Interface Specification

DILAX CSV Recording

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Version history

Version	Change	Author	Reviewer	Publisher	Valid from
1.0	Creation	MOE	AVO		
1.1	Change conditions for file creation. So “empty” files are created. Update descriptions of file closing according these new conditions.	AVO	MOE		
1.2	Add columns “Total In” and “Total Out”	AVO	MOE		
1.3	Grammar, spelling and layout reworked	AVO	DHO	DHO	10.10.2014
1.4	Change the value of “operator” and “site” columns from “can be empty” to “mandatory” exclude ‘_’ character (chapter 4). Otherwise, file names can’t be correctly built. Automatically replace ‘_’ by ‘-‘ in the filename (chapter 5.1). Add hints for clarification of the intermediate query (chapter 5.2.1) and Compression (chapter 5.4) too.	AVO	DHO	DHO	04.03.2015
1.5	Correct in the appendix B the text for status code 6. Add description of repairing of incomplete files (chapter 5.2.5)	AVO	DHO		

1 Introduction

1.1 Purpose

This document specifies the recording of counting data using the DILAX-CSV file format by means of the DILAX APCS (Automatic Passenger Counting System).

The DILAX sales can find a detailed description of this feature in this document, and can prepare it as description for customers.

For the DILAX product management this document is a base line for further development of the DILAX automatic counting systems.

For the developers of the DILAX counting devices this document is part of the requirement specification of these devices.

Developers of back office software will find the descriptions they need to read files in the DILAX-CSV file format. They get the information required for further processing of the data. Developers of vehicle control computers find description of providing of counting data files for transmission to the back office.

1.2 Scope

This recording feature is intended to be implemented in the firmware of the DILAX counting devices in the mobile application area (which is in contrast to the stationary area). This includes the usage in all vehicles for public transportation.

Counting data is recorded during the operation of a vehicle and stored in a CSV formatted file. When the recording is finished (the record file is closed), the record file will be transmitted to a back office system (e.g. once per day) for further processing.

Counting data is recorded per station. Counting data contains:

- Data to identify the vehicle and the operator
- Data to identify the station (station name, GPS position)
- Data to identify the tour (arrival time and departure time, line name, etc.)
- Number of passengers passing the doors of the vehicle.

The format is designed to be simple and portable, so developers should be able to implement it easily. The file format is intended to be opened with Microsoft Excel™ and other spreadsheet programs for visualization and for further processing of counting data.

Furthermore, it allows future extensions and custom add-ons.

1.3 Definitions, Acronyms, and Abbreviations

APCS	Automatic Passenger Counting System
CSV	Comma Separated Values
GPS	Global Positioning System
PIS	Passenger Information System
UTC	Universal Time, Coordinated
SNTP	Simple Network Time Protocol

Table 1: Definitions, Acronyms, and Abbreviations

1.4 References

none

1.5 Overview

The general structure of the CSV recording format is described first. In addition, used data types and formatting are specified.

With this information, the structure of a data line is specified, including the title of each data field, the data type, and the content of each field, including restrictions of values.

The last section describes creation and closing of record files, where closing means finishing of the recording to prepare record data to be transmitted to the back office.

2 CSV Document Structure

Counting data is recorded in a human readable textual format, which can simply be imported into a spreadsheet program like Microsoft Excel™.

The document has a table structure with rows and columns. The columns are separated by a separation character. Each row is represented by a line.

The first line is the header line, containing the names of the columns.

Except the header line, each line contains the counting data of one station or the results of an intermediate query at a station.

The CSV formatted document is coded in ISO-8859-1 (Latin-1). This character set is a superset of 7-bit ASCII. In addition, the ISO 8859-1 specific characters contain the specific symbols for the western European and American language.

The separation of the columns can be configured in two ways:

1. Comma character (,) as column delimiter and point (.) as decimal point (CP)
2. Semicolon character (;) as column delimiter and comma (,) as decimal point (SC)

By choosing one of the column delimiters, the decimal point is configured respectively.

If you want to import the files in Microsoft Excel™, you have to choose the delimiter character according the region and language settings of Microsoft Excel™ (e.g. the semicolon character for German-Germany, and the comma character for English-USA).This simplifies importing files, and no change of the regional setting is required. Which delimiter character is used by a file can be seen on the file name (see chapter 5.1).

Each line is completed by a carriage return and a line feed (CRLF) character (hexadecimal code 0D 0A).

Note: Even the last line of the document is completed by this sequence of characters.

Note: When values of data fields contain the delimiter characters, they are replaced by SPACE characters (hexadecimal 20).

3 Data Types

The values of the fields of the table are formatted according to their data types. The following chapters describe these data types.

3.1 Integer Values

Integer values are signed and unsigned without leading zeros and digit grouping. The sign character is only added for negative values. Maximum number of characters is 11.

Examples:
0
-12355123
-3
4879265
-1752967351

3.2 Boolean Values

Integer values representing the Boolean values true (1) and false (0).

Examples:
0
1

3.3 Floating Point Values

The floating point values are signed and unsigned with no leading zeroes and no digit grouping. The sign character is added only at negatives values. The decimal mark is the point (.) or the comma (,) character, depending on the configuration.

Examples with CP configuration:
0.2223
-22.33
12344.66
-168.774365

Examples with SC configuration:
0,2223
-22,33
12344,66
-168,774365

3.4 Timestamps

Timestamps are recorded in local or in UTC time. The character sequence is YYYY-MM-DD hh:mm:ss TZ including leading zeroes. In UTC time, the time zone (TZ) is replaced with the fix character sequence “UTC”. The date is separated by a hyphen character (-). Four characters are used for the year (YYYY), two for the month (MM) and for the day (DD). The time is separated by a colon (:). Two characters are used for the hour (hh), for the minute (mm) and for the seconds (ss). Date, time, and time zone are separated by one space character. Time zones (TZ) are described in http://home.kpn.nl/vanadovv/time/TZworld.html.

Local time example:
2014-01-17 23:32:06 CET

UTC time example:
2014-01-17 22:32:06 UTC

3.5 Text Values

A text value is a sequence of characters. It is not allowed to use the delimiter characters within the text. Therefore, every delimiter character will be replaced by a space character.

Example (CP):
Text,text -> Text text

Example (SC):
Text;text -> Text text

4 Line Structure

Column	Header Field Name	Type	Description
1	Id	Integer	Unique identifier of the counting data record. Range: 1 to 65535. Starts with 1 in each record file. If 65535 is reached, it restarts with 1.
2	Version	Text	Version of the structure of the DILAX-CSV format. This value is fix set to 10. The value must be changed, when the structure is changed (e.g. on an extension with new columns).
3	Type	Text	Type of the query, the line is representing. 'I' indicates an intermediate query. 'S' indicates a normal station query.
4	Operator	Text	Name of the operator as configured in the APCS. Max. 64 characters. Mandatory, shall not contain any underscore character '_'.
5	Site	Text	Name or ID of the vehicle or the site as configured in the APCS. Max. 64 characters. Mandatory, shall not contain any underscore character '_'.
6	Vehicle Type	Text	Type of the vehicle as configured in the APCS. Max. 64 characters. Can be empty.
7	Arrival Local	Timestamp	Local date and time when the station was reached.
8	Arrival UTC	Timestamp	UTC date and time when the station was reached.
9	Departure Local	Timestamp	Local date and time when the station was left. On an intermediate query, this time is the time of the query.
10	Departure UTC	Timestamp	UTC date and time when the station was left. On an intermediate query, this time is the time of the query.
11	Way Last Station	Integer	Travelled distance in meters since previous station. Range: -1 to 2.147.483.647. A value of -1 indicates that the distance cannot be measured.
12	Total Way	Integer	Total travelled distance in meters since system start. Range: -1 to 2.147.483.647. A negative value indicates that distance cannot be measured.
13	Line	Text	Name or ID of the current line. This information is extracted from the PIS data. Max. 64 characters. Can be empty.
14	Route	Text	Name or ID of the current route. This information is extracted from the PIS data. Max. 64 characters. Can be empty.
15	Trip	Text	Name or ID of the current trip. This information is extracted from the PIS data. Max. 64 characters. Can be empty.
16	Course	Text	Name or ID of the current course. This information is extracted from the PIS data. Max. 64 characters. Can be empty.

P1. 1.10.5.1.1
P1. 1.10.5.1.2

Column	Header Field Name	Type	Description
17	Station	Text	Name or ID of the current station. This information is extracted from the PIS data. Max. 64 characters. Can be empty. If the PIS prepares a name as well as an ID, the ID is used for this field.
18	Next Station	Text	Name or ID of the following station. This information is extracted from the PIS data. Max. 64 characters. Can be empty. If the PIS prepares a name as well as an ID, the ID is used for this field.
19	Stations Left	Text	Number of stations left until terminus. This information is extracted from the PIS data. Max. 64 characters. Can be empty.
20	Satellites	Integer	Number of satellites (0 to 12) used for position fixing. 0 indicates that no valid position data (Latitude, Longitude) is available at this station.
21	Latitude	Floating Point	Latitude of the current station in **°** (WGS 84 coordinate system). The precision is 0.0000001**°.** West is negative, east is positive. A value of 0.0000000 indicates that the position is unknown (Satellites = 0).
22	Longitude	Floating Point	Longitude of the current station in **°** (WGS 84 coordinate system). The precision is 0.0000001**°.** South is negative, north is positive. A value of 0.0000000 indicates that the position is unknown (Satellites = 0).
23	Map	Text	URL of the current position represented in a google map. If no coordinates are available (Satellites = 0) then the URL is empty. **Example:** http://maps.google.com/maps?q=48.69176%2C2.385685
24	Total Exchange	Integer	Total duration of passenger exchanges of the vehicle at the current station in seconds. The duration is calculated by subtracting the time of the first counted event from the time of the last counted event at any outer door of the vehicle. An event occurs when either an entering or exiting passenger is detected by the APCS. Range: 0 to 65535. A value of 0 indicates that no passenger exchange time is determined. On an intermediate query line, this value is always 0.
25	Total In	Integer	Number of passengers who entered at all doors since the previous station. Range: 0 to 65535.
26	Total Out	Integer	Number of passengers who left at all doors since the previous station. Range: 0 to 65535.
27	System State	Integer	Indicates the system state. 0 = No detected system error. >0 = Error See attachment Appendix B System Status Codes for error codes.

P1. 1.10.5.1.1
P1. 1.10.5.1.3
P1. 1.10.5.1.1
P1. 1.10.5.1.2
P1 1.10.3
P1. 1.10.1.8.8

Column	Header Field Name	Type	Description
The following sequence of columns is repeated for each XXX door. XXX is a number between 001 and NNN. NNN can be configured according to the number of doors in the APCS. NNN can be a number between 001 and 192.			
	DoorXXX	Text[1)]	Name of the XXX'th door. Max. 64 characters. Can be empty.
P1. 1.10.5.1.1	InXXX	Integer[1)]	Number of passengers who entered at this door since the previous station. Range: 0 to 65535.
	OutXXX	Integer[1)]	Number of passengers who left at this door since the previous station. Range: 0 to 65535.
	ExchangeXXX	Integer[1)]	Duration of passenger exchanges in seconds at this door at the current station. The duration is calculated by subtracting the time of the first counted event from the time of the last counted event for this door. An event occurs when either an entering or exiting passenger is detected by the APCS. If the calculation of the exchange time per door is deactivated, the value is set to 0. On an intermediate query line, this value is always 0. Range: 0 to 65535. For inner doors this value is not relevant, and shall be ignored (see chapter 5.2.1).
	StatusXXX	Integer[1)]	Status code of the door: 0 = Counting data is valid. Other values = The first error, or warning, which is detected at the door since the previous station. The counting data may be invalid. See Appendix A for a description of door status codes.
	SupplementXXX	Integer[1)]	Error supplement. Extends the status code. If the status code is not extended, the value is 0. See Appendix A for a description of door status codes.

Table 2: Structure of a CSV record line

[1)] If the number of doors is not explicitly configured in the CSV configuration of the APCS, then NNN has the value 10. That means, that the data of the first 10 doors are recorded and all other doors are ignored.
If the door is not present in the APCS, the values are empty text values.

5 File Generation

5.1 File Creation

A new record file will be created when the following conditions are fulfilled: The APCS has a **valid system time** and there is no record file present. This becomes true if:

- The previous file has been closed.
- DILAX-CSV data recording is activated.
- Parts of the APCS configuration have been changed.

Due to the fact that at file creation time there is no counting data available, an **"empty" record file** is generated with the header line only. For the back office, an empty record file shall indicate, that the APCS is running, even if no counting data is recorded.

Filename:

CSVSeparationType_StructureVersion_OperatorName_SiteName_UTCCreationDate_UTCCreationTime.csv

Part	Description
CSVSeparationType	Abbreviation of the delimiter character/decimal point combination used for this file. CP: Comma as delimiter character. Point as decimal point. SC: Semicolon as delimiter character. Comma as decimal point.
StructureVersion	Version of the structure of the CSV format. Fix set to V10. This version shall be equal to the version in the "Version" column. Where the decimal point is removed. This shall help to select the correct csv parser for the version of structure before the file is opened.
OperatorName	Name of the operator as configured in the APCS. Any underscore characters are replaced by a "–" character.
SiteName	Name or ID of the vehicle or site as configured in the APCS. Any underscore characters are replaced by a "–" character.
UTCCreationDate	UTC date of the record file creation. Format: YYYYMMDD. YYYY = Year, MM = Month, DD = Date.
UTCCreationTime	UTC time of the record file creation. Format: hhmmss.

	hh = hour, mm = minute, ss = seconds.

Table 3: Parts of the file name

Example:
CP_V10_DB_948004238010_20140412_170023.csv

5.2 Recording

The APCS is able to detect the arrival and the departure at a station. A record line is written in the record file:

- At a station on an intermediate query.
- After leaving the station.

5.2.1 Determining Counting Data

For each door of the vehicle, the entering and exiting passengers passing the door during a certain period of time are determined. To determine whether the data is valid, the error state of the door is also determined for the same period (see 5.2.2).

The period of the counting data, which is written to the record file when the current station is left, starts from the previous station.

Hint: There are outer doors where the passengers enter or exit the vehicle, and there are inner doors where the passengers move within the vehicle. The APCS cannot distinguish between these two classes of doors. That's why the system has to assume, that there are inner doors present in the vehicle and therefore it accumulates the entering and exiting passengers even for periods when the vehicle is moving. The APCS detects doors opening by means of electrical signals and it only counts when the door is open. Due to the fact that outer doors can only be opened when the vehicle stays at the station, only the passenger exchange at this station is determined, even if the period is longer than the stop at the station.

Intermediate Query

Additionally, for long term stops, an intermediate query is recorded. After a configured time starting with the arrival at the station, the APCS determines the current state (snap shot) of passenger exchange. This can be used to assign counting data to different trips. The period, until the intermediate query time is reached, will be assigned to one trip, and the following counting data, until the station is left, will be assigned to the consecutive trip.

Note: Even in case of an intermediate query, in the line, which is recorded when the station is left, counting data since the previous station is recorded. This means, the counters of the intermediate query are included in the counters of the data of the following line.

The period of the intermediate query starts when the previous station is left.

When the file is closed (see 5.3 for details) while the vehicle stays at a station, counting continues until the vehicle leaves the station and then the next record file will be created.

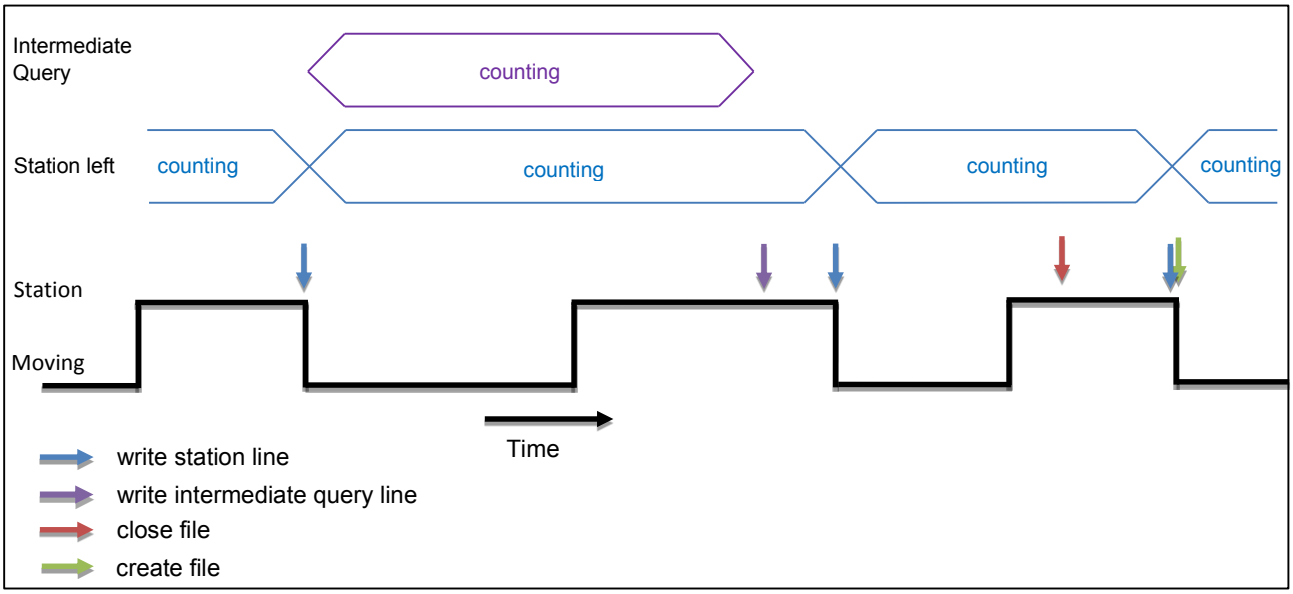

Figure 1: Timing diagram: counting periods and writing record lines

5.2.2 Recording Error States

Each door of a record line has an error state. If no error occurs during the counting period (see 5.2.1), the state value is 0. Otherwise, an error state is set. The first occurring error state during the counting period is recorded.

Note: Even if an error state disappears during the counting period, it is recorded in order to mark counting data as erroneous.

5.2.3 Determining Changes of the APCS Configuration

The APCS configuration can change due to a reconfiguration of the APCS. A change of the configuration related to the CSV recording is detected, if at least one of the following configuration items is changed:

1. The number of doors (parameter NNN, see 4) in the CSV structure.
2. The selected delimiter character.

5.2.4 Handling System Time Settings

As long as the APCS does not have an own Real Time Clock, which counts even during periods of power down of the APCS, the APCS will get the system time by external components (like an onboard unit, or via GPS, etc.). After system start, the APCS has no valid system time. Therefore, the time of arrival and the time of departure cannot be determined until the system time has been set to a valid time. The system time becomes valid if it is set from a value less or equal 2000-01-01 00:00:00 UTC to a value greater than 2000-01-01 00:00:00 UTC.

With an invalid system time, the time stamps for arrival and departure cannot be determined. Thus, counting data cannot be recorded in this situation.

If the system does not have a valid time when the vehicle arrives at a station, but it has a valid system time when the intermediate query is executed or when the vehicle leaves the station, then the time of arrival is calculated to be a valid time. The following timing diagram shows the behavior of the APCS when power goes on. If all components of the APCS have been detected, counting data will be reset and counting will be started. When the vehicle is standing at a station, which is the common situation on power on, the APCS detects the station, and the time of arrival is remembered. When the system time becomes valid, the time of arrival will be corrected according to the difference between the current system time und the current up-time (seconds since power on).

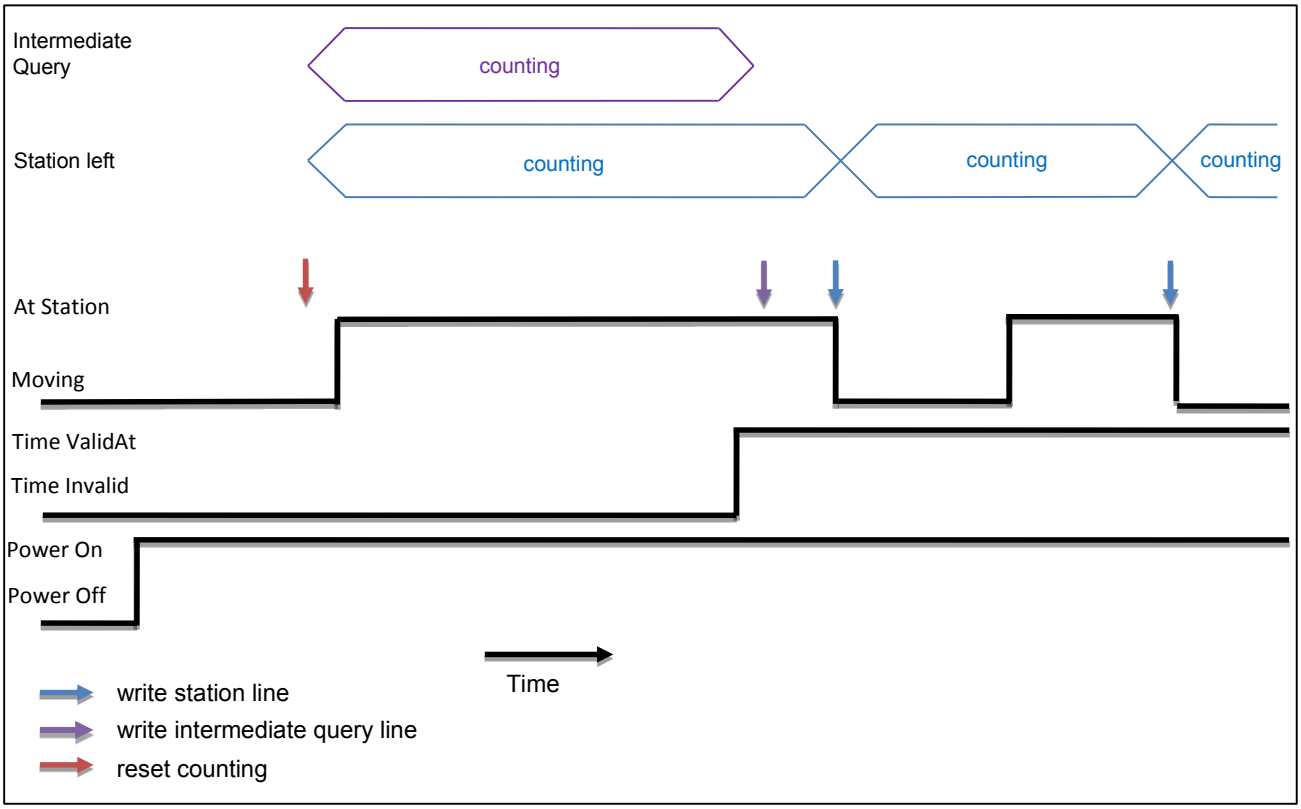

Figure 2: Handling of system time setting.

Note: Ensure, that the APCS gets a valid system time (e.g. via SNTP or from GPS) before the first station is left. Otherwise, counting data is not recorded until the system time becomes valid.

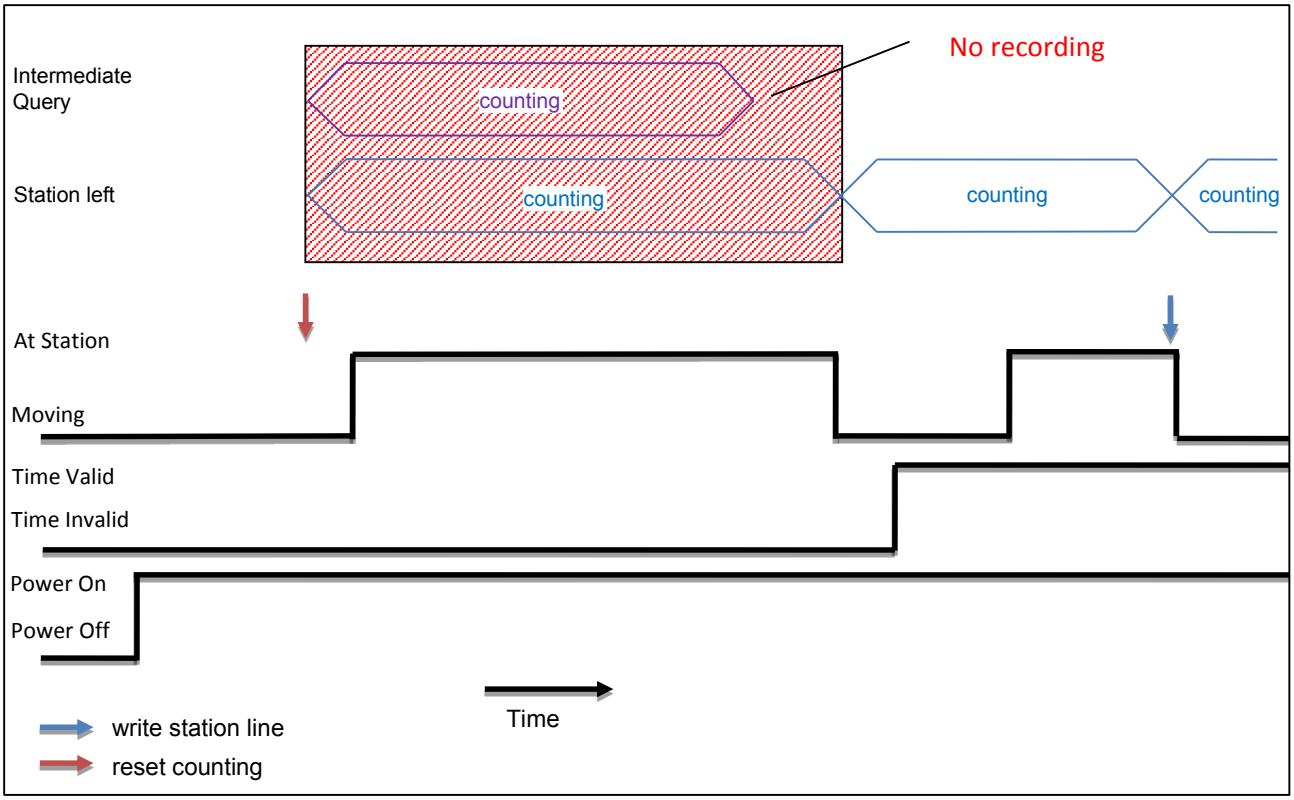

Figure 3: Handling of system time. Time becomes valid after first station.

5.2.5 Restart of the APCS

When the APCS restarts during a recording period, the current recording file is continued, except the recording period is over (see 5.3).

On system start, a record of the counting data of a station is started. The arrival time is set close to the time where the system has been started.

After Restart, the APC checks the completeness of the current recording file if any. If the current recording file is corrupted (does not end with a line end character sequence: carriage return + line feed), it will be repaired.

The characters of the incomplete line will be removed from record file. The next line will be written as usual, but the “Id” is incremented by two. This creates a gap into the sequence of “Id” values. This gap can be used to detect, the missing line of data. If the APC restarts after repairing the record file before a new line is added, the information about the missing line data is lost. This drawback is accepted to simplify the implementation.

5.2.6 Recording of PIS Data

As long as a PIS is connected to the APCS, the APCS continuously receives data from the PIS (like name of the current station etc.). Information received from the PIS is used to identify the station and the trip in addition to the time stamps and the position coordinates. The PIS information of a record line is determined when a station is reached (at the time of arrival). Changes of PIS information which occur while the vehicle is standing at a station will be ignored. When there is no PIS information available at this time, the values of PIS data remain empty.

5.2.7 Recording of Position Data

The APCS shall be equipped with a component to determine the current geographic position. This can be a GPS module or an external source of position data (like PIS).

When the vehicle arrives at a station, the APCS tries to determine the position data for this station. If this is not possible (e.g. due to low GPS signal situation), the APCS tries to get the position data until the station is left. Once the position data is determined in this time period, it is recorded for the current station. If no position data can be determined, the coordinate values and the number of satellites are set to zero.

5.3 File Closing

DILAX CSV data recording is intended to record one day of operation per file.

After closing, the file name is extended by the extension .raw.

Example:

CP_V10_DB_948004238010_20140412_170023.csv.raw

The record file can be closed by the following methods:

- Once a day at a configurable time.
- Automatic, where the APCS determines the closing time by itself.
- Manually, by means of a user action.
- When parts of the configuration of the APCS are changed.

The APCS can be configured to close the record file once a day at a certain time, or automatically, where the APCS tries to record a period of operation in one record file. The other methods close the record file on the occurrence of the corresponding events, independent of the configuration.

5.3.1 Closing once a Day

The APCS can be configured to close the file at a certain time of a day. This is configured by setting hour and minute of this time. The time is assumed to be the local time. Therefore, do not select a time which is not unique even on switching the local time for day light saving time purposes.

The APCS determines the time of closing the record file by looking for the file's creation time. If the difference between the current time and the file creation time is more than ±24 hours, the file will be closed. Otherwise the file will be closed until the file closing time of the day is over.

Note: A negative difference can occur, when the system time is set back during recording.

If the APCS was restarted and gets no valid system time, then the existing record file remains open until the system gets a valid time and the closing time can be calculated. If the system time is invalid for more than 12 hours, the record file will be closed. 12 hours are measured beginning at system start, but measurement

will restart with every new power-on. The file will also be closed, when the system starts twice without getting a valid system time. This shall prevent the file to be never closed in case the system time never becomes valid. This behavior is shown in the following state chart:

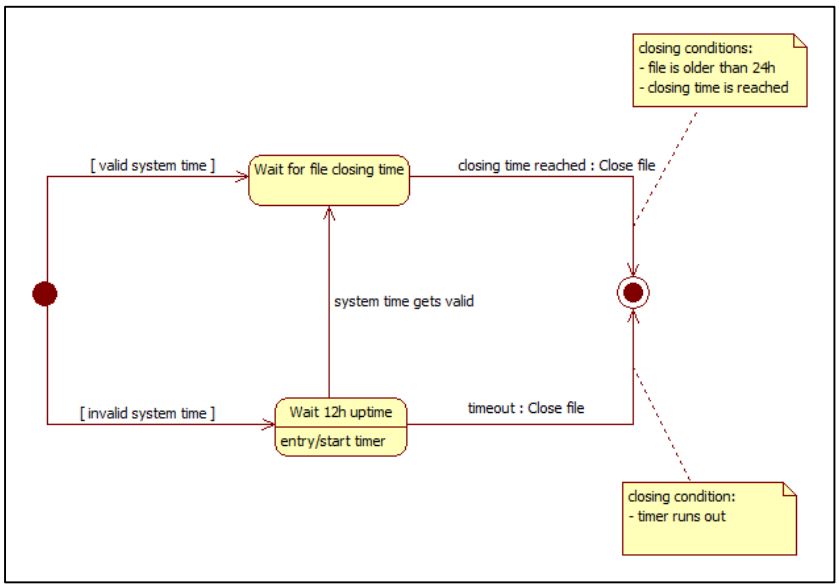

Figure 4: State chart: Closing once a day

The following timing diagram shows an example of the behavior of this state machine. File#1 is closed after one day, when the file closing time is reached. File#2 is continued after a power down period, but it is closed after power on, because it is older than 24 hours. File#3 is closed on the regular closing time.

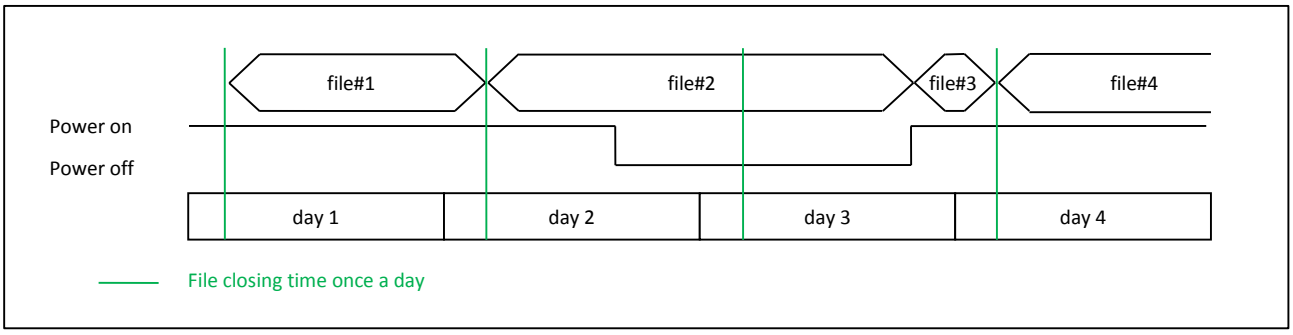

Figure 5: Timing diagram: Closing once a day

5.3.2 Automatic Closing

If automatic closing is configured in the APCS, the system tries to record a period of operation in one record file. After the vehicle goes in operation, the APCS waits for at least 4 hours since file creation time. If the waiting time is over and the vehicle is out of operation, the file will be closed. Otherwise, the APCS will wait until the vehicle goes out of operation for up to 24 hours and will then close the file. If the vehicle never goes in operation the file will be closed after 24 hours.

If the APCS has been restarted and is not able to get a valid system time, the record file remains open until the system gets a valid time and the closing time can be calculated. If the system time is invalid for more than 12 hours, the record file will be closed.

The file will also be closed, if the system starts twice without getting a valid system time. This shall prevent the file to be never closed when the system time never becomes valid.

The following two state charts show the implementation of this behavior.

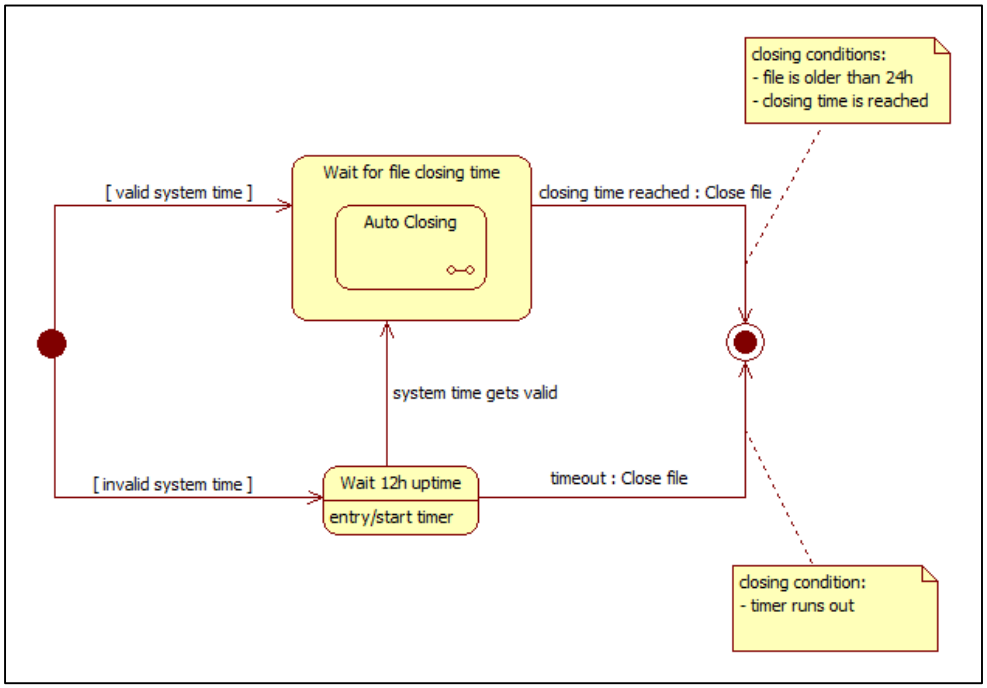

Figure 6: State chart: Automatic file closing for handling of system time setting

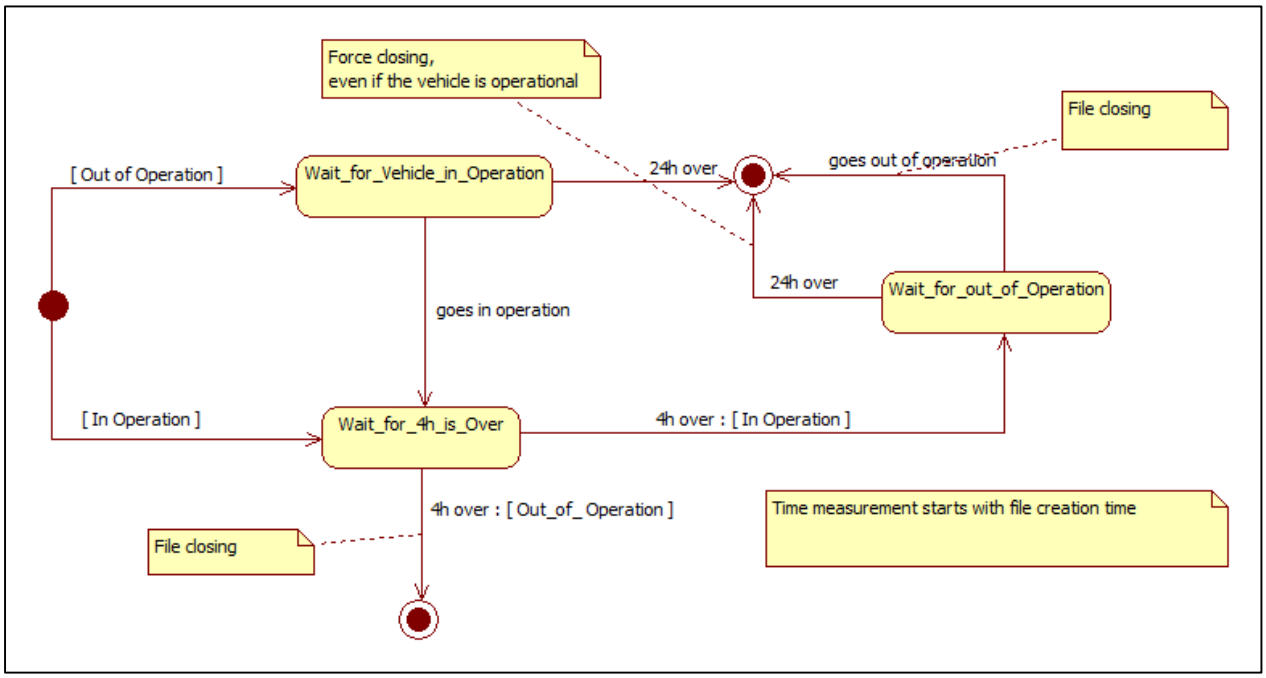

Figure 7: State chart: Automatic file closing on valid system time.

The same behavior can be represented by the following flow chart.

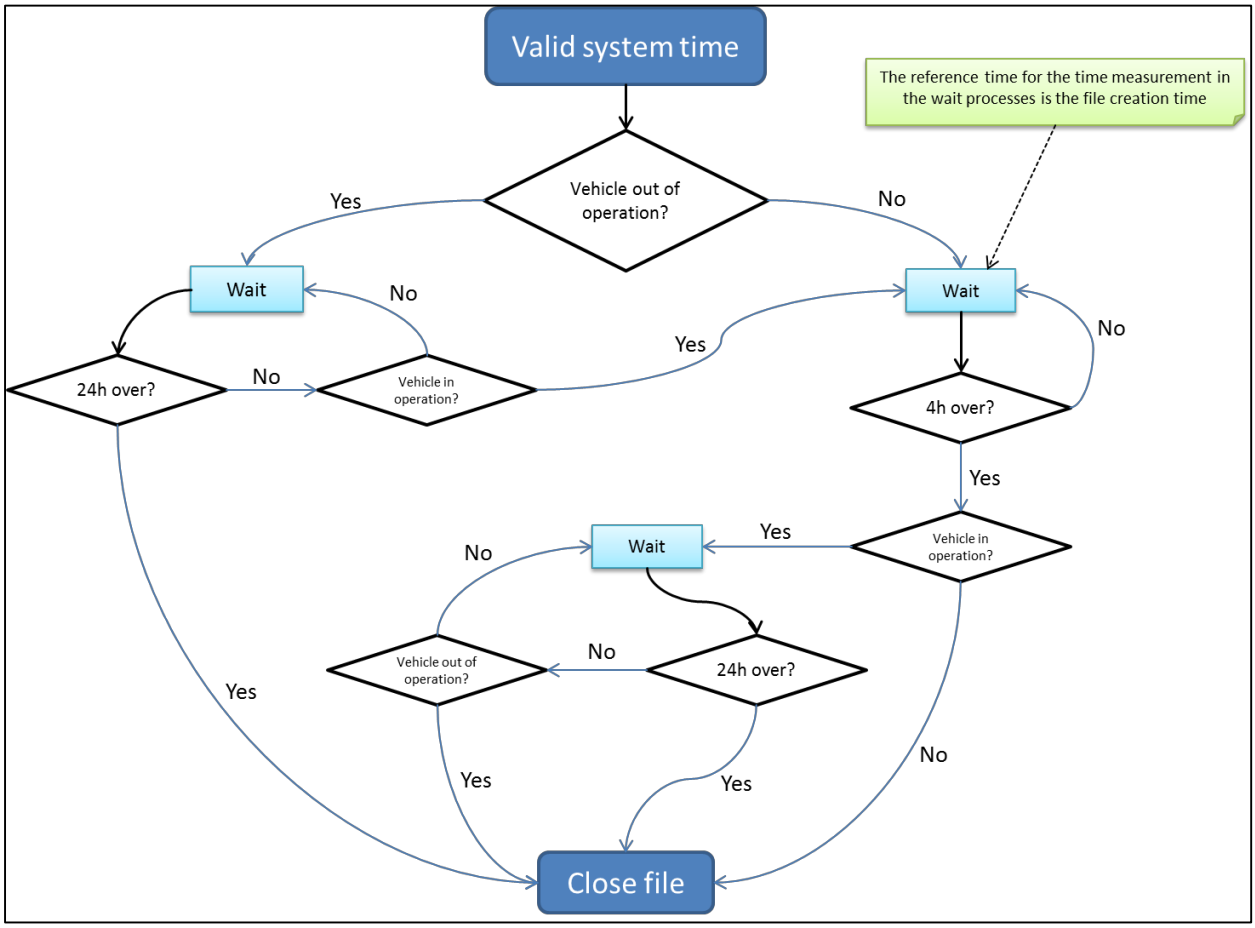

Figure 8: Flow chart: Automatic file closing

The following timing diagram shows an example of the behavior of this state machine. File#1 records a period of operation of the vehicle. During recording of file#2, the operational mode alternates for less than 4 hours. Then it remains in operation for more than 24 hours. Therefore, the file is closed when 24 hours after file creation are over. After closing file#2, file#3 is created. It records some hours until the middle of day 3. The following power off period ends at day 4. The system starts in in-operation mode but file#3 is closed, because it is older than 24 hours.

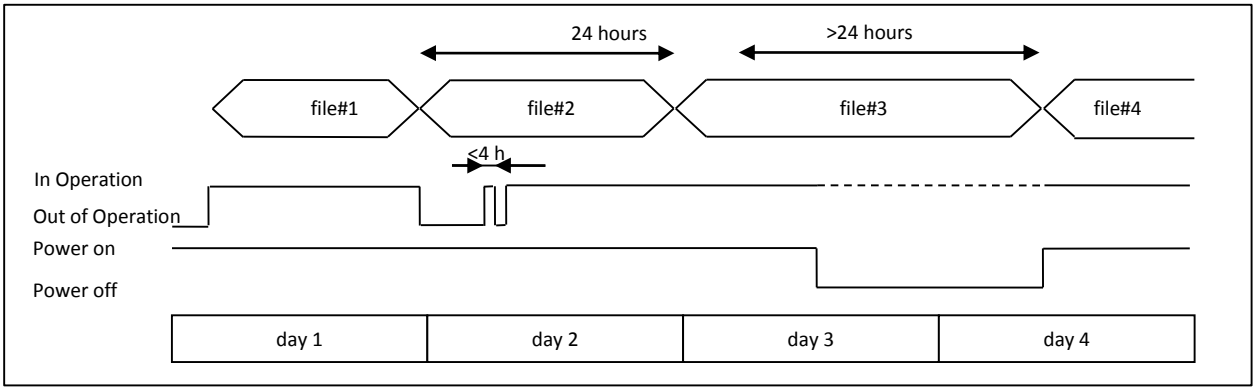

Figure 9: Timing diagram: Automatic file closing.

5.3.3 Manual Closing

If the operator initiates the “manual closing” function in the control interface of the APCS, the file will be closed immediately.

5.3.4 Closing on Changing Parts of the APCS Configuration

If the system detects a change of certain parts of the APCS configuration, the file will be closed (see 5.2.3 for details on change detection).

Note: Because a change of the APCS configuration is detected when a line is written, counting data of the corresponding station will be lost.

5.4 Preferred Ring Buffer Implementation

Recorded files are organized in a ring buffer. The buffer has a size of 100 files. If the maximum number of files is reached, then the oldest file in the ring buffer will be overwritten by the current file. The files of the ring buffer are compressed in gzip format for transferring to the back office. Each file is compressed into one file with the same file name but with the extension “.gz” added.

If the flash memory consumption of the APCS exceeds 75% of the total capacity, then the size of the ring buffer will be decreased by deleting the oldest files until the memory consumption is below 75%.

5.5 File Transmission

Once a file is closed, the APCS tries to transmit the file to the back office. Files which have to be transmitted are stored in the ring buffer. Transmitted files remain in the ring buffer as backup (file extension .bak).

Appendix A Door Status Codes

Status Code	Category	Description	Error Supplement
2	Error	Not enough nodes connected to the SSL bus.	The error supplement code indicates the position (counting starts at 1) of the first missing sensor of the door in the sensor chain.
3	Error	Flickering sensor.	The error supplement code indicates the position (counting starts at 1) of the flickering sensor in the sensor chain.
4	Error	SSL bus is not operational.	None
5	Error	Sensor or door is not operating correctly. It sends implausible data.	The error supplement code indicates the position (counting starts at 1) of the sensor that reports implausible data in the sensor chain. If it is not detectable, the SSL position is set to 0.
8	Error	Blocked sensor. It checks, whether one optic of a sensor does not change its state for at least 1 hour. (If there is no door signal defined at the door, the duration is 5 hours).	The error supplement code indicates the position (counting starts at 1) of the blocked sensor in the sensor chain.
10	Warning	Sensor optic has not detected anything for a long time. Checks the signals sent from the sensor for a long time period of vehicle operation (> 48h). The state is determined even if the vehicle occasionally is switched off.	The error supplement code indicates the position (counting starts at 1) of the sensor in the sensor chain.
11	Warning	Door contact has not changed its state for a long time. Checks the state of the door signal for a long time period of vehicle operation (> 48h). The state is determined even if the vehicle occasionally is switched off.	The error supplement code indicates the position (counting starts at 1) of the sensor in the sensor chain.
12	Warning	Sensor has not detected any valid event for a long time. Checks the signals sent from the sensor for a long time period of vehicle operation (> 72h). The state is determined even if the vehicle occasionally is switched off.	The error supplement code indicates the position (counting starts at 1) of the sensor in the sensor chain.
20	Warning	Door is erroneously reported as open. Checks the state of the door signal when the 'Vehicle in motion' state (calculated by the PCU) is active.	None

Table 4: Door status codes

Appendix B System Status Codes

Status Code	Description
1	No impulses at the odometer signal input while vehicle is moving. Compares the speed calculated from odometer counts with the GPS speed (occurs when an odometer signal is configured only).
2	Continuous impulses at the odometer signal input while vehicle stands still. Compares the speed calculated from odometer counts with the GPS speed (occurs when an odometer signal is configured only).
3	Driving signal is inactive while vehicle is moving. Compares the 'vehicle in motion' signal state with the GPS speed (occurs when a vehicle-in-motion/at-stop signal is configured only).
4	Driving signal is active while vehicle stands still. Compares the 'vehicle in motion' signal state with the GPS speed (occurs when a vehicle-in-motion/at-stop signal is configured only).
5	Doors released while vehicle is moving. Compares any 'door release' signal state with the 'Vehicle in motion' state of the vehicle (calculated by the APCS).
6	At station while vehicle is moving. Compares the 'at station' signal state with the GPS speed (occurs when the at-stop signal is configured only).

Table 5: System status codes

Appendix C Example File

CP_V10_DILAX_Master_20111103_020037