# [[F1][F2]ANNEX I B

## REQUIREMENTS FOR CONSTRUCTION, TESTING, INSTALLATION AND INSPECTION

**Textual Amendments**

**F1** Inserted by Council Regulation (EC) No 2135/98 of 24 September 1998 amending Regulation (EEC) No 3821/85 on recording equipment in road transport and Directive 88/599/EEC concerning the application of Regulations (EEC) No 3820/85 and (EEC) No 3821/85.

**F2** Substituted by Commission Regulation (EC) No 1360/2002 of 13 June 2002 adapting for the seventh time to technical progress Council Regulation (EEC) No 3821/85 on recording equipment in road transport (Text with EEA relevance).

## III.CONSTRUCTION AND FUNCTIONAL REQUIREMENTS FOR RECORDING EQUIPMENT

### 1. Monitoring cards insertion and withdrawal

The recording equipment shall monitor the card interface devices to detect card insertions and withdrawals.

Upon card insertion the recording equipment shall detect whether the card inserted is a valid tachograph card and in such a case identify the card type.

The recording equipment shall be so designed that the tachograph cards are locked in position on their proper insertion into the card interface devices.

The release of tachograph cards may function only when the vehicle is stopped and after the relevant data have been stored on the cards. The release of the card shall require positive action by the user.

### 2. Speed and distance measurement

This function shall continuously measure and be able to provide the odometer value corresponding to the total distance travelled by the vehicle.

This function shall continuously measure and be able to provide the speed of the vehicle.

The speed measurement function shall also provide the information whether the vehicle is moving or stopped. The vehicle shall be considered as moving as soon as the function detects more than 1 imp/sec for at least five seconds from the motion sensor, otherwise the vehicle shall be considered as stopped.

Devices displaying speed (speedometer) and total distance travelled (odometer) installed in any vehicle fitted with a recording equipment complying with the provisions of this Regulation, shall comply with the requirements relating to maximum tolerances laid down in this Annex (Chapters III(2)(1) and III(2)(2)).

**[**[F3]To detect manipulation of motion data, information from the motion sensor shall be corroborated by vehicle motion information derived from one or more source(s) independent from the motion sensor.**]**

**Textual Amendments**

**F3** Inserted by Commission Regulation (EU) No 1266/2009 of 16 December 2009 adapting for the tenth time to technical progress Council Regulation (EEC) No 3821/85 on recording equipment in road transport (Text with EEA relevance).

2.1. Measurement of distance travelled

The distance travelled may be measured either:
— so as to cumulate both forward and reverse movements, or
— so as to include only forward movement.

The recording equipment shall measure distance from 0 to 9 999 999,9 km.

Distance measured shall be within the following tolerances (distances of at least 1 000 m):
— ± 1 % before installation,
— ± 2 % on installation and periodic inspection,
— ± 4 % in use.

Distance measured shall have a resolution better than or equal to 0,1 km.

2.2. Measurement of speed

The recording equipment shall measure speed from 0 to 220 km/h.

To ensure a maximum tolerance on speed displayed of ± 6 km/h in use, and taking into account:
— a ± 2 km/h tolerance for input variations (tyre variations, …),
— a ± 1 km/h tolerance in measurements made during installation or periodic inspections,

the recording equipment shall, for speeds between 20 and 180 km/h, and for characteristic coefficients of the vehicle between 4 000 and 25 000 imp/km, measure the speed with a tolerance of ± 1 km/h (at constant speed).

Note: The resolution of data storage brings an additional tolerance of ± 0,5 km/h to speed stored by the recording equipment.

The speed shall be measured correctly within the normal tolerances within 2 seconds of the end of a speed change when the speed has changed at a rate up to 2 $m/s^2$.

Speed measurement shall have a resolution better than or equal to 1 km/h.

3. Time measurement

The time measurement function shall measure permanently and digitally provide UTC date and time.

**[**[F4]UTC date and time shall be used for dating data inside the recording equipment (recordings, data exchange) and for all printouts specified in Appendix 4 ‘Printouts’.**]**

**Textual Amendments**

**F4** Substituted by Commission Regulation (EU) No 1266/2009 of 16 December 2009 adapting for the tenth time to technical progress Council Regulation (EEC) No 3821/85 on recording equipment in road transport (Text with EEA relevance).

**[**[F4]In order to visualise the local time, it shall be possible to change the offset of the time displayed, in half hour steps. No other offsets than negative or positive multiples of half hours shall be allowed.**]**

Time drift shall be within ± 2 seconds per day in type approval conditions.

Time measured shall have a resolution better than or equal to 1 second.

Time measurement shall not be affected by an external power supply cut-off of less than 12 months in type approval conditions.

4. Monitoring driver activities

This function shall permanently and separately monitor the activities of one driver and one co-driver.

Driver activity shall be DRIVING, WORK, AVAILABILITY, or BREAK/REST.

It shall be possible for the driver and/or the co-driver to manually select WORK, AVAILABILITY, or BREAK/REST.

When the vehicle is moving, DRIVING shall be selected automatically for the driver and AVAILABILITY shall be selected automatically for the co-driver.

When the vehicle stops, WORK shall be selected automatically for the driver.

**[**[F4]The first change of activity to REST or AVAILABILITY arising within 120 seconds of the automatic change to WORK due to the vehicle stop shall be assumed to have happened at the time of vehicle stop (therefore possibly cancelling the change to WORK).**]**

This function shall output activity changes to the recording functions at a resolution of one minute.

**[**[F5]. . . . . .**]**

**Textual Amendments**

**F5** Deleted by Commission Regulation (EU) No 1266/2009 of 16 December 2009 adapting for the tenth time to technical progress Council Regulation (EEC) No 3821/85 on recording equipment in road transport (Text with EEA relevance).

**[**[F4]Given a calendar minute, if DRIVING is registered as the activity of both the immediately preceding and immediately succeeding minute, the whole minute shall be regarded as DRIVING.

Given a calendar minute that is not regarded as DRIVING according to the previous requirement 041, the whole minute shall be regarded to be of the same type of activity as the longest continuous activity within the minute (or the latest of equally long activities).**]**

This function shall also permanently monitor the continuous driving time and the cumulative break time of the driver.

5. Monitoring driving status

This function shall permanently and automatically monitor the driving status.

The driving status CREW shall be selected when two valid driver cards are inserted in the equipment, the driving status SINGLE shall be selected in any other case.

6. Drivers manual entries

6.1. Entry of places where daily work periods begin and/or end

This function shall allow for the entry of places where the daily work periods begin and/or end for a driver and/or a co-driver.

Places are defined as the country and, in addition where applicable, the region.

At the time of a driver (or workshop) card withdrawal, the recording equipment shall prompt the (co-)driver to enter a 'place where the daily work period ends'.

The recording equipment shall allow this request to be disregarded.

**[**[F4]It shall be possible to input places where daily work periods begin and/or end through commands in the menus. If more than one such input is done within one calendar minute, only the last begin place input and the last end place input done within that time shall be kept recorded.**]**

6.2. Manual entry of driver activities

**[**[F4]Upon driver (or workshop) card insertion, and only at this time, the recording equipment shall allow manual entries of activities. It shall be possible to make manual entries, if required, at the first insertion of a previously unused driver (or workshop) card.

Manual entries of activities shall be performed using local time and date values of the time zone (UTC offset) currently set for the vehicle unit.

At driver or workshop card insertion the cardholder shall be reminded of:

— The date and time of his last card withdrawal.

— Optionally: the local time offset currently set for the vehicle unit

It shall be possible to input activities with the following restrictions:

— Activity type shall be WORK, AVAILABILITY or BREAK/REST.

— Start and end times for each activity shall be within the period of the last card withdrawal — current insertion only.

Activities shall not be allowed to overlap mutually in time.

The procedure for manual entries of activities shall include as many consecutive steps as necessary to set a type, a start time and an end time for each activity. For any part of the time period between last card withdrawal and current card insertion, the cardholder shall have the option not to declare any activity.

During the manual entries associated with card insertion and if applicable, the card holder shall have the opportunity to input:

— a place where a previous daily work period ended, associated to the relevant time (if not already entered at the last card withdrawal),

— a place where the current daily work period begins, associated to the relevant time,

If a location is entered, it shall be recorded in the relevant tachograph card.

Manual entries shall be interrupted if:

— the card is withdrawn or,

— the vehicle is moving and the card is in the driver slot.

Additional interruptions are allowed, e.g. a timeout after a certain period of user inactivity. If manual entries are interrupted, the recording equipment shall validate any complete place and activity entries (having either unambiguous place and time, or activity type, begin time and end time) already made.

If a second driver or workshop card is inserted while manual entries of activities are in progress for a previously inserted card, the manual entries for this previous card shall be allowed to be completed before manual entries start for the second card.

The cardholder shall have the option to insert manual entries according to the following minimum procedure:

Enter activities manually, in chronological order, for the period last card withdrawal – current insertion.

Begin time of the first activity shall be set to card withdrawal time. For each subsequent entry, the start time shall be preset to immediately follow the end time of the previous entry. Activity type and end time shall be selected for each activity.

The procedure shall end when the end time of a manually entered activity equals the card insertion time. The recording equipment may then optionally allow the card holder to modify any activity manually entered, until validation by selection of a specific command. Thereafter, any such modification shall be forbidden.**]**

6.3. Entry of specific conditions

**[**[F4]The recording equipment shall allow the driver to enter, in real time, the following two specific conditions:

‘OUT OF SCOPE’ (begin, end)

‘FERRY / TRAIN CROSSING’

A ‘FERRY / TRAIN CROSSING’ may not occur if an ‘OUT OF SCOPE’ condition is opened.

An opened ‘OUT OF SCOPE’ condition shall be automatically closed, by the recording equipment, if a driver card is inserted or withdrawn.

An opened ‘OUT OF SCOPE’ condition shall inhibit the following events and warnings:

— Driving without an appropriate card,

— Warnings associated with continuous driving time.**]**

7. Company locks management

This function shall allow the management of the locks placed by a company to restrict data access in company mode to itself.

Company locks consist in a start date/time (lock-in) and an end date/time (lock-out) associated with the identification of the company as denoted by the company card number (at lock-in).

Locks may be turned ‘in’ or ‘out’ in real time only.

Locking-out shall only be possible for the company whose lock is ‘in’ (as identified by the first 13 digits of the company card number), or,

locking-out shall be automatic if another company locks in.

In the case where a company locks in and where the previous lock was for the same company, then it will be assumed that the previous lock has not been turned ‘out’ and is still ‘in’.

8. Monitoring control activities

This function shall monitor DISPLAYING, PRINTING, VU and card DOWNLOADING activities carried while in control mode.

This function shall also monitor OVER SPEEDING CONTROL activities while in control mode. An over speeding control is deemed to have happened when, in control mode, the ‘over speeding’ printout has been sent to the printer or to the display, or when ‘events and faults’ data have been downloaded from the VU data memory.

9. Detection of events and/or faults

This function shall detect the following events and/or faults:

9.1. Insertion of a non-valid card‘’ event

This event shall be triggered at the insertion of any non-valid card and/or when an inserted valid card expires.

9.2. ‘Card conflict’ event

This event shall be triggered when any of the valid cards combination noted X in the following table arise:

| **Card conflict** | | **Driver slot** | | | | |
|---|---|---|---|---|---|---|
| | | **No card** | **Driver card** | **Control card** | **Workshop card** | **Company card** |
| **Co-driver slot** | **No card** | | | | | |
| | **Driver card** | | | | X | |
| | **Control card** | | | X | X | X |
| | **Workshop card** | | X | X | X | X |
| | **Company card** | | | X | X | X |

9.3. ‘Time overlap’ event

This event shall be triggered when the date/time of last withdrawal of a driver card, as read from the card, is later than the current date/time of the recording equipment in which the card is inserted.

9.4. ‘Driving without an appropriate card’ event

This event shall be triggered for any tachograph cards combination noted X in the following table, when driver activity changes to DRIVING, or when there is a change of the mode of operation while driver activity is DRIVING:

| **Driving without an appropriate card** | **Driver slot** | | | | |
|---|---|---|---|---|---|
| | **No (or non-** | **Driver card** | **Control card** | **Workshop card** | **Company card** |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | **valid) card** | | | | |
| **Co-driver slot** | **No (or non-valid) card** | X | | X | | X |
| | **Driver card** | X | | X | X | X |
| | **Control card** | X | X | X | X | X |
| | **Workshop card** | X | X | X | | X |
| | **Company card** | X | X | X | X | X |

9.5. ‘Card insertion while driving’ event

This event shall be triggered when a tachograph card is inserted in any slot, while driver activity is DRIVING.

9.6. ‘Last card session not correctly closed’ event

This event shall be triggered when at card insertion the recording equipment detects that, despite the provisions laid down in paragraph III(1), the previous card session has not been correctly closed (the card has been withdrawn before all relevant data have been stored on the card). This event shall be triggered by driver and workshop cards only.

9.7. ‘Over speeding’ event

**[**[F4]This event shall be triggered for each over-speeding. This requirement shall apply only to vehicles falling within category M2, M3, N2 or N3, as defined in Annex II of Directive 2007/46/EC, establishing a framework for the approval of motor vehicles and their trailers.**]**

9.8. ‘Power supply interruption’ event

This event shall be triggered, while not in calibration mode, in case of any interruption exceeding 200 milliseconds of the power supply of the motion sensor and/or of the vehicle unit. The interruption threshold shall be defined by the manufacturer. The drop in power supply due to the starting of the engine of the vehicle shall not trigger this event.

9.9. ‘Motion data error’ event

This event shall be triggered in case of interruption of the normal data flow between the motion sensor and the vehicle unit and/or in case of data integrity or data authentication error during data exchange between the motion sensor and the vehicle unit.

**[**[F3]9.9 bis. *‘Vehicle Motion Conflict’ event*

This event shall also be triggered when a zero speed measurement is contradicted by motion information from at least one independent source for more than one uninterrupted minute.

In cases where the vehicle unit can receive or elaborate speed values from external independent source of motion information, this event may also be triggered if such speed values significantly contradict those elaborated from the motion sensor speed signal for more than one minute.**]**

9.10. ‘Security breach attempt’ event

This event shall be triggered for any other event affecting the security of the motion sensor and/or of the vehicle unit as specified within the generic security targets of these components, while not in calibration mode.

9.11. ‘Card’ fault

This fault shall be triggered when a tachograph card failure occurs during operation.

9.12. ‘Recording equipment’ fault

This fault shall be triggered for any of these failures, while not in calibration mode:
— VU internal fault,
— printer fault,
— display fault,
— downloading fault,
— sensor fault.

10. Built-in and self tests

The recording equipment shall self-detect faults through self tests and built-in-tests, according to the following table:

| Sub-assembly to test | Self test | Built-in-test |
|---|---|---|
| Software | | Integrity |
| Data memory | Access | Access, data integrity |
| Card interface devices | Access | Access |
| Keyboard | | Manual check |
| Printer | (up to manufacturer) | Printout |
| Display | | Visual check |
| Downloading (performed only during downloading) | Proper operation | |
| Sensor | Proper operation | Proper operation |

11. Reading from data memory

The recording equipment shall be able to read any data stored in its data memory.

12. Recording and storing in the data memory

For the purpose of this paragraph,
— ‘365 days’ is defined as 365 calendar days of average drivers activity in a vehicle. The average activity per day in a vehicle is defined as at least six drivers or co-drivers, six card insertion withdrawal cycles, and 256 activity changes. ‘365 days’ therefore include at least 2 190 (co-)drivers, 2 190 card insertion withdrawal cycles, and 93 440 activity changes,
— times are recorded with a resolution of one minute, unless otherwise specified,
— odometer values are recorded with a resolution of one kilometre,

— speeds are recorded with a resolution of 1 km/h.

Data stored into the data memory shall not be affected by an external power supply cut-off of less than twelve months in type approval conditions.

The recording equipment shall be able to record and store implicitly or explicitly in its data memory the following:

12.1. Equipment identification data

12.1.1. Vehicle unit identification data

The recording equipment shall be able to store in its data memory the following vehicle unit identification data:
— name of the manufacturer,
— address of the manufacturer,
— part number,
— serial number,
— software version number,
— software version installation date,
— year of equipment manufacture,
— approval number.

Vehicle unit identification data are recorded and stored once and for all by the vehicle unit manufacturer, except the software-related data and the approval number which may be changed in case of software upgrade.

12.1.2. Motion sensor identification data

The motion sensor shall be able to store in its memory the following identification data:
— name of the manufacturer,
— part number,
— serial number,
— approval number,
— embedded security component identifier (e.g. internal chip/processor part number),
— operating system identifier (e.g. software version number).

Motion sensor identification data are recorded and stored once and for all in the motion sensor, by the motion sensor manufacturer.

The vehicle unit shall be able to record and store in its data memory the following currently paired motion sensor identification data:
— serial number,
— approval number,
— first pairing date.

12.2. Security elements

The recording equipment shall be able to store the following security elements:
— European public key,
— Member State certificate,
— equipment certificate,
— equipment private key.

Recording equipment security elements are inserted in the equipment by the vehicle unit manufacturer.

12.3. Driver card insertion and withdrawal data

For each insertion and withdrawal cycle of a driver or workshop card in the equipment, the recording equipment shall record and store in its data memory:

— the card holder's surname and first name(s) as stored in the card,
— the card's number, issuing Member State and expiry date as stored in the card,
— the insertion date and time,
— the vehicle odometer value at card insertion,
— the slot in which the card is inserted,
— the withdrawal date and time,
— the vehicle odometer value at card withdrawal,
— the following information about the previous vehicle used by the driver, as stored in the card:
  — VRN and registering Member State,
  — card withdrawal date and time,
— a flag indicating whether, at card insertion, the card holder has manually entered activities or not.

The data memory shall be able to hold these data for at least 365 days.

When storage capacity is exhausted, new data shall replace oldest data.

12.4. Driver activity data

The recording equipment shall record and store in its data memory whenever there is a change of activity for the driver and/or the co-driver, and/or whenever there is a change of driving status, and/or whenever there is an insertion or withdrawal of a driver or workshop card:

— the driving status (CREW, SINGLE),
— the slot (DRIVER, CO-DRIVER),
— the card status in the relevant slot (INSERTED, NOT INSERTED) (see Note),
— the activity (DRIVING, AVAILABILITY, WORK, BREAK/REST),
— the date and time of the change.

Note: INSERTED means that a valid driver or workshop card is inserted in the slot. NOT INSERTED means the opposite, i.e. no valid driver or workshop card is inserted in the slot (e.g. a company card is inserted or no card is inserted).

Note: Activity data manually entered by a driver are not recorded in the data memory.

The data memory shall be able to hold driver activity data for at least 365 days.

When storage capacity is exhausted, new data shall replace oldest data.

12.5. Places where daily work periods start and/or end

The recording equipment shall record and store in its data memory whenever a (co-)driver enters the place where a daily work period begins and/or ends:

— if applicable, the (co-)driver card number and card issuing Member State,
— the date and time of the entry (or the date/time related to the entry when the entry is made during the manual entry procedure),
— the type of entry (begin or end, condition of entry),

— the country and region entered,
— the vehicle odometer value.

The data memory shall be able to hold daily work periods start and/or end data for at least 365 days (with the assumption that one driver enters two records per day).

When storage capacity is exhausted, new data shall replace oldest data.

12.6. Odometer data

The recording equipment shall record in its data memory the vehicle odometer value and the corresponding date at midnight every calendar day.

The data memory shall be able to store midnight odometer values for at least 365 calendar days.

When storage capacity is exhausted, new data shall replace oldest data.

12.7. Detailed speed data

The recording equipment shall record and store in its data memory the instantaneous speed of the vehicle and the corresponding date and time at every second of at least the last 24 hours that the vehicle has been moving.

12.8. Events data

For the purpose of this subparagraph, time shall be recorded with a resolution of one second.

The recording equipment shall record and store in its data memory the following data for each event detected according to the following storage rules:

| Event | Storage rules | Data to be recorded per event |
|---|---|---|
| Card conflict | — the 10 most recent events. | — date and time of beginning of event,<br>— date and time of end of event,<br>— cards' type, number and issuing Member State of the two cards creating the conflict. |
| Driving without an appropriate card | — the longest event for each of the 10 last days of occurrence,<br>— the five longest events over the last 365 days. | — date and time of beginning of event,<br>— date and time of end of event,<br>— cards' type, number and issuing Member State of any card inserted at beginning and/or end of the event, |

**a** The recording equipment shall also record and store in its data memory:
— the date and time of the last OVER SPEEDING CONTROL,
— the date and time of the first over speeding following this OVER SPEEDING CONTROL,
— the number of over speeding events since the last OVER SPEEDING CONTROL.

**b** These data may be recorded at power supply reconnection only, times may be known with an accuracy to the minute.

| | | | | |
|---|---|---|---|---|
| | | | — | number of similar events that day. |
| Card insertion while driving | — | the last event for each of the 10 last days of occurrence. | — <br>— <br>— | date and time of the event, <br>card's type, number and issuing Member State, <br>number of similar events that day. |
| Last card session not correctly closed | — | the 10 most recent events. | — <br>— <br>— | date and time of card insertion, <br>card's type, number and issuing Member State, <br>last session data as read from the card: <br>— date and time of card insertion, <br>— VRN and Member State of registration. |
| Over speeding[a] | — <br>— <br>— | the most serious event for each of the 10 last days of occurrence (i.e. the one with the highest average speed), <br>the five most serious events over the last 365 days. <br>the first event having occurred after the last calibration. | — <br>— <br>— <br>— <br>— <br>— | date and time of beginning of event, <br>date and time of end of event, <br>maximum speed measured during the event, <br>arithmetic average speed measured during the event, <br>card's type, number and issuing Member State of the driver (if applicable), <br>number of similar events that day. |
| Power supply interruption[b] | — | the longest event for each of the 10 last days of occurrence, | — <br>— <br>— | date and time of beginning of event, <br>date and time of end of event, <br>cards' type, number and issuing Member |

**a** The recording equipment shall also record and store in its data memory:
— the date and time of the last OVER SPEEDING CONTROL,
— the date and time of the first over speeding following this OVER SPEEDING CONTROL,
— the number of over speeding events since the last OVER SPEEDING CONTROL.

**b** These data may be recorded at power supply reconnection only, times may be known with an accuracy to the minute.

| | | | | |
|---|---|---|---|---|
| | — | the five longest events over the last 365 days. | — | State of any card inserted at beginning and/or end of the event,<br>number of similar events that day. |
| Motion data error | —<br>— | the longest event for each of the 10 last days of occurrence,<br>the five longest events over the last 365 days. | —<br>—<br>—<br>— | date and time of beginning of event,<br>date and time of end of event,<br>cards' type, number and issuing Member State of any card inserted at beginning and/or end of the event,<br>number of similar events that day. |
| **[**[F3]Vehicle Motion Conflict | —<br>— | the longest event for each of the 10 last days of occurrence,<br>the 5 longest events over the last 365 days. | —<br>—<br>—<br>— | date and time of beginning of event,<br>date and time of end of event,<br>cards’ type, number and issuing Member State of any card inserted at beginning and/or end of the event,<br>number of similar events that day.**]** |
| Security breach attempt | — | the 10 most recent events per type of event. | —<br>—<br>—<br>— | date and time of beginning of event,<br>date and time of end of event (if relevant),<br>cards' type, number and issuing Member State of any card inserted at beginning and/or end of the event,<br>type of event. |

**a** The recording equipment shall also record and store in its data memory:
— the date and time of the last OVER SPEEDING CONTROL,
— the date and time of the first over speeding following this OVER SPEEDING CONTROL,
— the number of over speeding events since the last OVER SPEEDING CONTROL.

**b** These data may be recorded at power supply reconnection only, times may be known with an accuracy to the minute.

12.9. Faults data

For the purpose of this subparagraph, time shall be recorded with a resolution of one second.

The recording equipment shall attempt to record and store in its data memory the following data for each fault detected according to the following storage rules:

| Fault | Storage rules | Data to be recorded per fault |
|---|---|---|
| Card fault | — the 10 most recent driver card faults. | — date and time of beginning of fault,<br>— date and time of end of fault,<br>— card's type number and issuing Member State. |
| Recording equipment faults | — the 10 most recent faults for each type of fault,<br>— the first fault after the last calibration. | — date and time of beginning of fault,<br>— date and time of end of fault,<br>— type of fault,<br>— cards' type, number and issuing Member State of any card inserted at beginning and/or end of the fault. |

12.10. Calibration data

The recording equipment shall record and store in its data memory data relevant to:
— known calibration parameters at the moment of activation,
— its very first calibration following its activation,
— its first calibration in the current vehicle (as identified by its VIN),
— the five most recent calibrations (If several calibrations happen within one calendar day, only the last one of the day shall be stored).

The following data shall be recorded for each of these calibrations:
— purpose of calibration (activation, first installation, installation, periodic inspection),
— workshop name and address,
— workshop card number, card issuing Member State and card expiry date,
— vehicle identification,
— parameters updated or confirmed: w, k, l, tyre size, speed limiting device setting, odometer (old and new values), date and time (old and new values).

The motion sensor shall record and store in its memory the following motion sensor installation data:
— first pairing with a VU (date, time, VU approval number, VU serial number),
— last pairing with a VU (date, time, VU approval number, VU serial number).

12.11. Time adjustment data

The recording equipment shall record and store in its data memory data relevant to:
— the most recent time adjustment,

— the five largest time adjustments, since last calibration,

performed in calibration mode outside the frame of a regular calibration (definition (f)).

The following data shall be recorded for each of these time adjustments:
— date and time, old value,
— date and time, new value,
— workshop name and address,
— workshop card number, card issuing Member State and card expiry date.

12.12. Control activity data

The recording equipment shall record and store in its data memory the following data relevant to the 20 most recent control activities:
— date and time of the control,
— control card number and card issuing Member State,
— type of the control (displaying and/or printing and/or VU downloading and/or card downloading).

In case of downloading, the dates of the oldest and of the most recent days downloaded shall also be recorded.

12.13. Company locks data

**[**[F4]The recording equipment shall record and store in its data memory the following data relevant to the 255 most recent company locks:
— lock-in date and time,
— lock-out date and time,
— Company Card number and card issuing Member States,
— Company name and address.

Data previously locked by a lock removed from memory due to the limit above, shall be treated as not locked.**]**

12.14. Download activity data

The recording equipment shall record and store in its data memory the following data relevant to the last data memory downloading to external media while in company or in calibration mode:
— date and time of downloading,
— company or workshop card number and card issuing Member State,
— company or workshop name.

12.15. Specific conditions data

The recording equipment shall record in its data memory the following data relevant to specific conditions:
— date and time of the entry,
— type of specific condition.

The data memory shall be able to hold specific conditions data for at least 365 days (with the assumption that on average, one condition is opened and closed per day). When storage capacity is exhausted, new data shall replace oldest data.

13. Reading from tachograph cards

The recording equipment shall be able to read from tachograph cards, where applicable, the necessary data:

— to identify the card type, the card holder, the previously used vehicle, the date and time of the last card withdrawal and the activity selected at that time,

— to check that last card session was correctly closed,

— to compute the driver's continuous driving time, cumulative break time and cumulated driving times for the previous and the current week,

— to print requested printouts related to data recorded on a driver card,

— to download a driver card to external media.

In case of a reading error, the recording equipment shall try again, three times maximum, the same read command, and then if still unsuccessful, declare the card faulty and non-valid.

14. Recording and storing on tachograph cards

The recording equipment shall set the ‘card session data’ in the driver or workshop card right after the card insertion.

The recording equipment shall update data stored on valid driver, workshop and/or control cards with all necessary data relevant to the period while the card is inserted and relevant to the card holder. Data stored on these cards are specified in Chapter IV.

The recording equipment shall update driver activity and location data (as specified in Chapter IV, paragraphs 5.2.5 and 5.2.6), stored on valid driver and/or workshop cards, with activity and location data manually entered by the cardholder.

**[**[F3]The ‘Vehicle Motion Conflict’ event shall not be stored on the driver and workshop cards.**]**

Tachograph cards data update shall be such that, when needed and taking into account card actual storage capacity, most recent data replace oldest data.

In the case of a writing error, the recording equipment shall try again, three times maximum, the same write command, and then if still unsuccessful, declare the card faulty and non valid.

Before releasing a driver card, and after all relevant data have been stored on the card, the recording equipment shall reset the card session data.

15. Displaying

The display shall include at least 20 characters.

The minimum character size shall be 5 mm high and 3,5 mm wide.

**[**[F4]The display shall support the characters specified in Appendix 1 Chapter 4 ‘Character sets’. The display may use simplified glyphs (e.g. accented characters may be displayed without accent, or lower case letters may be shown as upper case letters).**]**

The display shall be provided with adequate non-dazzling lighting.

Indications shall be visible from outside the recording equipment.

The recording equipment shall be able to display:

— default data,

— data related to warnings,

— data related to menu access,

— other data requested by a user.

Additional information may be displayed by the recording equipment, provided that it is clearly distinguishable from information required above.

The display of the recording equipment shall use the pictograms or pictogram combinations listed in Appendix 3. Additional pictograms or pictogram combinations may also be provided by the display, if clearly distinguishable from the aforementioned pictogram or pictogram combinations.

The display shall always be ON when the vehicle is moving.

The recording equipment may include a manual or automatic feature to turn the display OFF when the vehicle is not moving.

Displaying format is specified in Appendix 5.

15.1. Default display

**[**[F4]When no other information needs to be displayed, the recording equipment shall display, by default, the following:

— the local time (as a result of UTC time + offset as set by the driver),
— the mode of operation,
— the current activity of the driver and the current activity of the co-driver.

Information related to the driver:

— if his current activity is DRIVING, his current continuous driving time and his current cumulative break time,
— if his current activity is not DRIVING, the current duration of this activity (since it was selected) and his current cumulative break time.**]**

Display of data related to each driver shall be clear, plain and unambiguous. In the case where the information related to the driver and the co-driver cannot be displayed at the same time, the recording equipment shall display by default the information related to the driver and shall allow the user to display the information related to the co-driver.

In the case where the display width does not allow to display by default the mode of operation, the recording equipment shall briefly display the new mode of operation when it changes.

The recording equipment shall briefly display the card holder name at card insertion.

When an ‘OUT OF SCOPE’ condition is opened, then the default display must show using the relevant pictogram that the condition is opened (It is acceptable that the driver's current activity may not be shown at the same time).

15.2. Warning display

The recording equipment shall display warning information using primarily the pictograms of Appendix 3, completed where needed by an additional numerically coded information. A literal description of the warning may also be added in the driver's preferred language.

15.3. Menu access

The recording equipment shall provide necessary commands through an appropriate menu structure.

15.4. Other displays

**[**[F4]It shall be possible to display selectively on request:

— the UTC date and time, and local time offset,
— the content of any of the six printouts under the same formats as the printouts themselves,
— the continuous driving time and cumulative break time of the driver,
— the continuous driving time and cumulative break time of the co-driver,
— the cumulated driving time of the driver for the previous and the current week,
— the cumulated driving time of the co-driver for the previous and the current week.

Optional:
— the current duration of co-driver activity (since it was selected),
— the cumulated driving time of the driver for the current week,
— the cumulated driving time of the driver for the current daily work period,
— the cumulated driving time of the co-driver for the current daily work period.**]**

Printout content display shall be sequential, line by line. If the display width is less than 24 characters the user shall be provided with the complete information through an appropriate mean (several lines, scrolling, …). Printout lines devoted to hand-written information may be omitted for display.

16. Printing

The recording equipment shall be able to print information from its data memory and/or from tachograph cards in accordance with the six following printouts:
— driver activities from card daily printout,
— driver activities from Vehicle Unit daily printout,
— events and faults from card printout,
— events and faults from Vehicle Unit printout,
— technical data printout,
— over speeding printout.

The detailed format and content of these printouts are specified in Appendix 4.

Additional data may be provided at the end of the printouts

Additional printouts may also be provided by the recording equipment, if clearly distinguishable from the six aforementioned printouts.

The ‘driver activities from card daily printout’ and ‘events and faults from card printout’ shall be available only when a driver card or a workshop card is inserted in the recording equipment. The recording equipment shall update data stored on the relevant card before starting printing.

In order to produce the ‘driver activities from card daily printout’ or the ‘events and faults from card printout’, the recording equipment shall:
— either automatically select the driver card or the workshop card if one only of these cards is inserted,
— or provide a command to select the source card or select the card in the driver slot if two of these cards are inserted in the recording equipment.

The printer shall be able to print 24 characters per line.

The minimum character size shall be 2,1 mm high and 1,5 mm wide.

**[**[F4]The printer shall support the characters specified in Appendix 1 Chapter 4 ‘Character sets’.**]**

Printers shall be so designed as to produce these printouts with a degree of definition likely to avoid any ambiguity when they are read.

Printouts shall retain their dimensions and recordings under normal conditions of humidity (10 to 90 %) and temperature.

**[**[F4]The printout paper used by the recording equipment shall bear the relevant type approval mark and an indication of the type(s) of recording equipment with which it may be used.**]**

**[**[F3]Printouts shall remain clearly legible and identifiable under normal conditions of storage, in terms of light intensity, humidity and temperature, for at least two years.

The printout paper shall conform at least to the test specifications defined on the website of the laboratory appointed to carry out interoperability testing, as set out in Requirement 278.

Any amendment or updating of the specifications described in the above paragraph shall only be made after the appointed laboratory has consulted the type approved digital tachograph vehicle unit manufacturer in conjunction with the type approval authorities.**]**

It shall also be possible to add handwritten notes, such as the driver's signature, to these documents.

The recording equipment shall manage ‘paper out’ events while printing by, once paper has been re-loaded, restarting printing from printout beginning or by continuing printing and providing an unambiguous reference to previously printed part.

17. Warnings

The recording equipment shall warn the driver when detecting any event and/or fault.

Warning of a power supply interruption event may be delayed until the power supply is reconnected.

**[**[F4]The recording equipment shall warn the driver 15 minutes before and at the time of exceeding the maximum allowed continuous driving time.**]**

Warnings shall be visual. Audible warnings may also be provided in addition to visual warnings.

Visual warnings shall be clearly recognisable by the user, shall be situated in the driver's field of vision and shall be clearly legible both by day and by night.

Visual warnings may be built into the recording equipment and/or remote from the recording equipment.

**[**[F4]In the latter case it shall bear a ‘T’ symbol.**]**

Warnings shall have a duration of at least 30 seconds, unless acknowledged by the user by hitting any key of the recording equipment. This first acknowledgement shall not erase warning cause display referred to in next paragraph.

Warning cause shall be displayed on the recording equipment and remain visible until acknowledged by the user using a specific key or command of the recording equipment.

Additional warnings may be provided, as long as they do not confuse drivers in relation to previously defined ones.

18. Data downloading to external media

The recording equipment shall be able to download on request data from its data memory or from a driver card to external storage media via the calibration/downloading connector. The recording equipment shall update data stored on the relevant card before starting downloading.

In addition and as an optional feature, the recording equipment may, in any mode of operation, download data through another connector to a company authenticated through this channel. In such a case, company mode data access rights shall apply to this download.

Downloading shall not alter or delete any stored data.

The calibration/downloading connector electrical interface is specified in Appendix 6.

Downloading protocols are specified in Appendix 7.

19. Output data to additional external devices

When the recording equipment does not include speed and/or odometer display functions, the recording equipment shall provide output signal(s) to allow for displaying the speed of the vehicle (speedometer) and/or the total distance travelled by the vehicle (odometer).

The vehicle unit shall also be able to output the following data using an appropriate dedicated serial link independent from an optional CAN bus connection (ISO 11898 Road vehicles — Interchange of digital information — Controller Area Network (CAN) for high speed communication), to allow their processing by other electronic units installed in the vehicle:

— current UTC date and time,
— speed of the vehicle,
— total distance travelled by the vehicle (odometer),
— currently selected driver and co-driver activity,
— information if any tachograph card is currently inserted in the driver slot and in the co-driver slot and (if applicable) information about the corresponding cards identification (card number and issuing Member State).

Other data may also be output in addition to this minimum list.

When the ignition of the vehicle is ON, these data shall be permanently broadcast. When the ignition of the vehicle is OFF, at least any change of driver or co-driver activity and/or any insertion or withdrawal of a tachograph card shall generate a corresponding data output. In the event that data output has been withheld whilst the ignition of the vehicle is OFF, that data shall be made available once the ignition of the vehicle is ON again.

20. Calibration

The calibration function shall allow:

— to automatically pair the motion sensor with the VU,
— to digitally adapt the constant of the recording equipment (k) to the characteristic coefficient of the vehicle (w) (vehicles with two or more axle ratios shall be fitted with a switch device whereby these various ratios will automatically be brought into line with the ratio for which the equipment has been adapted to the vehicle),
— to adjust (without limitation) the current time,
— to adjust the current odometer value,
— to update motion sensor identification data stored in the data memory,
— to update or confirm other parameters known to the recording equipment: vehicle identification, w, l, tyre size and speed limiting device setting if applicable.

Pairing the motion sensor to the VU shall consist, at least, in:

— updating motion sensor installation data held by the motion sensor (as needed),

— copying from the motion sensor to the VU data memory necessary motion sensor identification data.

The calibration function shall be able to input necessary data through the calibration/downloading connector in accordance with the calibration protocol defined in Appendix 8. The calibration function may also input necessary data through other connectors.

21. Time adjustment

The time adjustment function shall allow for adjusting the current time in amounts of one minute maximum at intervals of not less than seven days.

The time adjustment function shall allow for adjusting the current time without limitation, in calibration mode.

22. Performance characteristics

The Vehicle Unit shall be fully operational in the temperature range - 20 $^{o}$C to 70 $^{o}$C, and the motion sensor in the temperature range - 40 $^{o}$C to 135 $^{o}$C. Data memory content shall be preserved at temperatures down to - 40 $^{o}$C.

The recording equipment shall be fully operational in the humidity range 10 % to 90 %.

The recording equipment shall be protected against over-voltage, inversion of its power supply polarity, and short circuits.

**[**[F3]Motion sensors shall either:

— react to a magnetic field which disturbs vehicle motion detection. In such circumstances, the vehicle unit will record and store a sensor fault (Requirement 070) or,

have a sensing element that is protected from, or immune to, magnetic fields.**]**

The recording equipment shall conform to Commission Directive 95/54/EC of 31 October 1995[(1)] adapting to technical progress Council Directive 72/245/EEC[(2)], related to electromagnetic compatibility, and shall be protected against electrostatic discharges and transients.

23. Materials

All the constituent parts of the recording equipment shall be made of materials of sufficient stability and mechanical strength and with stable electrical and magnetic characteristics.

For normal conditions of use, all the internal parts of the equipment shall be protected against damp and dust.

The Vehicle Unit shall meet the protection grade IP 40 and the motion sensor shall meet the protection grade IP 64, as per standard IEC 529.

The recording equipment shall conform to applicable technical specifications related to ergonomic design.

The recording equipment shall be protected against accidental damage.

24. Markings

If the recording equipment displays the vehicle odometer value and speed, the following details shall appear on its display:

— near the figure indicating the distance, the unit of measurement of distance, indicated by the abbreviation ‘km’,

— near the figure showing the speed, the entry ‘km/h’.

The recording equipment may also be switched to display the speed in miles per hour, in which case the unit of measurement of speed shall be shown by the abbreviation ‘mph’.

A descriptive plaque shall be affixed to each separate component of the recording equipment and shall show the following details:

— name and address of the manufacturer of the equipment,

— manufacturer's part number and year of manufacture of the equipment,

— equipment serial number,

— approval mark for the equipment type.

When physical space is not sufficient to show all abovementioned details, the descriptive plaque shall show at least: the manufacturer's name or logo, and the equipment's part number.**]]**

**(1)** **[[F1][[F2]**OJ L 266, 8.11.1995, p. 1.**]]**

**(2)** **[[F1][[F2]**OJ L 152, 6.7.1972, p. 15.**]]**

**Textual Amendments**

**F1** Inserted by Council Regulation (EC) No 2135/98 of 24 September 1998 amending Regulation (EEC) No 3821/85 on recording equipment in road transport and Directive 88/599/EEC concerning the application of Regulations (EEC) No 3820/85 and (EEC) No 3821/85.

**F2** Substituted by Commission Regulation (EC) No 1360/2002 of 13 June 2002 adapting for the seventh time to technical progress Council Regulation (EEC) No 3821/85 on recording equipment in road transport (Text with EEA relevance).

**Changes to legislation:**
There are currently no known outstanding effects for the Council Regulation (EEC) No 3821/85, Division III..