter to allow visual analysis of the finer details of driver behaviour to be made;
- (2) analogue signals will be monitored on a continuous basis throughout the journey. Summary statistics for each variable (analogue and digital) will be calculated for blocks of 224 distance pulses (i.e. every 3,36 km). This will form the basic data of the experiment. Thus 165 data points per variable will be obtained over the entire journey;
- (3) the sampling rates for some analogue inputs were initially high enough to possibly interfere with the operation of the computer. Sampling rates have been reduced to more acceptable levels.

Statistical analysis will be based on the data generated by the low sampling rate, while the raw data produced by the higher sampling rate will be used by the experimenter, chiefly as an aid to the interpretation of the computer analysis. In addition, more detailed data is required for the analysis of the more complex "fine structure" of behaviour associated with significant environmental stimuli. As an example, it may prove useful to compute the changes in physiological activity in response to road signs signalling danger and compare this with the changes associated with more neutral road signs.

The other major amendment to the original specifications concerns the use of the video display unit (VDU) for communication of status information to the operator. The initial plan was for the operator to receive information regarding equipment malfunctions, distance travelled, etc. via various displays, lights and buzzers on the console. This would have been very inconvenient for the operator who would have had to sit in almost complete darkness as the console is situated next to the driver's cab and a night drive is being simulated. As more detailed and meaningful information can be displayed on the VDU, this will now become the primary link between the operator and the simulator. The VDU will be located in an adjacent room, thus enabling the operator to do other work.

Further details regarding the information to be displayed on the VDU may be found in Section 4.1.

The computer program based on this report and PERS 288 is strictly applicable to phases 1 and 2 of the driver fatigue project only. In phase 1 drivers will be required to remain at the wheel for as long as possible, while in phase 2 drivers will be allowed to stop for short rests on demand. Phase 3 of this study, in which subjects will be required to stop at pre-determined points along the route, may require slight adjustments to the program. However, these can be made only after a preliminary data analysis of phases 1 and 2 has been carried out.

2. ANALOGUE DATA

2.1 Criteria for continuous storage

Analogue data will be continuously stored according to the following criteria:

- (1) all three urban zones plus approximately 15 minutes into adjacent rural zones, i.e., distance count 0 to 2172, 16644 to 20260, and 35190 to 36960. As the driver will not necessarily stop at the last distance count, continuous storage may continue further until he does stop. This is described in greater detail in Section 5.1;
- (2) approximately 10 seconds before, during, and 10 seconds after any road sign not already included under (1) above;
- (3) during any risk slide sequence, and for 20 seconds* after the dummy slide has been projected (see PERS 288, Section 5.4 for details of the risk sequence).
- (4) 30 seconds* after the police siren is sounded;
- (5) 20 seconds* after the risk or police probability generators have been sampled as a result of driver violations (NB: This must occur irrespective of the results of sampling of the probability generators);
- (6) over certain sections of the journey (in rural zones) where the driver is subject to very little stimulation. This data will serve as a baseline against which data obtained in high stimulus density areas may be compared. The relevant distance count values are stated in Appendix A.

The distance count values at which continuous storage is to be started and stopped according to criteria (1) and (2) have been listed in the sequence of computer-controlled events in Appendix A. These distance counts are based on vehicle speeds of 60 or 90 kmh⁻¹, but as actual speed will differ, the amount of data stored will vary slightly from subject to subject.

**All numerical values marked with an asterisk are parameters which can be varied by the computer operator.*

2.2 Sampling rates for analogue signals

An examination of the properties of the various physiological signals (Venables and Martin, 1967; Strong, 1970) as well as those of the simulated vehicle (McRuer, Peters, Ringland, Allen, Blanvelt and Weir, 1974) has revealed that smaller bandwidths may be expected than those which were quoted in PERS 288. In view of this, the following sampling rates for analogue data are suggested:

heart rate (interbeat interval)	: 4 Hz
breathing rate	: 2 Hz
electromyogram	: 2 Hz
skin conductance level	: 2 Hz
vehicle speed	: 8 Hz
steering error	: 8 Hz
steering wheel angle	: 12 Hz
Total effective sampling rate	: 38 Hz

In order to prevent aliasing (i.e. an incorrect representation of the frequency properties of signals due to an inadequate sampling rate), all analogue inputs will be electronically low-pass filtered before conversion to digital form.

2.3 Amount of analogue data stored

The time associated with continuous storage of analogue data as shown in point (1) is approximately two hours. The remaining data is mostly associated with 188 road signs, each of which corresponds to a sample time of approximately 40 seconds. The total amount of "raw" analogue data to be stored (assuming two bytes per sample) is therefore: $\{(2 \times 3600 \times 38) + (188 \times 40 \times 38)\} \times 2 = 1,12$ Mbytes.

This is a considerable reduction from the 4,03 Mbytes calculated in PERS 288.

The amount of data associated with summary statistics (see Section 3 for details) is negligible as only 165 data points per variable will be stored.

2.4 Analogue outputs

The two analogue outputs generated by the computer are:

- (1) steering demand; and
- (2) road "gradient".

The output frequency of these variables should match those of the corresponding analogue inputs (i.e. steering error/steering wheel position and vehicle speed). This requirement can be relaxed in the case of road gradient since vehicle speed may change at a much higher rate than the gradient of the road. The following analogue output frequencies are suggested:

steering demand : 8 Hz
road gradient : 0,5 Hz

There are a number of different procedures for generating the pseudo-random outputs required for these variables. In PERS 288 it was suggested that a series of sine functions with frequencies not harmonically related be used. This method had the advantage of producing an output with precisely defined frequency characteristics. In the case of steering demand, it was possible to model both low and high frequencies corresponding to road curves and wind gusts or road irregularities respectively. An equally effective method involves the integration over time of a series of pseudo-random numbers. Although it may be difficult to choose a series of random numbers which will produce the required frequency characteristics when integrated, this method is possibly more efficient in terms of computing time and is therefore more attractive.

Irrespective of the method used, these analogue outputs must have the following properties:

- (1) Steering demand must have a bandwidth from DC to 0,8Hz* maximum.
Road gradient must have a bandwidth from DC to 0,05Hz* maximum.
- (2) For both steering demand and road gradient, the frequency must increase with increasing vehicle velocity.

(3) For steering demand, the output must be zero when the vehicle velocity is zero;

(4) For road gradient, the output must be a constant when vehicle velocity is zero.

The bandwidths suggested above are provisional and should be regarded as parameters which may be altered during the pilot study.

3. SUMMARY STATISTICS

The basic data of this study will consist of average values for variables calculated over blocks of 224 distance pulses. Averages for analogue signals need not be based on the sampling rates of Section 2.2. If spare processing time is not available, lower sampling rates can be used; however it is recommended that the highest possible sampling rates commensurate with orderly functioning of the computer be used.

Since the calculation of averages requires division, which is time-consuming, running or cumulative totals may be stored instead. Averages may then be calculated after completion of the experiment. The storage of totals allows analogue and digital (discrete event) data to be treated in a similar way.

The following data must be calculated and stored every 224 distance pulses (variables marked with an asterisk are counts from which averages cannot be meaningfully calculated);

- (1) skin conductance level (SCL)
- (2) neck muscle tension (EMG)
- (3) heart rate (HR)
- (4) breathing rate (BR)
- (5) vehicle speed
- (6) root-mean-square steering error
- (7) root-mean-square steering wheel position
- (8) number of brake "on" responses*
- (9) brake reaction time to road signs requiring stops (measured from the time the computer changes to the relevant slide)

- (10) brake reaction time to emergency stimulus (default to largest possible negative number if there have not been any emergency stimuli)
- (11) number of random lights, field 1*
- (12) number of random lights, field 2*
- (13) number of random lights, field 3*
- (14) number of random lights, field 4*
- (15) number of missed lights, field 1*
- (16) number of missed lights, field 2*
- (17) number of missed lights, field 3*
- (18) number of missed lights, field 4*
- (19) number of spurious responses to random lights (i.e. any response occurring more than 5s* after a light)
- (20) reaction time to random lights, field 1
- (21) reaction time to random lights, field 2
- (22) reaction time to random lights, field 3
- (23) reaction time to random lights, field 4
- (24) number of samples of risk probability generators (due to driver violations only)*
- (25) number of times police siren is activated*
- (26) number of risk slide sequences (excluding pre-programmed sequences)*
- (27) number of pre-programmed risk sequences encountered*
- (28) driver's accumulated "behaviour index"*
- (29) number of stops not associated with a road sign*
- (30) real time at end of block*
- (31) number of projector failures (road signs)*
- (32) number of projector failures (risk stimuli)*

4. AMENDMENTS TO PERS 288 - CONTROL OF SIMULATOR AND DISPLAY OF INFORMATION

4.1 Video Display Unit

Due to its flexibility of use and the greater amount of information which may be displayed, the VDU will be the primary source of information regarding the status of the simulator, and thus replaces some dedicated hardware described in PERS 288. The VDU will also be used to load programs and lists of parameters from floppy disks into core memory, and will be the means by

which parameters will be changed during the pilot study (as an alternative, the teletype can be used for this function - thus allowing a "hardcopy" of the current parameters to be generated).

Three inputs (to the computer) which are affected by this change are the START and STOP switches (PERS 288, Sections 3.4.7 and 5.7) and the projector reset switch (PERS 288, Sections 3.4.6 and 5.5). These will be replaced by three different keycodes (terminated by a carriage return) which the operator will enter from the keyboard.

Three outputs which must be changed are the slide change malfunction indicators (PERS 288, Sections 3.5.4 and 5.5) and the rest/end of journey indicator (Sections 3.5.8 and 5.10). In each case, the relevant information will be displayed on the VDU as a short, unambiguous message, reinforced by the sounding of the terminal's buzzer at half-second intervals. The buzzer is stopped by the operator's response; in the case of the rest/end of journey message, the operator must respond by keying in the stop command, while in the case of a slide change malfunction the operator should key in the number of the projector in question.

In order to keep the operator informed of the progress of the experiment, certain information should be permanently displayed on the VDU (or should be callable by means of simple keycodes). The following information should be displayed:

- (1) real time (24-hour clock);
- (2) real time elapsed since the start of the experiment;
- (3) distance count value;
- (4) per cent of total distance travelled;
- (5) distance travelled (decimal kilometres);
- (6) zone (urban 1, rural 1, urban 2, rural 2 or urban 3);
- (7) per cent of magnetic tape used (updated whenever data transfers occur);
- (8) status of data logging operations (paused or proceeding);
- (9) vehicle speed (kilometres per hour);
- (10) steering error (arbitrary decimal units; updated every 8th sample);
- (11) anomalous driver behaviour (e.g. driver stops at a green traffic signal or "GO" sign; vehicle remaining stationary 10 seconds* after the emergency stimulus has disappeared - see Section 4.3 for further details).

- (12) anomalous analogue inputs (maximum possible values reached);
- (13) computer errors (e.g. parity/checksum errors, buffer overflow, etc.).

It will be useful if the VDU screen can be divided into various zones which can be dedicated to the display of a particular message or class of messages.

4.2 Slide projectors and slide numbers

At the time of writing of PERS 288, GAF slide projectors having a capacity of 100 slides per magazine were in use. It has since been discovered that the reliability of the slide change mechanism of this type of projector is not sufficient for the fatigue experiment, and thus Kodak "Carousel"-type projectors will be used instead. Since these have a capacity of 80 slides per magazine, slides will now be numbered from 1 to 80. Slide magazines for road signs will not necessarily be filled, however, as it is necessary that changeover from one magazine to the next should occur in a region of very little activity in order that the journey be disrupted as little as possible. Regardless of the actual number of slides in a magazine, the first slide will always be numbered 1 (according to the format described in PERS 288, Fig. 4), while the last slide will always be numbered 80.

Because the risk slide sequences are cyclic, the risk slide magazine will be completely filled (see PERS 288, Section 5.5 for details). Position 0 in the Carousel magazine cannot be occupied by a slide. It is therefore necessary that the computer issue an extra slide change command when slide 80 is read. This will ensure that the projector is ready to change to the first risk slide (slide 1) when the next risk sequence is called by the computer.

4.3 Operation of risk slide sequence

The operation of the risk slide projector was described in PERS 288, Sections 5.4 and 5.11.1. Discussion with programmers at NRIMS has revealed that some aspects of projector control were omitted from the specifications, while others posed severe problems with regard to their implementation. In order to resolve these issues, the following points should be noted:

- (1) risk slides are coded sequentially from 1 to 80, the code being read by the computer approximately 1,5 seconds* after a slide change command has been issued by the computer;
- (2) associated with each slide will be two "flags" (in the computer's memory) which will indicate whether the slide is an emergency stimulus or a dummy stimulus respectively. The driver is required to make an emergency stop in response to the emergency stimulus, while the dummy stimulus cannot be seen by the driver and is used to indicate to the computer that it should exit from the risk sequence subroutine. A list of slide numbers and associated flags can be found in Appendix B.
- (3) the actions taken by the computer whenever the emergency slide is detected were not fully covered in PERS 288. A stricter criterion for determining whether the driver is making an emergency stop is required, and the following procedure is suggested:
 - (i) when the emergency stimulus is detected, the computer must look at the state of the brake pedal. If brakes are already being applied, no brake reaction time to the stimulus can be computed, and a code signifying this condition, together with real time, correct to one millisecond, must be stored as data. If brakes are not being applied, a timer is started. This timer is stopped when a brake response occurs, and the resulting reaction time is computed and stored as data;
 - (ii) 1,5 seconds* after the emergency stimulus, the state of the brake pedal must again be tested (irrespective of whether a brake response was made earlier). If the brakes are not being applied, the police siren is sounded and points are subtracted from the driver's "behaviour index". (NOTE: the police siren is not contingent upon the output of the probability generator, as was stated in PERS 288). Whenever the police siren is sounded, the computer must advance to the dummy risk slide stimulus, and then exit from the risk subroutine;

(iii) if brakes are being applied, the computer must continue to interrogate the brake pedal at 1,5 second* intervals, as described above;

(iv) the computer should also monitor vehicle speed every 1,5 seconds*. As soon as speed falls below a threshold V_e (the value of which is a parameter determined in the pilot study) the computer advances the dummy stimulus;

(v) if by the 10th* sample of the brake pedal, vehicle velocity is still greater than V_e , then the police siren must be sounded. The dummy slide is then advanced, correct recognition of which signals the computer to exit from the risk subroutine;

(vi) the disappearance of the emergency stimulus signals the driver to increase speed again. There is a small chance that he will not do so. To allow for this eventuality, vehicle speed must always be sampled 10 seconds* after the dummy stimulus is detected. If the speed is still less than V_e and a road sign requiring a stop is not being simultaneously displayed, then a message must be displayed on the VDU screen (e.g. "end of emergency - driver not proceeding"). The operator may then instruct the driver to continue his journey.

- (4) In PERS 288, Section 5.11.1, the problem of "continuous" sampling of the probability generators was discussed, and measures to overcome this were proposed. Discussion with the programmers has revealed that these measures are impractical, and therefore they have been scrapped. This is justified as the probabilities associated with the generators are low enough to prevent a "continuous" sequence of risk slides or police sirens from occurring. In any event, a risk probability generator cannot be sampled while a risk sequence is already in operation, and this in itself puts a restraint on the frequency of risk sequences. As regards sampling of the police siren probability generator, the problem is much reduced as probabilities are lower. If the police siren were to be operated a few times in succession, the driver should be sufficiently alerted to his continuous error and should therefore correct it.

- (5) The probability of physical risk or police detection as a result of continuous steering errors (measured as a root-mean-square value over a period T) has been altered. Referring to PERS 288, Section 5.11.1, point (5);

if $e_{si}(\text{rms}) \gg E_{se}$ then $p(\text{risk slides}) = L$
 $p(\text{police}) = L$
for both urban and rural zones

4.4 Change of road sign slide magazine

The description of the sequence of events which occur when a road sign slide magazine has to be changed, was given only sketchily in PERS 288, Section 5.5, pp. 27 - 28. It is necessary to pay more attention to details as the slide fader has to be operated in a different way to allow the slide code for slide number 1 to be read immediately (see PERS 288, Section 5.3 for a complete description of the operation of the slide fader). The following sequence of events will occur:

- (1) approximately 30 seconds before the magazine change is due, a pre-programmed distance count value will cue the computer to output a warning message to the VDU ("change to slide magazine # x in 30 seconds"). At the same time, the buzzer (bell) on the VDU will sound at approximately half-second intervals until the operator acknowledges that he has noted the message by keying in a code;
- (2) at the pre-programmed distance count, the last slide will be inserted into the projector gate. The light fader will be activated, and the brightness of the projector lamp will increase. As slide 80 is a dummy stimulus, i.e. opaque, it is not visible to the driver. However, the slide code reader will function normally, and when the lamp reaches a certain brightness, a pulse from comparator C1 will instruct the computer to read the slide code (the reader is referred to PERS 288, Fig. 3 for an explanation of terms used here). If the expected code is read, the sequence will continue as described below: otherwise the slide change malfunction subroutine is called;

(3) as soon as the expected slide code (no. 80) is read, the computer must output a pulse to the "set" terminal of latch L2, and must simultaneously send a message to the VDU ("change to slide magazine # x"). The latch prevents the projector lamp from being reset by an internal pulse from the lamp fader. The computer must also halt all normal data logging operations except the monitoring of vehicle velocity which is required for the output of the steering demand and road gradient. Distance pulses must be ignored as well as the pulse from comparator C2 of the lamp fader;

(4) the operator will now change magazines, making sure that slide no. 80 of the new magazine is in the projector gate. He will then press the "projector reset" switch;

(5) when the projector reset is detected, the computer must recommence counting distance pulses. At the first pulse received, slide no. 1 is inserted into the projector gate by a slide change command pulse;

(6) approximately 1,5 seconds* later, the computer must read the slide code. If the code is not "one", the slide change malfunction subroutine is called;

(7) if the correct slide code is read, the computer must extinguish the projector lamp by outputting a pulse to the "reset" terminal of latch L2. At the same time, normal data logging operations are recommended.

NB: to provide a record of events, real times and codes referring to points (3), (5) and (7) above must be stored as data.

5. CONTROL OF EVENTS FROM DISTANCE COUNTS

As explained in Sections 3.4.1 and 5.1 in PERS 288, all computer-controlled events which are not contingent upon driver behaviour will be cued by specific distance counts. Since each distance pulse received by the computer represents a displacement of approximately 15 metres, all such events can be related to distances measured from the start of the journey.

A complete list of distance count related events is given in Appendix A. In order to clarify the entries in this list, a more comprehensive description of the first few events will be given here, as well as a description of some events which occur only infrequently.

The column headings are defined as follows:

event number: this is self explanatory and serves as an aid to tabulation;

distance count: the total number of distance pulses received at a given point;

total road sign count: this is the number of road sign slides (numbered sequentially from the beginning of the slide magazine). In this experiment five road sign slide magazines will be used. The slides will be numbered as follows:

Magazine no. 1: 1 to 80;
Magazine no. 2: 1 to 63, 80;
Magazine no. 3: 1 to 78, 80;
Magazine no. 4: 1 to 65, 80;
Magazine no. 5: 1 to 49.

road sign slide code: this is the binary representation of the total road sign count, shifted left, and with the least significant bit set to identify the code as originating from the road sign slide projector (in the risk slides, this bit will always be reset);

stop required: this information is used by the computer as a flag to indicate whether the driver is required to stop so that the physical risk and police siren probability generators may be sampled if necessary;

physical risk probability: this refers to the probability of a risk slide sequence occurring at a particular point. When this probability is stated, the appropriate probability generator must be sampled. If a risk slide sequence is already in operation, the probability generator must not be sampled;

A simple notation is used to identify the six physical risk probability generators (see PERS 288, Section 5.11) for further details:

U,H = urban, high p
U,M = urban, medium p
U,L = urban, low p
R,H = rural, high p
R,M = rural, medium p
R,L = rural, low p

The entries in Appendix A refer to distance count-related sampling of the probability generators only - driver behaviour can also cause the generators to be sampled.

The actual probability assigned to each generator is a parameter which should be able to be altered by the operator whenever necessary.

other: } these entries clarify the
comments: } physical nature of an event

In order to save space, some words and phrases have been abbreviated, e.g. "risk" means: "sample risk probability generator with the specified probability"; "C2 + 2s" means: "at two seconds after the pulse from comparator C2 has been received"; "start cont." means: "start 'continuous' data storage". Other abbreviations include the following:

traf. sig. = traffic signal ("robot");
d.s. = dummy stimulus (risk or road sign slides);
s.l. = speed limit;
stop. cont. = stop "continuous" data storage.

PERS 288 reference: this entry contains the Section numbers in PERS 288 to which the reader may refer if more information about a particular function is required. As the distance count related events are highly repetitive, reference numbers are given to the first occurrence of an event, or to unusual events only.

5.1 Detailed descriptions of some computer-controlled events

Event No. 1:

This is a command to commence the main data logging program, and will be typed on the VDU keyboard by the operator when the subject is ready to start. N.B.: this is an amendment to Section 5.7 in PERS 288, as the START switch was previously specified by this function.

Event No. 2:

This is a dummy road sign stimulus (slide number 1) which is not seen by the driver, and which serves as a check on the correct functioning of the projector. Referring to Fig. 3 of PERS 288 (p. 20), the counter will have been preset by the operator prior to the start of the journey. Thus only one distance count will be required before comparator C1 outputs a pulse to the computer. NB: the projector will have been pre-loaded with slide no. 1, so that a slide change command pulse is not required. When the computer receives the pulse from C1, it must read the slide code and compare it with the expected code which is stored in memory. If a match occurs, the slide code number and the real time at which the pulse from C1 was received is stored as data. If a mismatch occurs, the slide change malfunction subroutine is called, and real time and a code referring to this event are stored as data. Further information on this subroutine may be found in PERS 288, Section 5.5.

On receipt of the pulse from C1, the computer must also output a pulse to the "set" terminal of latch L2. This prevents the projector lamp from being extinguished when the lamp fader resets itself, and is required because of the close proximity between events 2 and 3. The pulse output by C2 must be ignored by the computer.

Event No. 3:

This is the first speed limit sign (60kmh⁻¹), and follows almost immediately after the dummy slide. The normal "zoom" effect of the lamp fader will not operate for this sign, but the lamp will be extinguished in the normal way, as described in PERS 288, Section 5.3. No physical risk is associated with this sign.

Event No. 4:

This is a road sign ("danger, children") which is initiated after 16 distance pulses have been received. The road sign projector lamp fader is operated in the normal way as described in PERS 288, Section 5.3. No stop is required.

Event No. 5:

In this event the probability generator associated with an urban, medium probability of physical risk is sampled three seconds after the pulse from C2 has been received (i.e. 3 seconds after the driver "passes" the road sign of Event No. 4). If the output of the generator is a one, then a risk slide sequence is initiated by the computer. This is described in greater detail in PERS 288, Section 5.4.

Event No. 6:

This is a red traffic signal and is initiated by the computer upon receipt of the 31st distance pulse by means of a slide change command pulse followed by a pulse to the "set" terminal of latch L1. As soon as the vehicle stops (according to the criteria stated in PERS 288, Section 5.3.2) a timer is started. If the vehicle does not stop, both the physical risk and police probability generators must be sampled with probabilities as described in PERS 2.8, Section 5.11.

Event No. 7:

This is a green traffic signal which appears 25s after the vehicle has stopped. Note that the light fader will have been held in the "on" position, so that the green signal can be observed. As the projector lamp is on, the computer can read the slide ID approximately 1,5 seconds after the slide change command pulse was output. As the driver gathers speed, the slide fader will operate in the normal way, switching off the projector lamp as the vehicle "passes" the traffic signal.

Event No. 8:

The physical risk probability generator must be sampled as soon as a pulse from comparator 2 is received. This is to simulate the increased risk of a collision in an intersection. The probability assigned to this generator is: urban, low.

The remaining events are very much the same as those described above, and thus only those involving unusual changes in procedure will be described below.

Event No. 49:

Here the risk slide sequence occurs unconditionally, i.e. without any sampling of a probability generator. This is to simulate the danger associated with road works. The risk slide sequence starts three seconds after the computer receives the pulse from comparator C2.

Event No. 59:

This is an unguarded level crossing, and is initiated one second after a pulse is received from comparator C2 (i.e. one second after the driver passes the previous road sign). The police probability generator must be sampled when a pulse is received from comparator C1 if the vehicle speed is greater than 20kmh^{-1} .* A risk slide sequence is initiated upon receipt of a pulse from C2.

Event No. 65, 66 and 67:

These events occur at the same distance count value (i.e. 672). A signal is sent to the random light generator to initiate a transition from a high stimulus density to a low stimulus density (see PERS 288, Section 5.8). Simultaneously, a change is made from urban to rural probability generators for physical risk only. Road sign # 42 (90kmh^{-1} speed limit) is advanced, the new speed limit becoming effective upon receipt of a pulse from C2.

Event No. 74:

At distance count 1344 (i.e. approximately 10km into rural zone no. 1), a change is made from urban to rural probability generators for police detection only.

Event No. 84:

At distance count 2172 continuous storage of analogue data is stopped. Selective data storage, as discussed in Section 2.1 is commenced.

Event No. 85 - 87:

At distance count 2366 continuous storage is resumed. A slide change command pulse is sent to the road sign projector at distance count 2383, and the physical risk probability generator is sampled three seconds after a pulse from comparator two has been received. If no, risk sequence results, continuous storage is discontinued 10 seconds after the pulse from comparator two, otherwise continuous sampling continues until 20 seconds* have elapsed after the dummy risk stimulus has been detected by the computer.

The above sequence is typical of those of the road signs located in non-continuous storage, rural zones.

Event No. 103 to 105:

Continuous storage of analogue data commences at distance count 3589. A risk slide sequence is initiated at distance count 3606. Twenty seconds after the risk dummy stimulus is detected, continuous storage of analogue data is discontinued.

Event No's. 130 and 131:

At distance count 4572 continuous storage of analogue data is commenced. Sixty seconds later, this is discontinued. This event occurs in a section of the journey that is devoid of environmental stimuli, and is used to obtain baseline data.

Event No. 188 to 196:

At distance count 7350 a message is sent to the operator, via the VDU, informing him of the need to change road sign slide magazines to magazine No. 2 in approximately 30 seconds time. The buzzer on the VDU is sounded at half-second intervals until the operator responds by pressing a specific key or keys. The slide change command is sent to the road sign projector at distance count 7400. Thereafter, the sequence of events is as described in Section 4.3 of this report.

Event No. 263 to 267:

At distance count 10679 continuous storage of analogue data is commenced, and this continues until after distance count 10756. The storage of analogue data is discontinued 10 seconds after the pulse from comparator C2 is received, unless a risk slide sequence is called in which case storage continues for 20 seconds after the risk dummy stimulus is detected. The reason for this extended section of analogue storage is that a rest will probably occur over this portion of the journey, and it is desirable that detailed physiological data be available.

Event No's. 307 and 308:

Starting at distance count 12725, a 60-second block of analogue data is stored. This occurs in a region of low activity, and will be used as a baseline from which comparisons with other sections of the journey can be made.

Event No. 316 to 319:

Here a road sign (rest, 1 Km) is followed later by a compulsory risk slide sequence.

Event No. 405:

This is a similar sequence to the previous one.

Event No. 411:

At distance count 16644 continuous storage of analogue data is resumed and continues for the duration of urban zone No. 2.

Event No. 416 to 424:

Here road sign slide magazine No. 3 replaces the previous magazine, as described in detail in Section 4.3.

Event No. 427:

At distance count 17472 the probabilities of a driver violation being detected by the police revert to the higher urban values.

Event No. 435 to 437:

At distance count 18144 a pulse is sent to the random light generator to signal a transition from low to high stimulus density levels. Simultaneously, the risk of physical injury increases to urban values, and the urban, low probability generator is sampled.

Event No. 500 to 502:

At distance count 18816 a pulse is sent to the random light generator to signal a transition from high to low stimulus density. At the same time rural physical risk probabilities become applicable. A road sign (90km⁻¹ speed limit) is displayed, the new speed limit becoming applicable when the pulse from comparator C2 is detected.

The remaining events are essentially a repetition of those already described, and thus will not be discussed here. The end of the journey requires a more detailed description as correct termination of the program is essential if information is not to be lost or gathered in excess.

At event no. 915 (distance count 36919), a slide change command pulse causes a road sign to be displayed. Simultaneously a message is output to the VDU informing the operator that the end of the journey is to be expected in approximately one minute. At distance count 36940 a "stop-end-of-journey" road sign is displayed. When this sign becomes visible to the driver, he will have approximately 70 metres to stop from a speed of 60kmh^{-1} . It is unlikely that he will stop before distance count 36960 and thus the last data block will be complete. However, it is desirable that analogue data be sampled and stored up to the time that the driver switches off his engine. For this reason, the computer must inform the operator when the vehicle speed reaches zero. The operator will then inform the driver on the intercom to switch off the ignition, and when he does so the operator must instruct the computer to cease data logging and commence "data compress" operations (described in greater detail in Sections 3 and 6).

6. DATA PRINTOUT

As mentioned in Section 3, summary statistics computed every 224 distance pulses will form the basic data of this study. It is highly desirable that this data be displayed at the end of each day so that any signs of equipment failure not detectable by the computer may be spotted. Since a graphical representation is the most effective means of detecting anomalous data, an "intelligent" X - Y plotter will be used. In order to provide for clarity of representation, the variables to be plotted will be graphed as follows:

(1) physiological data:

SCL

EMG

HR

BR

(2) vehicle data:

speed

rms steering error

rms steering wheel position

- (3) "environmental" data:
 - n random lights, field 1
 - n random lights, field 2
 - n random lights, field 3
 - n random lights, field 4
 - n road signs requiring stops
 - n samples of risk probability generator due to violations

- (4) driver behaviour data, group A:
 - n missed lights, random lights field 1
 - n missed lights, random lights field 2
 - n missed lights, random lights field 3
 - n missed lights, random lights field 4
 - n spurious responses, random lights
 - n brake responses

- (5) driver behaviour, group B:
 - average RT to random lights, field 1
 - average RT to random lights, field 2
 - average RT to random lights, field 3
 - average RT to random lights, field 4
 - average brake RT to road signs requiring stops.

- (6) driver behaviour, group C:
 - cumulative driver "behaviour index".

The following information concerns events which occur with a very low frequency and which, therefore, are best represented in tabular form printed on the teletype:

- brake RT to emergency stimuli (if any);
- number of risk slide sequences;
- number of times police siren is activated;
- number of stops not associated with a road sign;
- real time;
- number of projector failures (road signs);
- number of projector failures (risk slides).

It will be more meaningful to print the data for the above low-frequency events for each of the five zones of the journey. These zones are defined as shown in Tabel 1.

TABEL 1 : HIGH AND LOW STIMULUS DENSITY ZONES

Zone	Number of blocks	Distance count values
urban 1	3	0 - 672
rural 1	78	672 - 18144
urban 2	3	18144 - 18816
rural 2	78	18816 - 36288
urban 3	3	36288 - 36960

The variables to be graphed will, however, be calculated for each block, i.e. 165 points will be plotted.

7. RISK SLIDE CODING

Appendix B contains a list of risk slide numbers and their associated flags. Each risk sequence consists of from one to three risk slides, and is terminated by a dummy stimulus, or an emergency stimulus and dummy stimulus. The probability of an emergency stimulus is proportional to the number of preceding risk stimuli. The probability of an emergency, given that a single risk stimulus has occurred, was arbitrarily set to 0,1; however, in adjusting the resulting sequence of slides to accommodate them to a slide magazine with a capacity of 80 slides, the conditional probability which results is 0,11.

The initial slide sequence, which was derived from a random number table, contained a much higher proportion of sequences of length three. This was altered to even out the distribution to the following:

TABLE 2 : DISTRIBUTION OF RISK SEQUENCE LENGTHS

Sequence length	Frequency
1	9
2	8
3	8

Three emergency stimuli occur after sequences of length three, two after sequences of length two, and one emergency occurs after a sequence of only one risk slide.

8. REFERENCES

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Appendix A : A complete list of computer-controlled events:

1 - 918

EVENT NO.	DISTANCE COUNT	TOTAL ROAD SIGN COUNT	ROAD SIGN SLIDE CODE	STOP REQD?	PHYSICAL RISK (i.e. risk slide) PROBABILITY	OTHER	PERS 288 REF.	COMMENTS
25	246	16	00100001	no	—		5.3.1	road sign (pedestrians)
26	—	—	—	—	U,M	phys risk prob gen	5.3 5.4 5.11.1	C2 + 1sec.
27	273	17	00100011	yes	—	start timer when vehicle stops	5.3.2	stop sign
28	—	18	00100101	—	—	after 25s	5.3.2	go sign
29	—	—	—	—	U,M	risk	5.3 5.4 5.11.1	C2
30	295	19	00100111	yes	—	start timer when veh stops	5.3.2	red traffic signal
31	—	20	00101001	no	—	25s after stop, change to this slide		green traffic signal
32	—	—	—	—	U,L	risk prob. gen.		C2
33	319	21	00101011	no	—			school children crossing
34	—	—	—	—	U,M	risk prob. gen		C2
35	344	22	00101101	yes	—			red traffic signal. Start timer when vehicle stops
36	—	23	00101111	no	—	25s after stop, change to this slide		green traffic signal
37	—	—	—	—	U,L	risk prob gen		C2
38	362	24	00110001	yes	—			stop sign. Start timer when V stops
39	—	25	00110011	no	—	25s after stop		go sign
40	—	—	—	—	U,M	risk prob gen		C2
41	392	26	00110101	no	—			pedestrians crossing
42	—	—	—	—	U,M	risk prob gen		C2
43	414	27	00110111	yes	—			red traf sig. Start timer when V stops
44	—	28	00111001	no	—	25s after stop		green traffic signal
45	—	—	—	—	U,L	risk prob gen		C2
46	440	29	00111011	no	—			speed limit 40kmh ⁻¹ (from C2)
47	—	—	—	—	U,L	risk prob. gen		C2 + 3S

EVENT NO.	DISTANCE COUNT	TOTAL ROAD SIGN COUNT	ROAD SIGN SLIDE CODE	STOP REQD?	PHYSICAL RISK (i.e. risk slide) PROBABILITY	OTHER	PERS 288 REF.	COMMENTS
48	453	30	00111101	no	—			danger road works
49	—	—	—	—	p = 1	risk prob gen	5.4 5.11.1	C2 + 3s
50	477	31	00111111	no	—			green robot
51	—	—	—	—	U,M	risk prob gen		C2
52	501	32	01000001	no	—			speed limit 60 from C2
53	531	33	01000011	yes	—	start timer when speed of vehicle zero		stop sign. Start timer when V stops
54	—	34	01000101	no	—	25s after stop		go sign
55	—	—	—	—	U,M			C2
56	556	35	01000111	no	—			green traffic signal
57	—	—	—	—	U,L			C2
58	584	36	01001001	no	—			unguarded level crossing
59	—	37	01001011	yes	U,H	change to this slide at pulse from C2 plus 1 sec delay		level crossing, 2 tracks
60	609	38	01001101	yes	—	start timer when vehicle stops		stop sign
61	—	39	01001111	no	—	25s after stop		go sign
62	—	—	—	—	U,M	risk prob gen		C2
63	631	40	01010001	no	—			direction sign
64	644	41	01010011	no	—			Durban x km
65	672	—	—	—	—	high-to-low stimulus density transition	5.8	random light generator
66	672	42	01010101	no	—			random light generator
67	672	—	—	—	(R)	Urban-to-Rural transition - physical risk	5.11	90kmh-1 speed limit from C2
68	1036	43	01010111	no	—			Durban 529 km
69	1219	44	01011001	no	—			40kmh-1 speed limit from C2
70	—	—	—	—	R,L	risk prob gen		C2 + 3s
71	1258	45	01011011	no	—			danger roadworks
72	—	—	—	—	R,M	risk prob gen		C2 + 2s

EVENT NO.	DISTANCE COUNT	TOTAL ROAD SIGN COUNT	ROAD SIGN SLIDE CODE	STOP REQD?	PHYSICAL RISK (i.e. risk slide) PROBABILITY	OTHER	PERS 288 REF.	COMMENTS
73	1301	46	01011101	no	-			90kmh-1 speed limit from C2
74	1344	-	-	-	-	U-R transition-police detection	5.11	
75	1484	47	01011111	no	-			danger road works
76	-	-	-	-	R,M	risk prob. gen		C2 + 2s
77	1489	48	01100001	no	-			danger no overtaking
78	-	-	-	-	R,L	risk prob. gen		C2
79	2057	49	01100011	no	-			60kmh-1 speed limit from C2
80	-	-	-	-	R,L	risk		C2 + 2s
81	2094	50	01100101	no	-			crossroads
82	-	-	-	-	R,M	risk		C2 + 1s
83	2116	51	01100111	no	-			90kmh-1 speed limit from C2
84	2172	-	-	-	-	lower sample rates, no continuous store		from now on continuous store only contingent upon violations or distance counts
85	2366	-	-	-	-	high sample rates, continuous store		
86	2383	52	01101001	no	-			road from left
87	-	-	-	-	R,L	risk		C2 + 3s
88	-	-	-	-	-	stop continuous store		stop continuous store at C2 plus 10s OR if risk sequence is in operation, at dummy slide plus 20s
89	2699	-	-	-	-	high rates, continuous		
90	2716	53	01101011	no	-			police 1K
91	-	-	-	-	-	stop continuous store low sampling rates		at C2 plus 10s
92	3028	-	-	-	-	continuous store high sampling rates		
93	3045	54	01101101	no	-			danger, road from left

EVENT NO.	DISTANCE COUNT	TOTAL ROAD SIGN COUNT	ROAD SIGN SLIDE CODE	STOP REQD?	PHYSICAL RISK (i.e. risk slide) PROBABILITY	OTHER	PERS 288 REF.	COMMENTS
94	-	-	-	-	R,L	risk		C2
95	-	-	-	-	-	stop continuous		at C2 plus 10s EXCEPT if risk sequence dummy stimulus plus 20s
96	3072	-	-	-	-	continuous storage		
97	3089	55	01101111	no	-			danger, trucks
98	-	-	-	-	R,M	risk		C2 + 1s
99	-	-	-	-	-	stop continuous		C2 plus 10s EXCEPT risk - dummy stimulus plus 20s
100	3506	-	-	-	-	continuous		
101	3523	56	01110001	no	-			resting 1K
102	-	-	-	-	-	stop continuous		C2 plus 10s EXCEPT dummy stimulus plus 20s
103	3589	-	-	-	-	start continuous		
104	3606	-	-	-	p = 1	risk	5.4 5.11.1	risk sequence here
105	-	-	-	-	-	stop continuous		stop at d.s. + 20s
106	3706	-	-	-	-	continuous store		
107	3723	57	01110011	no	-			direction sign
108	3747	58	01110101	no	-			danger, intersection from left
109	-	-	-	-	R,M	risk		C2 + 1s
110	-	-	-	-	-	stop continuous		C2 plus 10s EXCEPT risk: ds + 20s
111	3799	-	-	-	-	continuous store		
112	3816	59	01110111	no	-			60kmh ⁻¹ speed limit from C2
113	-	-	-	-	R,L	risk		C2 + 3s
114	-	-	-	-	-	stop continuous		C2 + 10s EXCEPT risk - d.s. + 20s
115	3857	-	-	-	-	continuous store		
116	3869	60	01111001	no	-			danger children crossing
117	-	-	-	-	R,M	risk		C2 + 3s
118	-	-	-	-	-	stop continuous		C2 + 10s EXCEPT risk - d.s. + 20s

EVENT NO.	DISTANCE COUNT	TOTAL ROAD SIGN COUNT	ROAD SIGN SLIDE CODE	STOP REQD?	PHYSICAL RISK (i.e. risk slide) PROBABILITY	OTHER	PERS 288 REF.	COMMENTS
119	3897	—	—	—	—	continuous store		
120	3909	61	01111011	yes	—			start timer stop sign
121	—	62	01111101	no	—	25s after stop		go sign. Start timer at C2
122	—	—	—	—	R,M	risk		C2
123	—	—	—	—	—	stop continuous		C2 plus 20s EXCEPT risk - d.s. plus 20s
124	4239	—	—	—	—	start continuous		
125	4251	63	01111111	no	—			90kmh ⁻¹ speed limit from C2
126	—	—	—	—	—	stop continuous		C2 plus 10s
127	4439	—	—	—	—	start continuous		
128	4456	64	10000001	no	—			hotel 3km
129	—	—	—	—	—	stop continuous		C2 plus 10s
130	4572	—	—	—	—	start continuous		start timer } 60s recording stop at 60s } when little activity
131	—	—	—	—	—	stop continuous		
132	4719	—	—	—	—	start continuous		
133	4736	65	10000011	no	—			60kmh ⁻¹ speed limit from C2
134	—	—	—	—	R,L	risk		C2 + 2s
135	—	—	—	—	—	stop continuous		stop at C2 + 10s EXCEPT risk, d.s. + 20s
136	4751	—	—	—	—	start continuous		
137	4763	66	10000101	no	—			danger crossroads
138	4789	67	10000111	no	—			direction sign
139	—	—	—	—	R,M	risk		C2 + 3s
140	—	—	—	—	—	stop continuous		C2 + 10s EXCEPT risk, d.s. + 20s
141	4817	—	—	—	—	start continuous		
142	4829	68	10001001	no	—			90kmh ⁻¹ from C2
143	—	—	—	—	—	stop continuous		C2 + 10s
144	5246	—	—	—	—	start continuous		
145	5263	69	10001011	no	—			danger, road from left
146	—	—	—	—	R,L	risk		C2 + 2s
147	—	—	—	—	—	stop continuous		C2 + 10s EXCEPT risk: d.s. + 20s

EVENT NO.	DISTANCE COUNT	TOTAL ROAD SIGN COUNT	ROAD SIGN SLIDE CODE	STOP REQD?	PHYSICAL RISK (i.e. risk slide) PROBABILITY	OTHER	PERS 288 REF.	COMMENTS
148	5592	—	—	—	—	start continuous		
149	5609	70	10001101	no	—			danger cattle
150	—	—	—	—	R,H	risk		C2 + 3s
151	—	—	—	—	—	stop continuous		C2 + 10s EXCEPT risk. d.s. + 20s
152	5932	—	—	—	—	start continuous		
153	5949	71	10001111	no	—			danger road from right
154	—	—	—	—	R,L	risk		C2 + 3s
155	—	—	—	—	—	stop continuous		C2 + 10s EXCEPT risk, d.s. + 20s
156	6086	—	—	—	—	start continuous		
157	6103	72	10010001	no	—			danger cyclists
158	—	—	—	—	R,L	risk		C2 + 1s
159	—	—	—	—	—	stop continuous		C2 + 10s EXCEPT risk: d.s. + 20s
160	6179	—	—	—	—	start continuous		
161	6196	73	10010011	no	—			60kmh-1 speed limit from C2
162	—	—	—	—	R,L	risk		C2 + 3s
163	—	—	—	—	—	stop continuous		C2 + 10s EXCEPT risk: d.s. + 20s
164	6211	—	—	—	—	start continuous		
165	6223	74	10010101	no	—			danger roadworks
166	—	—	—	—	R,M	risk		C2 + 2s
167	—	—	—	—	—	stop continuous		C2 + 10s EXCEPT risk: d.s.+ 20s
168	6277	—	—	—	—	start continuous		
169	6289	75	10010111	no	—			danger trucks
170	—	—	—	—	R,M	risk		C2 + 3s
171	—	—	—	—	—	stop continuous		C2 + 10s EXCEPT risk: d.s.+ 20s
172	6384	—	—	—	—	start continuous		
173	6396	76	10011001	yes	—	start timer when speed is zero		stop sign

EVENT NO.	DISTANCE COUNT	TOTAL ROAD SIGN COUNT	ROAD SIGN SLIDE CODE	STOP REQD?	PHYSICAL RISK (i.e. risk slide) PROBABILITY	OTHER	PERS 288 REF.	COMMENTS
174	-	-	-	-	-	25s after stop		go sign
175	-	-	-	-	R,M	risk		C2
176	-	-	-	-	-	stop continuous		C2 + 10s EXCEPT risk: d.s. + 20s
177	6424	-	-	-	-	start continuous		
178	6436	77	10011011	no	-			90kmh-1 speed limit from C2
179	-	-	-	-	-	stop continuous		C2 + 10s
180	7066	-	-	-	-	start continuous		
181	7083	78	10011101	no	-			danger, road from right
182	-	-	-	-	R,L	risk		C2 + 1s
183	-	-	-	-	-	stop continuous		C2 + 10s EXCEPT risk: d.s. + 20s
184	7226	-	-	-	-	start continuous		10s prior to sign
185	7243	79	10011111	no	-			△ road from right
186	-	-	-	-	R,L	risk		C2
187	-	-	-	-	-	stop continuous		C2 + 10s/d.s. + 20s
188	7350	-	-	-	-	VDU		message to VDU: "Change to magazine #2 in 30 seconds" Buzzer
189	7400	80	10100001	-	-	dummy stimulus	5.3.1 5.5	
190	-	-	-	-	-	read code		at C1 latch slide fader "on" and read code
191	-	-	-	-	-	VDU		message to VDU: "change to mag #2" more distance pulses
192	-	-	-	-	-	stop logging		Decrement dist. count. Stop logging
193	-	-	-	-	-	projector reset		Expresses reset s/w. Start counting dist. pulses
194	-	1	00000011	-	-	dummy stimulus		change to this slide at 1st distance pulse received
195	-	-	-	-	-	read slide code		read at d.s. + 1 second
196	-	-	-	-	-	restart logging		If slide I.D. is O.K., re- start logging, etc.

EVENT NO.	DISTANCE COUNT	TOTAL ROAD SIGN COUNT	ROAD SIGN SLIDE CODE	STOP REQD?	PHYSICAL RISK (i.e. risk slide) PROBABILITY	OTHER	PERS 288 REF.	COMMENTS
197	7439	—	—	—	—	start continuous		
198	7456	2	00000101	no	—			60kmh-1 speed limit from C2
199	—	—	—	—	R,L	risk		C2 + 3s
200	—	—	—	—	—	stop continuous		C2 + 10s/d.s. + 20s
201	7477	—	—	—	—	start continuous		
202	7489	3	00000111	no	—			danger, road from left
203	7509	4	00001001	no	—			direction sign
204	—	—	—	—	R,M	risk		C2 + 1s
205	—	—	—	—	—	stop continuous		C2 + 10s/d.s. + 20s
206	7537	—	—	—	—	start continuous		
207	7549	5	00001011	no	—			danger children
208	—	—	—	—	R,H	risk		C2 + 1s
209	—	—	—	—	—	stop continuous		C2 + 10s/d.s. + 20s
210	8097	—	—	—	—	start continuous		
211	8109	6	00001101	no	—			90kmh-1 speed limit from C2
212	—	—	—	—	—	stop continuous		C2 + 10s
213	8239	—	—	—	—	start continuous		
214	8256	7	00001111	no	—			direction sign
215	—	—	—	—	R,L	risk		C2
216	—	—	—	—	—	stop continuous		C2 + 10s/d.s. + 20s
217	8426	—	—	—	—	start continuous		
218	8443	8	00010001	no	—			hospital
219	—	—	—	—	—	stop continuous		C2 + 10s
220	8639	—	—	—	—	start continuous		
221	8656	9	00010011	no	—			danger trucks
222	—	—	—	—	R,M	risk		C2 + 3s
223	—	—	—	—	—	stop continuous		C2 + 10s/d.s. + 20s
224	8919	—	—	—	—	start continuous		
225	8936	10	00010101	no	—			rest 1K
226	—	—	—	—	—	stop continuous		C2
227	9066	—	—	—	—	start continuous		

EVENT NO.	DISTANCE COUNT	TOTAL ROAD SIGN COUNT	ROAD SIGN SLIDE CODE	STOP REQD?	PHYSICAL RISK (i.e. risk slide) PROBABILITY	OTHER	PERS 288 REF.	COMMENTS
228	9083	11	00010111	no	—			petrol 3 km
229	—	—	—	—	—	stop continuous		C2 + 10s
230	9159	—	—	—	—	start continuous		
231	9176	12	00011001	no	—			danger pedestrians
232	—	—	—	—	R,M	risk		C2
233	—	—	—	—	—	stop continuous		C2 + 10s/d.s. + 20s
234	9232	—	—	—	—	start continuous		
235	9249	13	00011011	no	—			60kmh-1 speed limit from C2
236	—	—	—	—	R,L	risk		C2 + 1s
237	—	—	—	—	—	stop continuous		C2 + 10s/d.s. + 20s
238	9264	—	—	—	—	start continuous		
239	9276	14	00011101	no	—			danger roadworks
240	—	—	—	—	R,H	risk		C2 + 2s
241	—	—	—	—	—	stop continuous		C2 + 10s/d.s. + 20s
242	9291	—	—	—	—	start continuous		
243	9303	15	00011111	no	—			direction sign
244	—	—	—	—	R,M	risk		C2 + 1s
245	—	—	—	—	—	stop continuous		C2 + 10s/d.s. + 20s
246	9357	—	—	—	—	start continuous		
247	9369	16	00100001	no	—			60kmh-1
248	—	—	—	—	—	stop continuous		C2 + 10s
249	9791	—	—	—	—	start continuous		
250	9803	17	00100011	no	—			danger roadworks
251	—	—	—	—	R,H	risk		C2 + 3s
252	—	—	—	—	—	stop continuous		C2 + 10s/d.s. + 20s
253	9904	—	—	—	—	start continuous		
254	9916	18	00100101	no	—			90kmh-1 speed limit from C2
255	—	—	—	—	—	stop continuous		C2 + 10s
256	10212	—	—	—	—	start continuous		
257	10229	19	00100111	no	—			danger 2-way traffic
258	—	—	—	—	—	stop continuous		C2 + 10s

EVENT NO.	DISTANCE COUNT	TOTAL ROAD SIGN COUNT	ROAD SIGN SLIDE CODE	STOP REQD?	PHYSICAL RISK (i.e. risk slide) PROBABILITY	OTHER	PERS 288 REF.	COMMENTS
259	10612	—	—	—	—	start continuous		
260	10629	20	00101001	no	—			▲
261	—	—	—	—	R,L	risk		C2 + 3s
262	—	—	—	—	—	stop continuous		C2 + 10s/d.s. + 20s
263	10679	—	—	—	—	start continuous		
264	10696	21	00101011	no	—			rest, 1 km
265	10756	—	—	no	—			danger, cattle
266	—	—	—	—	R,M	risk		C2 + 3s
267	—	—	—	—	—	stop continuous		C2 + 10s/d.s. + 20s
268	10946	—	—	—	—	start continuous		
269	10963	22	00101101	no	—			axle max limit
270	—	—	—	—	—	stop continuous		C2 + 10s
271	10972	—	—	—	—	start continuous		
272	10989	23	00101111	no	—			direction sign
273	—	—	—	—	R,L	risk		C2 + 1s
274	—	—	—	—	—	stop continuous		C2 + 10s/d.s. + 20s
275	11359	—	—	—	—	start continuous		
276	11376	24	00110001	no	—			60kmh-1 s.l. from C2
277	—	—	—	—	R,L	risk		C2 + 3s
278	—	—	—	—	—	stop continuous		C2 + 10s/d.s. + 20s
279	11457	—	—	—	—	start continuous		
280	11469	25	00110011	no	—			danger roadworks
281	—	—	—	—	R,M	risk		C2 + 2s
282	—	—	—	—	—	stop continuous		C2 + 10s/d.s. + 20s
283	11484	—	—	—	—	start continuous		
284	11496	26	00110101	no	—			danger road grader
285	—	—	—	—	R,H	risk		C2 + 1s
286	—	—	—	—	—	stop continuous		C2 + 10s/d.s. + 20s
287	11551	—	—	—	—	start continuous		
288	11563	27	00110111	no	—			danger trucks
289	—	—	—	—	R,M	risk		C2 + 1s
290	—	—	—	—	—	stop continuous		C2 + 10s/d.s. + 20s

EVENT NO.	DISTANCE COUNT	TOTAL ROAD SIGN COUNT	ROAD SIGN SLIDE CODE	STOP REQD?	PHYSICAL RISK (i.e. risk slide) PROBABILITY	OTHER	PERS 288 REF.	COMMENTS
291	11724	—	—	—	—	start continuous		
292	11736	28	00111001	yes	—	when vehicle stops start timer		stop sign
293	—	29	00111011	no	—	25s after stop		go sign
294	—	—	—	—	R,M	risk		C2
295	—	—	—	—	—	stop continuous		C2 + 10s/d.s. + 20s
296	11764	—	—	—	—	start continuous		
297	11776	30	00111101	no	—			90kmh ⁻¹ speed limit from C2
298	—	—	—	—	—	stop continuous		C2 + 10s
299	12139	—	—	—	—	start continuous		
300	121516	31	00111111	no	—			danger, road from left
301	—	—	—	—	R,L	risk		C2 + 1s
302	—	—	—	—	—	stop continuous		C2 + 10s/d.s. + 20s
303	12426	—	—	—	—	start continuous		
304	12443	32	01000001	no	—			danger, road from right
305	—	—	—	—	R,L	risk		C2 + 1s
306	—	—	—	—	—	stop continuous		C2 + 10s/d.s. + 20s
307	12725	—	—	—	—	start continuous start timer		60s recording when very little external activity
308	—	—	—	—	—	after 60s stop cont		
309	12892	—	—	—	—	start continuous		
310	12909	33	01000011	no	—			hospital 1 K
311	—	—	—	—	—	stop continuous		C2 + 10s
312	12946	—	—	—	—	start continuous		
313	12963	34	01000101	no	—			pedestrian crossing
314	—	—	—	—	R,M	risk		C2 + 2s
315	—	—	—	—	—	stop continuous		C2 + 10s/d.s. + 20s
316	13292	—	—	—	—	start continuous		
317	13309	35	01000111	no	—			rest 1K
318	13388	—	—	—	p = 1	risk		
319	—	—	—	—	—	stop continuous		compulsary risk sequence. Stop at d.s. + 20s
320	13599	—	—	—	—	start continuous		

EVENT NO.	DISTANCE COUNT	TOTAL ROAD SIGN COUNT	ROAD SIGN SLIDE CODE	STOP REQD?	PHYSICAL RISK (i.e. risk slide) PROBABILITY	OTHER	PERS 288 REF.	COMMENTS
321	13616	36	01001001	no	-			60kmh ⁻¹ speed limit from C2
322	-	-	-	-	R,L	risk		C2
323	-	-	-	-	-	stop continuous		C2 + 10s/d.s. + 20s
324	13631	-	-	-	-	start continuous		
325	13643	37	01001011	no	-			danger roadworks
326	-	-	-	-	R,M	risk		C2
327	-	-	-	-	-	stop continuous		
328	13684	-	-	-	-	start continuous		
329	13696	38	01001101	no	-			90kmh ⁻¹ speed limit from C2
330	-	-	-	-	-	stop continuous		C2 + 10s
331	14025	-	-	-	-	start continuous		
332	14042	39	01001111	no	-			hotel 3K
333	-	-	-	-	-	stop continuous		C2 + 10s
334	14246	-	-	-	-	start continuous		
335	14263	40	01010001	no	-			danger cattle
336	-	-	-	-	R,M	risk		C2 + 3s
337	-	-	-	-	-	stop continuous		C2 + 10s/d.s. + 20s
338	14506	-	-	-	-	start continuous		
339	14523	41	01010011	no	-			60kmh ⁻¹ speed limit from C2
340	-	-	-	-	R,L	risk		C2
341	14576	42	01010101	no	-			direction sign
342	-	-	-	-	R,M	risk		C2 + 1s
343	-	-	-	-	-	stop continuous		C2 + 10s/d.s. + 20s
344	14604	-	-	-	-	start continuous		
345	14616	43	01010111	no	-			danger pedestrians
346	-	-	-	-	R,M	risk		C2 + 2s
347	-	-	-	-	-	stop continuous		C2 + 10s/d.s. + 20s
348	14684	-	-	-	-	start continuous		
349	14696	44	01011001	no	-			60kmh ⁻¹
350	-	-	-	-	-	stop continuous		C2 + 10s
351	14724	-	-	-	-	start continuous		
352	14736	45	01011011	yes	-	start timer when vehicle stops		stop sign

EVENT NO.	DISTANCE COUNT	TOTAL ROAD SIGN COUNT	ROAD SIGN SLIDE CODE	STOP REQD?	PHYSICAL RISK (i.e. risk slide) PROBABILITY	OTHER	PERS 288 REF.	COMMENTS
353	-	46	01011101	no	-	25s after stop		go sign
354	-	-	-	-	R,M	risk		C2 + 3s
355	-	-	-	-	-	stop continuous		C2 + 10s/d.s. + 20s
356	14777	-	-	-	-	start continuous		
357	14789	47	01011111	no	-			90kmh-1 s.l. from C2
358	-	-	-	-	-	stop continuous		C2 + 10s
359	14919	-	-	-	-	start continuous		
360	14936	48	01100001	no	-			danger slippery road
361	-	-	-	-	R,L	risk		C2 + 3s
362	-	-	-	-	-	stop continuous		C2 + 10s/d.s. + 20s
363	14986	-	-	-	-	start continuous		
364	15003	49	01100011	no	-			danger trucks
365	-	-	-	-	R,M	risk		C2
366	-	-	-	-	-	stop continuous		C2 + 10s/d.s. + 20s
367	15086	-	-	-	-	start continuous		
368	15103	50	01100101	no	-			danger road from right
369	-	-	-	-	R,L	risk		C2
370	-	-	-	-	-	stop continuous		
371	15166	-	-	-	-	start continuous		
372	15183	51	01100111	no	-			60kmh-1 speed limit from C2
373	-	-	-	-	R,L	risk		C2
374	-	-	-	-	-	stop continuous		C2 + 10s/d.s. + 20s
375	15224	-	-	-	-	start continuous		
376	15236	52	01101001	no	-			direction sign
377	-	-	-	-	R,M	risk		C2 + 3s
378	-	-	-	-	-	stop continuous		
379	15344	-	-	-	-	start continuous		
380	15356	53	01101011	no	-			danger children
381	-	-	-	-	R,H	risk		C2 + 2s
382	-	-	-	-	-	stop continuous		C2 + 10s/d.s. + 20s
383	15397	-	-	-	-	start continuous		
384	15409	54	01101101	no	-			90kmh-1 speed limit from C2
385	-	-	-	-	-	stop continuous		C2 + 10s

EVENT NO.	DISTANCE COUNT	TOTAL ROAD SIGN COUNT	ROAD SIGN SLIDE CODE	STOP REQD?	PHYSICAL RISK (i.e. risk slide) PROBABILITY	OTHER	PERS 288 REF.	COMMENTS
386	15696	-	-	-	-	start continuous		
387	15703	55	01101111	no	-			danger no overtaking
388	-	-	-	-	R,L	risk		C2 + 2s
389	-	-	-	-	-	stop continuous		
390	15839	-	-	-	-	start continuous		
391	15856	56	01110001	no	-			60kmh ⁻¹ speed limit from C2
392	-	-	-	-	R,L	risk		C2 + 3s
393	-	-	-	-	-	stop continuous		
394	15951	-	-	-	-	start continuous		
395	15963	57	01110011	yes	-	start timer when vehicle stops		stop sign
396	-	58	01110101	no	-	change slide at 25s		go sign
397	-	-	-	-	R,M	risk		C2
398	-	-	-	-	-	stop continuous		C2 + 10s/d.s. + 20s
399	16004	-	-	-	-	start continuous		
400	16016	59	01110111	no	-			90kmh ⁻¹ speed limit from C2
401	-	-	-	-	-	stop continuous		C2 + 10s
402	16212	-	-	-	-	start continuous		
403	16229	60	01111001	no	-			90kmh ⁻¹ from C2
404	-	-	-	-	-			90kmh ⁻¹ from C2
405	16319	-	-	-	-	start continuous		
406	16336	61	01111011	no	-			rest 1Km
407	-	-	-	-	-			
408	-	-	-	-	-			
409	16415	-	-	-	p = 1	risk	5.4 5.11.1	
410	-	-	-	-	-	stop continuous		risk sequence here at d.s. + 20s
411	16644	-	-	-	-			continuous store, from now on
412	16729	62	01111111	no	-			road sign (pedestrians)
413	-	-	-	-	R,M	risk		C2 + 3 sec

EVENT NO.	DISTANCE COUNT	TOTAL ROAD SIGN COUNT	ROAD SIGN SLIDE CODE	STOP REQD?	PHYSICAL RISK (i.e. risk slide) PROBABILITY	OTHER	PERS 288 REF.	COMMENTS
414	17176	63	01111111	no				△ no overtaking C2 + 2s Message to VDU: "change to magazine #3 in 30 seconds" Buzzer
415	-	-	-	-	R,L			
416	17283	-	-	-	-	VDU		
417	17333	80	10100001	no		dummy stimulus		Read at C1 and latch fader "on"
418	-	-	-	-	-	read code		
419	-	-	-	-	-	VDU		Message to VDU: "change to magazine #3"
420	-	-	-	-	-	stop logging		Ignore dist pulses and decrement dist count: Stop logging
421	-	-	-	-	-	projector reset S/W		E presses proj reset S/W.
422	-	1	00000011	no	-	dummy stimulus		Start counting dist. pulses Change slide at first distance pulse received
423	-	-	-	-	-	read slide code		read at d.s. + 1sec.
424	-	-	-	-	-	restart logging		Restart if slide I.D. O.K.
425	17456	2	00000101	no	-			△ trucks
426	-	-	-	-	R,M	risk		
427	17472	-	-	-	-	R - U trans. police risk		
428	17596	3	00000111	no	-			police 1 km
429	17709	4	-	no	-			danger road from right
430	-	-	-	-	R,L	risk		C2 + 1s
431	17869	5	00001011	no	-			danger cattle
432	-	-	-	-	R,M	risk		C2 + 2s
433	17923	6	00001101	no	-			distance sign
434	18128	7	00001111	no	-			60km ⁻¹ speed limit from C2
435	18144	-	-	-	-	R-U transition physical risk	5.11	
436	-	-	-	-	-	low - high trans., R.L.G.	5.8	random light generator

EVENT NO.	DISTANCE COUNT	TOTAL ROAD SIGN COUNT	ROAD SIGN SLIDE CODE	STOP REQD?	PHYSICAL RISK (i.e. risk slide) PROBABILITY	OTHER	PERS 288 REF.	COMMENTS
437	-	-	-	-	U,L	phys. risk prob. gen		
438	18147	8	00010001	no	-			60kmh-1
439	18160	9	00010011	no	-			danger children
440	-	-	-	-	U,M	risk (physical)		C2 + 3s
441	18175	10	00010101	yes	-	start timer when vehicle stops		red traffic signal
442	-	11	00010111	no	-	Change to this slide after 25s		green traffic signal
443	-	-	-	-	U,L	risk (physical)		C2
444	18192	12	00011001	no	-			
445	18215	13	00011011	no	-			green traffic signal
446	-	-	-	-	U,L	risk (physical)		C2
447	18247	14	00011101	no	-			green traffic signal
448	-	-	-	-	U,L	risk		C2
449	18271	15	00011111	yes	-	start timer when vehicle stops		stop sign
450	-	16	00100001	-	-	25s after stop, change to this slide		go sign
451	-	-	-	-	U,M	risk prob gen		risk prob gen sampled at C2
452	18293	17	0010001	no	-			hospital sign
453	18310	18	00100101	yes	-			red traffic signal. Start timer when vehicle stops.
454	-	19	00100111	-	-	25s after stop change to this slide		green traffic signal
455	-	-	-	-	U,L	risk prob gen		risk prob gen sampled at C2
456	18335	20	00101001	no	-			Slippery road
457	-	-	-	-	U,L	risk		C2 + 2s
458	18365	21	00101011	no	-			green traffic signal
459	-	-	-	-	U,L	risk prob gen		C2
460	18390	22	00101101	no	-			pedestrian crossing
461	-	-	-	-	U,M	risk prob gen		C2 + 1s
462	18417	23	00101111	yes	-			stop sign. Start timer when vehicle stops

EVENT NO.	DISTANCE COUNT	TOTAL ROAD SIGN COUNT	ROAD SIGN SLIDE CODE	STOP REQD?	PHYSICAL RISK (i.e. risk slide) PROBABILITY	OTHER	PERS 288 REF.	COMMENTS
463	-	24	00110001	-	-	25s after stop change to this sign		go sign
464	-	-	-	-	U,M	risk prob gen		C2
465	18439	25	00110011	yes	-			red traffic signal. Start timer when vehicle stops
466	-	26	00110101	no	-	25s after stop change to this slide		green traffic signal
467	-	-	-	-	U,L	risk prob gen		C2
468	18463	27	00110111	no	-			school children crossing
469	-	-	-	-	U,M	risk prob gen		C2
470	18488	28	00111001	yes	-			red traffic signal. Start timer when vehicle stops
471	-	29	00111011	no	-	25s after stop, change to this slide		green traffic signal
472	-	-	-	-	U,L	risk prob. gen		C2
473	18506	30	00111101	yes	-			stop sign. Start timer when vehicle stops
474	-	31	00111111	no	-	25s after stop		go sign
475	-	-	-	-	U,M	risk prob gen		C2
476	18536	32	01000001	no	-			pedestrian crossing
477	-	-	-	-	U,M	risk prob gen		C2
478	18558	33	01000011	yes	-			red traf sig. Start timer when vehicle stops.
479	-	34	01000101	no	-	25s after stop		green traffic signal
480	-	-	-	-	U,L	risk prob. gen		C2
481	18584	35	01000111	no	-			speed limit 40kmh ⁻¹ (from C2)
482	-	-	-	-	U,L	risk prob gen		C2 + 3s
483	18597	36	01001001	no	-			danger road works
484	-	-	-	-	p = 1	risk prob gen		C2 + 3s
485	18621	37	01001011	no	-			green robot
486	-	-	-	-	U,M	risk prob gen		C2
487	18645	38	01001101	no	-			speed limit 60 from C2
488	18675	39	01001111	yes	-	start timer when speed of V zero		stop sign. Start timer when vehicle stops

EVENT NO.	DISTANCE COUNT	TOTAL ROAD SIGN COUNT	ROAD SIGN SLIDE CODE	STOP REQD?	PHYSICAL RISK (i.e. risk slide) PROBABILITY	OTHER	PERS 288 REF.	COMMENTS
489	-	40	01010001	no	-			go sign
490	-	-	-	-	U,M			C2
491	18700	41	01010011	no	-			green traffic signal
492	-	-	-	-	U,L			C2
493	18728	42	01010101	no	-			unguarded level crossing
494	-	43	01010111	yes	(U,M)	change to this slide at pulse from C2		level crossing 2 tracks
495	18753	44	01011001	yes	-	Start timer when veh. stops		Stop sign
496	-	45	01011011	no	-	25s after stop		go sign
497	-	-	-	-	U,M	risk prob gen		C2
498	18775	46	01011101	no	-			direction sign
499	18788	47	01011111	no	-			Durban x km
500	18816	-	-	-	-	high-to-low stimulus density transition		random light generator
501	-	48	01100001	no	-			90kmh-1 speed limit from C2
502					(R)	Urban to Rural transition. Phys risk		
503	19180	49	01100011	no	-			Durban 529km
504	19363	50	01100101	no	-			40kmh-1 speed limit from C2
505	-	-	-	-	R,L	risk prob gen.		C2 + 3s
506	19402	51	01100111	no	-			danger roadworks
507	-	-	-	-	R,M	risk prob gen.		C2 + 2s
508	19445	52	01101001	no	-			90kmh-1 speed limit from C2
509	19488	-	-	-	-	U-R transition police detection		danger road works
510	19628	53	01101011	no	-			
511	-	-	-	-	R,M	risk prob gen		C2 + 2s
512	19633	54	01101101	no	-			danger no overtaking
513	-	-	-	-	R,L	risk prob gain		C2
514	20201	55	01101111	no	-			60kmh-1 speed limit from C2
515	-	-	-	-	R,L	risk		C2 + 2s
516	20238	56	01110001	no	-			crossroads
517	-	-	-	-	R,M			C2

EVENT NO.	DISTANCE COUNT	TOTAL ROAD SIGN COUNT	ROAD SIGN SLIDE CODE	STOP REQD?	PHYSICAL RISK (i.e. risk slide) PROBABILITY	OTHER	PERS 288 REF.	COMMENTS
518	20248	-	-	-	-	start continuous		
519	20260	57	01110011	no				90kmh-1 s.1. from C2
520	-	-	-	-	R,L	risk		C2
521	-	-	-	-	-	stop continuous		C2 + 10s/d.s. + 20s
522	-	58	01110101			start continuous		
523	20560	59	01110111	no				danger road from left
524	-	-	-	-	R,L	risk		C2 + 3s
525	-	-	-	-	-	stop continuous store		stop continuous store at C- plus 10s OR if risk sequence is in operation, at dummy slide plus 20s
526	20843	-	-	-	-	high rates cont		
527	20860	60	01111001	no				Police 1K
528	-	-	-	-	-	stop continuous store low sampling rates		at C2 plus 10s
529	21172	-	-	-	-	continuous store high sampling rates		
530	21189	61	01111011	no				danger road from left
531	-	-	-	-	R,L	risk		C2
532	-	-	-	-	-	stop continuous		at C2 plus 10s EXCEPT if risk sequence dummy stimulus plus 20s
533	21216	-	-	-	-	continuous storage		
534	21233	62	01111101	no				danger trucks
535	-	-	-	-	R,M	risk		C2 + 1s
536	-	-	-	-	-	stop continuous		C2 plus 10s EXCEPT risk-dummy stimulus plus 20s
537	21650	-	-	-	-	continuous		
538	21667	63	01111111	no				resting 1K
539	-	-	-	-	-	stop continuous		C2 plus 10s EXCEPT dummy stimulus plus 20s
540	21733	-	-	-	-	start continuous		
541	21750	-	-	-	p = 1	risk		risk sequence here
542	-	-	-	-	-	stop continuous		stop at d.s. + 20s

EVENT NO.	DISTANCE COUNT	TOTAL ROAD SIGN COUNT	ROAD SIGN SLIDE CODE	STOP REQD?	PHYSICAL RISK (i.e. risk slide) PROBABILITY	OTHER	PERS 288 REF.	COMMENTS
543	21850	—	—	—	—	continuous store		
544	21867	64	10000001	no	—			direction sign
545	21891	65	10000011	no	—			danger intersection from left
546	—	—	—	—	R,M	risk		C2 + 1s
547	—	—	—	—	—	stop continuous		C2 plus 10s EXCEPT risk: ds + 20s
548	—	—	—	—	—	continuous store		
549	21960	66	10000101	no	—			60kmh ⁻¹ speed limit from C2
550	—	—	—	—	R,L	risk		C2 + 3s
551	—	—	—	—	—	stop continuous		C2 + 10s EXCEPT risk - d.s. + 20s
552	22001	—	—	—	—	continuous store		
553	22013	67	10000111	no	—			danger children crossing
554	—	—	—	—	R,M	risk		C2 + 3s
555	—	—	—	—	—	stop continuous		C2 + 10s EXCEPT risk - d.s. + 20s
556	22041	—	—	—	—	continuous store		
557	22053	68	10001001	yes	—			start timer stop sign
558	—	69	10001011	no	—	25s after stop		go sign. Start timer at C2
559	—	—	—	—	R,M	risk		C2
560	—	—	—	—	—	stop continuous		C2 plus 20s EXCEPT risk - d.s. + 20s
561	22383	—	—	—	—	start continuous		
562	22395	70	10001101	no	—			90kmh ⁻¹ speed limit from C2
563	—	—	—	—	—	stop continuous		C2 plus 10s
564	22583	—	—	—	—	start continuous		
565	22600	71	10001111	no	—			Hotel 3km
566	—	—	—	—	—	stop continuous		C2 plus 10s
567	22716	—	—	—	—	start continuous		Start timer 60s recording
568	—	—	—	—	—	stop continuous		Stop at 60s when little act.
569	22863	—	—	—	—	start continuous		
570	22880	72	10010001	no	—			60kmh ⁻¹ speed limit from C2

EVENT NO.	DISTANCE COUNT	TOTAL ROAD SIGN COUNT	ROAD SIGN SLIDE CODE	STOP REQD?	PHYSICAL RISK (i.e. risk slide) PROBABILITY	OTHER	PERS 288 REF.	COMMENTS
571	-	-	-	-	R,L	risk		
572	-	-	-	-	-	stop continuous		Stop at C2 + 10s EXCEPT risk d.s. + 20s
573	22895	-	-	-	-	start continuous		
574	22907	73	10010011	no				danger crossroads
575	22933	74	10010101	no				direction sign
576	-	-	-	-	R,M	risk		C2 + 3s
577	-	-	-	-	-	stop continuous		C2 + 10s EXCEPT risk: d.s. + 20s
578	22961	-	-	-		start continuous		
579	22973	75	10010111	no				90kmh-1 from C2
580	-	-	-	-		stop continuous		C2 + 10s
581	23390	-	-	-		start continuous		
582	23407	76	10011001	no				danger, road from left
583	-	-	-	-	R,L	risk		C2 + 2s
584	-	-	-	-		stop continuous		C2 + 10s EXCEPT risks: d.s. + 20s
585	23736	-	-	-		start continuous		
586	23753	77	10011011	no				danger cattle
587	-	-	-	-	R,H	risk		C2 + 3s
588	-	-	-	-		stop continuous		C2 + 10s EXCEPT risk: d.s. + 20s
589	24076	-	-	-		start continuous		
590	24093	78	10011101	no				#danger road from right
591	-	-	-	-	R,L	risk		C2 + 3s
592	-	-	-	-		stop continuous		C2 + 10s/d.s. + 20s
593	24180	-	-	-		VDU		Message: "Change to magazine 4 in 30s." Buzzer.
594	24225	80	10100001	no		dummy stimulus		
595	-	-	-	-		read code		Read at C1. Latch fader "on"
596	-	-	-	-		VDU		Message: "Change to magazine number 4"
597	-	-	-	-		stop logging		Ignore distance pulses and decrement dist. count. Stop logging data.

EVENT NO.	DISTANCE COUNT	TOTAL ROAD SIGN COUNT	ROAD SIGN SLIDE CODE	STOP REQD?	PHYSICAL RISK (i.e. risk slide) PROBABILITY	OTHER	PERS 288 REF.	COMMENTS
624	24580	7	00001111	no				90kmh ⁻¹ speed limit from C2
625	-	-	-	-		stop continuous		C2 + 10s
626	25210	-	-	-		start continuous		
627	25227	8	00010001	no				danger road from left
628	-	-	-	-	R,L	risk		C2 + 1s
629	-	-	-	-	-	stop continuous		C2 + 10s EXCEPT risk: d.s. + 20s
630	25370	-	-	-	-	start continuous		
631	25387	9	00010011	no				60kmh ⁻¹ speed limit from C2
632	-	-	-	-	R,L	risk		C2 + 3s
633	-	-	-	-	-	stop continuous		C2 + 10s/d.s. + 20s
634	25621	-	-	-	-	start continuous		
635	25633	10	00010101	no				danger road from left
636	25653	11	00010111	no				direction sign
637	-	-	-	-	R,M	risk		C2 + 1s
638	-	-	-	-	-	stop continuous		C2 + 10s/d.s. + 20s
639	25681	-	-	-	-	start continuous		
640	25693	12	00011001	no				danger children
641	-	-	-	-	R,H	risk		C2 + 1s
642	-	-	-	-	-	stop continuous		C2 + 10s/d.s. + 20s
643	26241	-	-	-	-	start continuous		
644	26253	13	00011011	no				90kmh ⁻¹ speed limit from C2
645	-	-	-	-	-	stop continuous		C2 + 10s
646	26383	-	-	-	-	start continuous		
647	26400	14	00011101	no				direction sign
648	-	-	-	-	R,L	risk		C2
649	-	-	-	-	-	stop continuous		C2 + 10s/d.s. + 20s
650	26570	-	-	-	-	start continuous		
651	26587	15	00011111	no				hospital
652	-	-	-	-	-	stop continuous		C2 + 10s
653	26783	-	-	-	-	start continuous		
654	26800	16	00100001	no				danger trucks
655	-	-	-	-	R,M	risk		C2 + 3s
656	-	-	-	-	-	stop continuous		C2 + 10s/d.s. + 20s

EVENT NO.	DISTANCE COUNT	TOTAL ROAD SIGN COUNT	ROAD SIGN SLIDE CODE	STOP REQD?	PHYSICAL RISK (i.e. risk slide) PROBABILITY	OTHER	PERS 288 REF.	COMMENTS
657	27063	-	-	-	-	start continuous		
658	27080	17	00100011	no				Rest 1K
659	-	-	-	-		stop continuous		C2
660	27210	-	-	-		start continuous		
661	27227	18	00100101	no				Petrol 3K
662	-	-	-	-		stop continuous		C2 + 10s
663	27303	-	-	-		start continuous		
664	27320	19	00100111	no				danger pedestrians
665	-	-	-	-	R,M	risk		C2
666	-	-	-	-	-	stop continuous		C2 + 10s/d.s. + 10s
667	27376	-	-	-	-	start continuous		
668	27393	20	00101001	no				60kmh ⁻¹ speed limit from C2
669	-	-	-	-	R,L	risk		C2 + 1s
670	-	-	-	-	-	stop continuous		C2 + 10s/d.s. + 20s
671	27408	-	-	-	-	start continuous		
672	27420	21	00101011	no				danger roadworks
673	-	-	-	-	R,H	risk		C2 + 2s
674	-	-	-	-	-	stop continuous		C2 + 10s/d.s. + 20s
675	27435	-	-	-	-	start continuous		90kmh ⁻¹ speed limit from C2
676	27447	22	00101101	no				
677	-	-	-	-		stop continuous		C2 + 10s
678	28356	-	-	-		start continuous		
679	28373	23	00101111					danger 2-way traffic
680	-	-	-	-		stop continuous		C2 + 10s
681	28756	-	-	-		start continuous		
682	28773	24	00110001	no				danger road from left
683	-	-	-	-	R,L	risk		C2 + 3s
684	-	-	-	-	-	stop continuous		C2 + 10s/d.s. + 20s
685	28823	-	-	-	-	start continuous		
686	-	25	00110011					Rest 1K
687	-	-	-	-	-	stop continuous		C2 + 10s
688	28850	26	00110101	no		start continuous		danger cattle
689	-	-	-	-	R,M	risk		C2 + 3s
690	-	-	-	-	-	stop continuous		C2 + 10s/d.s. + 20s

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EVENT NO.	DISTANCE	TOTAL ROAD SIGN COUNT	ROAD SIGN SLIDE CODE	STOP REQD?	PHYSICAL RISK (i.e. risk slide) PROBABILITY	OTHER	PERS 288 REF.	COMMENTS
691	29090							
692	29107	27	00110111	no		start continuous		axle max. limit
693	-	-	-	-		stop continuous		C2 + 10s
694	29116	-	-	-		start continuous		
695	29133	28	00111001	no				direction sign
696	-	-	-	-	R,L	risk		C2 + 1s
697	-	-	-	-	-	stop continuous		C2 + 10s/d.s. + 20s
698	29503	-	-	-	-	start continuous		
699	29520	29	00111011	no				60kmh-1 s.1. from C2
700	-	-	-	-	R,L	risk		C2 + 3s
701	-	-	-	-	-	stop continuous		C2 + 10s/d.s. + 20s
702	29601	-	-	-	-	start continuous		
703	29613	30	00111101	no				danger trucks
704	-	-	-	-	R,M	risk		C2 + 1s
705	-	-	-	-	-	stop continuous		C2 + 10s/d.s. + 20s
706	29868	-	-	-	-	start continuous		
707	29880	31	00111111	yes		when vehicle stops, start timer		stop sign
708	-	32	01000001	no		25s after stop		go sign
709	-	-	-	-	R,M	risk		C2
710	-	-	-	-	-	stop continuous		C2 + 10s/d.s. + 20s
711	29908	-	-	-	-	start continuous		
712	29920	33	01000011	no				90kmh-1 speed limit from C2
713	-	-	-	-		stop continuous		C2 + 10s
714	30283	-	-	-		start continuous		
715	30300	34	01000101	no				danger road from left
716	-	-	-	-	R,L	risk		C2 + 1s
717	-	-	-	-	-	stop continuous		C2 + 10s/d.s. + 20s
718	30570	-	-	-	-	start continuous		
719	30587	35	01000111	no				danger road from right
720	-	-	-	-	R,L	risk		C2 + 1s
721	-	-	-	-	-	stop continuous		C2 + 10s/d.s. + 20s
722	30869	-	-	-	-	start continuous start timer		{60s recording when very little external activity

EVENT NO.	DISTANCE COUNT	TOTAL ROAD SIGN COUNT	ROAD SIGN SLIDE CODE	STOP REQD?	PHYSICAL RISK (i.e. risk slide) PROBABILITY	OTHER	PERS 288 REF.	COMMENTS
724	31036	-	-	-		start continuous		
725	31053	36	01001001	no				hospital 1K
726	-	-	-	-		stop continuous		C2 + 10s
727	31090	-	-	-		start continuous		
728	31107	37	01001011	no				Pedestrian crossing
729	-	-	-	-	R,M	risk		C2 + 2s
730	-	-	-	-	-	stop continuous		C2 + 10s/d.s. + 20s
731	31436	-	-	-	-	start continuous		
732	31453	38	01001101	no				Rest 1K
733	31520	-	-	-	R,L	risk		
734	-	-	-	-	-	stop continuous		Stop record. at 31525 EX- CEPT if o/p of prob. given is 1; then stop at d.s. + 20s
735	31743	-	-	-	-	start continuous		
736	31760	39	01001111	no	-			60kmh ⁻¹ speed limit from C2
737	-	-	-	-	R,L	risk		C2
738	-	-	-	-	-	stop continuous		C2 + 10s/d.s. + 20s
739	31775	-	-	-	-	start continuous		
740	31787	40	01010001	no				danger road works
741	-	-	-	-	R,M	risk		C2
742	-	-	-	-	-	stop continuous		
743	31828	-	-	-	-	start continuous		
744	31840	41	01010011	no				danger cattle
745	-	-	-	-	R,M	risk		C2 + 3s
746	-	-	-	-	-	stop continuous		C2 + 10s/d.s. + 20s
747	32650	-	-	-	-	start continuous		
748	32667	42	01010101	no				60kmh ⁻¹ speed limit from C2
749	-	-	-	-	R,L	risk		C2
750	32720	43	01010111	no				direction sign
751	-	-	-	-	R,M	risk		C2 + 3s
752	-	-	-	-	-	stop continuous		C2 + 20s/d.s. + 20s
753	32650	-	-	-	-	start continuous		
754	32667	44	01011001	no				60kmh ⁻¹ speed limit from C2

EVENT NO.	DISTANCE COUNT	TOTAL ROAD SIGN COUNT	ROAD SIGN SLIDE CODE	STOP REQD?	PHYSICAL RISK (i.e. risk slide) PROBABILITY	OTHER	PERS 288 REF.	COMMENTS
755	-	-	-	-	R,L	risk		C2
756	32720	45	01011011	no	-			direction sign
757	-	-	-	-	R,M	risk		C2 + 1s
758	-	-	-	-	-	stop continuous		C2 + 10s/d.s. + 20s
759	32748	-	-	-	-	start continuous		
760	32760	46	01011101	no	-			danger pedestrians
761	-	-	-	-	R,M	risk		C2 + 2s
762	-	-	-	-	-	stop continuous		C2 + 10s/d.s. + 20s
763	32828	-	-	-	-	start continuous		
764	32840	47	01011111	no	-			60kmh-1
765	-	-	-	-	-	stop continuous		C2 + 10s
766	32868	-	-	-	-	start continuous		
767	32880	48	01100001	yes	-	start timer when veh stops		stop sign
768	-	49	01100011	no	-	25s after stop		go sign
769	-	-	-	-	R,M	risk		C2 + 3s
770	-	-	-	-	-	stop continuous		C2 + 10s/d.s. + 20s
771	32921	-	-	-	-	start continuous		
772	32933	50	01100101	no	-			90kmh-1 s.l. from C2
773	-	-	-	-	-	stop continuous		C2 + 10s
774	33063	-	-	-	-	start continuous		
775	33080	51	01100111	no	-			danger slippery road
776	-	-	-	-	R,L	risk		C2 + 3s
777	-	-	-	-	-	stop continuous		C2 + 10s/d.s. + 20s
778	33130	-	-	-	-	start continuous		
779	33147	52	01101001	no	-			danger trucks
780	-	-	-	-	R,M	risk		C2
781	-	-	-	-	-	stop continuous		C2 + 10s/d.s. + 20s
782	33230	-	-	-	-	start continuous		
783	33247	53	01101011	no	-			danger road from right
784	-	-	-	-	R,L	risk		C2
785	-	-	-	-	-	stop continuous		
786	33310	-	-	-	-	start continuous		
787	33327	54	01101101	no	-			60kmh-1 speed limit from C2

EVENT NO.	DISTANCE COUNT	TOTAL ROAD SIGN COUNT	ROAD SIGN SLIDE CODE	STOP REQD?	PHYSICAL RISK (i.e. risk slide) PROBABILITY	OTHER	PERS 288 REF.	COMMENTS
788	-	-	-	-	R,L	risk		C2
789	-	-	-	-	-	stop continuous		C2 + 10s/d.s. + 20s
790	33368	-	-	-	-	start continuous		
791	33380	55	01101111	no	-			direction sign
792	-	-	-	-	R,M	risk		C2 + 3s
793	-	-	-	-	-	stop continuous		
794	33488	-	-	-	-	start continuous		
795	33500	56	01110001	no	-			danger children
796	-	-	-	-	R,H	risk		C2 + 2s
797	-	-	-	-	-	stop continuous		C2 + 10s/d.s. + 20s
798	33541	-	-	-	-	start continuous		
799	33553	57	01110011	no	-			90kmh ⁻¹ speed limit from C2
800	-	-	-	-	-	stop continuous		C2 + 10s
801	33830	-	-	-	-	start continuous		
802	33847	58	01110101	no	-			danger no overtaking
803	-	-	-	-	R,L	risk		C2 + 2s
804	-	-	-	-	-	stop continuous		
805	33983	-	-	-	-	start continuous		
806	34000	59	01110111	no	-			60kmh ⁻¹ speed limit from C2
807	-	-	-	-	R,L	risk		C2 + 3s
808	-	-	-	-	-	stop continuous		
809	34095	-	-	-	-	start continuous		
810	34107	60	01111001	yes	-	start timer when vehicle stops		stop sign
811	-	61	01111011	no	-	change slide at 25s		go sign
812	-	-	-	-	R,M	risk		C2
813	-	-	-	-	-	stop continuous		C2 + 10s/d.s. + 20s
814	34148	-	-	-	-	start continuous		
815	34160	62	01111101	no	-			90kmh ⁻¹ speed limit from C2
816	-	-	-	-	-	stop continuous		C2 + 10s
817	34356	-	-	-	-	start continuous		
818	34373	63	01111111	no	-			60kmh ⁻¹ from C2
819	-	-	-	-	-	stop continuous		

EVENT NO.	DISTANCE COUNT	TOTAL ROAD SIGN COUNT	ROAD SIGN SLIDE CODE	STOP REQD?	PHYSICAL RISK (i.e. risk slide) PROBABILITY	OTHER	PERS 288 REF.	COMMENTS
820	34463	—	—	—		start continuous		
821	34480	64	10000001	no				Rest 1K
822	—	—	—	—		stop continuous		C2
823	34542	—	—	—	—	start continuous		
824	34559	—	—	—	p = 1	risk sequence		compulsory risk here
825	—	—	—	—	—	stop continuous		d.s. + 20s
826	34656	—	—	—	—	start continuous		
827	34873	65	10000011	no	—			pedestrians
828	—	—	—	—	R,M	risk		C2 + 3s
829	—	—	—	—	—	stop continuous		C2 + 10s/d.s. + 20s
830	35000	—	—	—	—	VDU		Message: Change to magazine #5 in 30 seconds. Buzzer
831	35050	80	10100001			dummy stimulus		
832	—	—	—	—	—	read code		Read at C1. Latch fader "on"
833	—	—	—	—	—	VDU		Message: Change to mag. #5
834	—	—	—	—	—	stop logging		Ignore distance pulses and decrement distance count. Stop logging data.
835	—	—	—	—	—	proj reset		E presses projector reset S/W
836	—	1	00000011	no	—	dummy stimulus		Start counting distance pulses Change to this slide at 1st distance pulse received
837	—	—	—	—	—	read slide code		d.s. + 1s
838	—	—	—	—	—	restart logging		Restart if slide I.D. is O.K.
839	35190	—	—	—	—	start cont data store		Continuous storage of analog data from now on
840	35320	2	00000101	no	—			no overtaking
841	—	—	—	—	R,L	risk		C2 + 3s
842	35600	3	00000111	no	—			trucks
843	—	—	—	—	R,M	risk		C + s
844	35616	—	—	—	—	R-U. transition		
845	35740	4	00001001	no		police detect		police 1K

EVENT NO.	DISTANCE COUNT	TOTAL ROAD SIGN COUNT	ROAD SIGN SLIDE CODE	STOP REQD?	PHYSICAL RISK (i.e. risk slide) PROBABILITY	OTHER	PERS 288 REF.	COMMENTS
846	35853	5	00001011	no				danger road from right
847	-	-	-	-	R,L	risk		C2 + 1s
848	36013	6	00001101	no	-			danger cattle
849	-	-	-	-	R,M	risk		C2 + 2s
850	36067	7	00001111	no				distance sign
851	36272	8	00010001	no				60kmh-1 from C2
852	36288	-	-	-	(U)	R - U trans. (phys. risk)		((2) rural to urban transition, physical risk
853	-	-	-	-	U,L	risk		C2 + 2s
854	36288	-	-	-	-	Low-high stimulus density trans. R.L.G		RLG set
855	36291	9	00010011	no				60kmh-1
856	36304	10	00010101	no				danger children
857	-	-	-	-	U,M	risk (physical)		C2 + 3s
858	36319	11	00010111	yes	-	start timer when veh. stops		red traffic signal
859	-	12	00011001	no		change to this slide after 25s		green traffic signal
860	-	-	-	-	U,L	risk (physical)		C2
861	36336	13	00011011	no	-			
862	36359	14	00011101	no				green traffic signal
863	-	-	-	-	U,L	risk (physical)		C2
864	36391	15	00011111	no				green traffic signal
865	-	-	-	-	U,L	risk		C2
866	36415	16	00100001	yes		start timer when veh. stops		stop sign
867	-	17	00100011	-	-	25s after stop, change to this slide		go sign
868	-	-	-	-	U,M	risk prob. gen.		risk prob gen sampled at C2
869	36437	18	00100101	no	-			hospital sign
870	36454	19	00100111	yes	-			red traffic signal. Start timer when vehicle stops

EVENT NO.	DISTANCE COUNT	TOTAL ROAD SIGN COUNT	ROAD SIGN SLIDE CODE	STOP REQD?	PHYSICAL RISK (i.e. risk slide) PROBABILITY	OTHER	PERS 288 REF.	COMMENTS
871	-	20	00101001	-	-	25s after stop change to this slide		
872	-	-	-	-	U,L	risk prob generator		risk prob gen sampled at C2
873	36479	21	00101011	no	-	risk		Slippery road
874	-	-	-	-	U,L			C2 + 2s
875	36509	22	00101101	no	-			green traffic signal
876	-	-	-	-	U,L	risk prob generator		C2
877	36534	23	00101111	no	-			pedestrian crossing
878	-	-	-	-	U,M	risk prob generator		C2 + 1s
879	36561	24	00110001	yes	-			Stop sign. Start timer when vehicle stops
880	-	25	00110011	-	-	25s after stop change to this slide		go sign
881	-	-	-	-	U,M	risk prob generator		C2
882	36583	26	00110101	yes	-			red traffic signal. Start timer when vehicle stops
883	-	27	00110111	no	-	25s after stop change to this slide		green traffic signal
884	-	-	-	-	U,L	risk prob generator		C2
885	36607	28	00111001	no	-			school children crossing
886	-	-	-	-	U,M	risk prob generator		C2
887	36632	29	00111011	yes	-			red traffic signal. Start timer when vehicle stops
888	-	30	00111101	no	-	25s after stop change to this slide		green traffic signal
889	-	-	-	-	U,L	risk prob generator		C2
890	36650	31	00111111	yes	-			Stop sign. Start timer when vehicle stops.
891	-	32	01000001	no	-	25s after stop		go sign
892	-	-	-	-	U,M	risk prob generator		C2
893	36680	33	01000011	no	-			pedestrian crossing
394	-	-	-	-	U,M	risk prob generator		C2
395	36702	34	01000101	yes	-			red traf sig. Start timer when vehicle stops

EVENT NO.	DISTANCE COUNT	TOTAL ROAD SIGN COUNT	ROAD SIGN SLIDE CODE	STOP REQD?	PHYSICAL RISK (i.e. risk slide) PROBABILITY	OTHER	PERS 288 REF.	COMMENTS
896	-	35	01000111	no	-	25s after stop		green traffic signal
897	-	-	-	-	U,L	risk prob generator		C2
898	36728	36	01001001	no	-			speed limit 40kmh ⁻¹ (from C2)
899	-	-	-	-	U,L	risk prob generator		C2 + 3s
900	36741	37	01001011	no	-			danger road works
901	-	-	-	-	p = 1	risk prob generator		C2 + 3s
902	36765	38	01001101	no	-			green robot
903	-	-	-	-	U,M	risk prob generator		C2
904	36789	39	01001111	no	-			speed limit 60 kmh ⁻¹ from C2
905	36819	40	01010001	yes		start timer when vehicle stops		stop sign. Start timer when veh. stops
906	-	41	01010011	no				go sign
907	-	-	-	-	U,M			C2
908	36844	42	01010101	no	-			green traffic signal
909	-	-	-	-	U,L			C2
910	36872	43	01010111	no	-			unguarded level crossing
911	-	44	01011001	yes	(U,M)	change to this disk at pulse from C2		level crossing 2 tracks
912	36897	45	01011011	yes	-	start timer when vehicle stops		Stop sign
913	-	46	01011101	no		25s after stop		go sign
914	-	-	-	-	U,M	risk prob generator		C2
915	36919	47	01011111	no	-			direction sign
916	36919					message to VDU		"End of journey; 1 minute"
917	36940	49	0110011	no			5.10	Stop. "End of Journey. Thank you." sign
918	36960	-	-	-	-	stop data logging		If vehicle stops before this, stop logging when V < 10kmh ⁻¹

Appendix B : Risk slide numbers and flags

APPENDIX B: Risk slide numbers and flags:

Risk Slide number	Emergency flag	Dummy stimulus flag
1	0	0
2	0	0
3	0	0
4	0	1
5	0	0
6	0	0
7	1	0
8	0	1
9	0	0
10	0	1
11	0	0
12	0	0
13	0	1
14	0	0
15	0	1
16	0	0
17	0	0
18	0	0
19	0	1
20	0	0
21	0	0
22	0	0
23	1	0
24	0	1
25	0	0
26	0	0
27	0	1
28	0	0
29	0	0
30	0	0
31	0	1
32	0	0
33	0	0
34	0	1
35	0	0
36	0	1
37	0	0
38	0	0
39	0	0
40	0	1
41	0	0
42	0	0
43	0	1
44	0	0
45	0	0
46	0	0
47	1	0
48	0	1
49	0	0
50	0	1

APPENDIX B: (Cont.)

Risk slide number	Emergency flag	Dummy stimulus flag
51	0	0
52	0	1
53	0	0
54	0	0
55	0	1
56	0	0
57	0	0
58	0	0
59	1	0
60	0	1
61	0	0
62	0	1
63	0	0
64	0	0
65	0	1
66	0	0
67	0	0
68	1	0
69	0	1
70	0	0
71	0	0
72	0	0
73	0	1
74	0	0
75	0	1
76	0	0
77	1	0
78	0	1
79	0	0
80	0	1

