



Ministero delle Infrastrutture e dei Trasporti

Department of Transport, Navigation and Information and Statistical Systems

Directorate-General for Road Traffic

Division 4

Technical and operational specifications

MCTCNet 2

Consolidated Specification

Table of contents

1. INTRODUCTION	5
1.1 Document characteristics	7
1.2 Conventions	8
1.3 Terminology	8
1.3.1 Type of data	10
1.3.2 PCStazione	10
1.3.3 PCApparecchiatura	15
1.3.4 PCPrenotazione	16
2. SYSTEM CONFIGURATION	20
2.1 Connections between system components	22
2.1.1 Network connection specifications	22
2.2 Concept of interchangeability	23
3. DEFINITION OF SYSTEM DATA	24
3.1.1 File validation by software modules	25
3.1.2 Resolution of measuring data	28
3.1.3 Entry validation	28
3.2 Implementing computer security	29
3.2.1 INTRODUCTION	29
3.2.2 PROTECTION OF INDIVIDUAL TEST DATA	29
3.2.2.1 Public key infrastructure	31
3.2.2.2 Calculating the anti-forgery code	32
3.2.2.3 Checking the anti-forgery code	34
3.2.3 DATA PROTECTION TO BE APPLIED TO RS INSTRUMENTS	36
3.2.3.1 Application of RS encryption	37
3.2.4 Further information on computer security	40
3.3 Test data	42
3.3.1 Version identification data	42
3.3.1.1 Section ⇒ IdentificazioneProtocollo	42
3.3.2 Booking and reception data	42
3.3.2.1 Section ⇒ Prenotazione	43
3.3.2.2 Section ⇒ Vehicle data from logbook	44
3.3.2.3 Section ⇒ Clearance Test Data	50
3.3.3 Test data	50
3.3.3.1 Section ⇒ Brake Test	52
3.3.3.2 Section ⇒ Decelerometer test	61
3.3.3.3 Section ⇒ Suspension	62
3.3.3.4 Section ⇒ Drift	63
3.3.3.5 Section ⇒ GAS Analysis	64
3.3.3.6 Section ⇒ SPEED test	75
3.3.3.7 Section ⇒ OPACITY test	77
3.3.3.8 Sound meter section	80
3.3.3.9 Section ⇒ Headlight test	85
3.3.3.10 Section ⇒ License plate photo	90
3.3.3.11 Section ⇒ EOBD test	92
3.3.3.12 Section ⇒ Tyre check	94
3.3.3.13 List of Visual Check items	97

3.3.3.14	Section ⇒ Overall result of instrumental checks	105
3.3.4	Automatic acquisition of tested vehicle images	107
3.3.4.1	Introduction	107
3.3.4.2	Image acquisition.	107
3.3.4.3	Activities performed by RT software	107
3.3.4.4	Activities carried out by the brake test software (DIR and RETE)	115
3.3.4.5	Connection of licence plate recognition system	117
3.3.4.6	Activities carried out by the PCStazione software	118
3.3.4.7	Webcam software approval	119
3.3.5	Scantool test	121
3.4	Measurement data input manually	123
3.5	Shared Data	124
3.5.1	Sections and Entries for the MCTC.INI file	124
3.5.1.1	Section ⇒ IdentificazioneProtocollo	125
3.5.1.2	Section ⇒ Shared folders	125
3.5.1.3	Section ⇒ Fuel systems	125
3.5.1.4	Section ⇒ International Categories	126
3.5.1.5	Section ⇒ Description of vehicle for categories M and N	127
3.5.1.6	Section ⇒ Description of vehicle for O categories	127
3.5.1.7	Section ⇒ Description of vehicle for categories L	128
3.5.1.8	Section ⇒ Diesel emission directives	128
3.5.1.9	Section ⇒ Light vehicle petrol emission directives	129
3.5.1.10	Section ⇒ Moped petrol emission directives	129
3.5.1.11	Section ⇒ Motorcycle petrol emission directives	129
3.5.1.12	Section ⇒ Acoustic directives	130
3.5.1.13	Section ⇒ Motorcycle acoustic emission directives	130
3.5.1.14	Section ⇒ Motor vehicle horn directives	130
3.5.1.15	Section ⇒ Test type	130
3.5.2	Environmental values	131
3.5.2.1	Section [ValoriAmbientali] File meteo.met	132
3.6	Confidential data	132
3.7	Test centre application and device software updates	133
4.	“PCPRENOTAZIONE ⇔ PCSTAZIONE” DATA EXCHANGE	134
4.1	Archiving of tests carried out and connection to EDP centre	139
4.1.1	Test state	139
4.1.1.1	Booked	139
4.1.1.2	Received or work in progress	139
4.1.1.3	Completed, awaiting transmission to EDP centre	139
4.1.1.4	Completed, cannot be sent to the EDP centre due to expired terms	140
4.1.1.5	Completed with transmission to the EDP centre:	141
4.1.1.6	Cancelled	141
4.1.1.7	Formal errors	143
4.1.2	Data security	145
4.1.3	Backup	145
4.2	“MCTCNet” protocol update methods and flows	146
4.2.1	MCTCNet system connection set-up	146
4.2.2	New update methodology	147
4.2.3	Use of MCTCVER.INI file	148
4.2.3.1	Content of MCTCVER.INI file	148
4.2.4	Use of multiple booking files	150
4.2.5	Use of multiple reception files	150
4.2.6	Further notes on multiple booking and reception files	151
4.2.7	Entering protocol version in results files	151

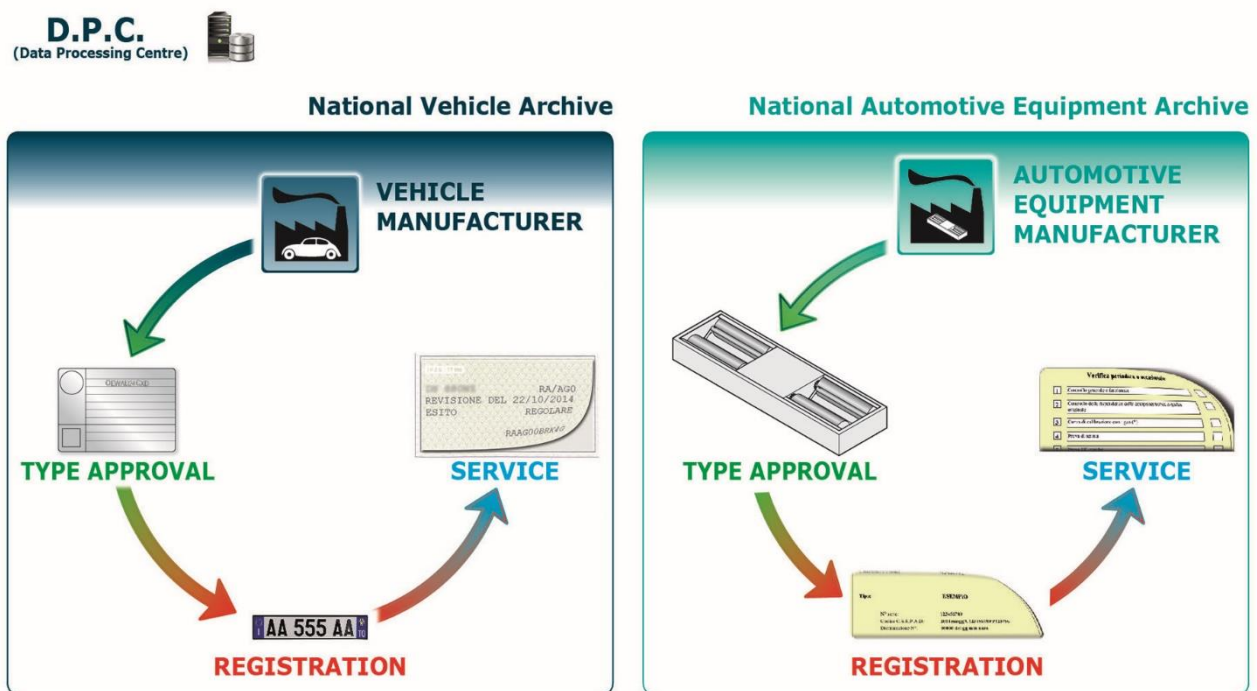
4.2.8	Information flows after the required changes	151
4.2.8.1	PCStazione and PCPrenotazione flow	151
4.2.8.2	Flow for PCApparecchiatura connected to PCPrenotazione in “RETE” mode	152
4.2.8.3	Flow for device connected to PCStazione in “DIR” mode	152
4.2.8.4	Flow for device connected to PCStazione in “RS Senza Esito” mode	153
4.2.9	Resolution of ambiguities over modified entries	153
4.2.10	Miscellaneous notes	157
4.2.11	Test operating flow at the completion stage	157
4.3	Notes on the performance of tests during the roadworthiness test.	158
5.	“PCSTAZIONE ⇔ APPARECCHIATURE” DATA EXCHANGE	161
5.1	Device connected with RS protocol	161
5.1.1	Serial connection specifications	161
5.1.2	Logical communication protocol	163
5.1.3	Connection with “Senza Elaborazione Esito” device	167
5.1.3.1	PCStazione ⇔ GAS analyser Commands and Responses	167
5.1.3.2	PCStazione ⇔ OPACIMETER commands and responses	199
5.1.3.3	PCStazione ⇔ REV COUNTER commands and responses	221
5.1.3.4	PCStazione ⇔ Speed test commands and responses	231
5.1.3.5	PCStazione ⇔ SOUND LEVEL METER commands and responses	243
1.1.1.1	Figure 1 – Sound level meter test diagram	259
5.1.3.6	PCStazione ⇔ HEADLIGHT TEST command and response	272
5.1.4	Notes on connection with 'senza elaborazione esito' devices	284
5.2	Device connected with “Dir” protocol	284
6.	APPENDICES	287
6.1	Appendix A : MCTCNet connection diagram	287
6.2	Appendix B : SHA 1	294
6.3	Appendix C : RC4	296
6.3.1	RC4 encryption methodology	296
6.3.2	Transmission	297
6.3.3	Reception	297
6.3.4	Example of C-ANSI source code for RC4 encryption:	297
6.4	Appendix D Connection of devices ‘con and senza elaborazione esito’ in MCTCNet version 2.1.0	300
6.4.1	Send test identification data	301
6.4.2	Send session key	302
6.5	Appendix E: Base64 coding	303

1. Introduction

This document defines the operating rules of the IT infrastructure applied in Italy in order to regulate the exchange of data between the various devices and the national Data Processing Centre (DPC).

It should be stated that the IT system is able to manage the entire in-service vehicle fleet as well as all devices in use at test centres. In particular, the following image shows how the following are registered with the DPC:

- vehicle manufacturers;
- models and associated accredited type approvals;
- all vehicles registered and on the road;
- all results of routine and non-routine tests on registered vehicles.
- equipment manufacturers;
- models and associated accredited type approvals;
- all equipment registered and used by authorised companies;



Every test operation can also be traced back through the DPC to the operational site where it was carried out and the technical manager who carried out the checks. All technicians authorised to carry out equipment metrology checking are also registered and we are in the process of computerising all routine equipment service operations.

Below are the links for downloading the following DPC IT interface user manuals:

- [manuals](#) for the transmission of test data
- [manuals](#) for registering manufacturers and web services for the management of public keys.

This infrastructure allows our Administration to monitor all vehicle-related activities at all times with the aim of reducing the road traffic accident rate as well as containing all forms of harmful emissions as much as possible.

With this in mind, the following video shows the workflow of a test operation that provides an overview of data exchange activities with the Ministry of Transport IT infrastructure, taking into account that every data item is guaranteed by RSA1024 asymmetric key encryption applied at all levels.

- [Play video](#)

Applying these specifications makes it possible to standardise test operations carried out by authorised entities, impose the use of the required equipment and obtain a result at the end of testing together with all data collected in order to achieve the goals summarised below:

- veracity of the test:
 - guarantee that the vehicle to be tested is present in the workshop
 - guarantee that all the required instrumental measurements have been carried out on the vehicle
 - guarantee that the equipment has been correctly used in accordance with the relevant technical specifications
 - allocation of a result and back-up of partial data
- data security
 - files are created only by the equipment or by PCStazione
 - if the files are amended, the change is recorded by the new monitoring applications
 - file creation by non-approved bodies is recorded by the new monitoring applications
- state-of-the-art technology
 - faster update times to adjust to new regulations
 - computerisation of SW updates designed to simplify procedures and reduce authorised technical operations.
 - computerised monitoring by the Ministry of Transport with regard to all operations associated with testing.

This protocol is also applied to equipment eligible for the roadworthiness tests carried out on all motor vehicle categories(L1e, L2e, L3e, L4e, L5e, L6e and L7e), thus ensuring full compatibility and uniformity of test operations regardless of the vehicle type.

My heartfelt thanks goes to everyone who helped draw up this document, particularly the officials of DG Road Traffic Division 4 and CSRPAD in Rome for their great commitment and professionalism.

DIVISION 4 DIRECTOR
(Stefano Baccarini)

1.1 Document characteristics

The purpose of this technical and functional document is to establish the information (data) and procedures necessary to define the logical protocol used to make a connection and ensure a subsequent dialogue between the various items of equipment in an MCTC test centre. Once these have been defined, the operations required during car roadworthiness testing can be automated.

This document has been organised taking account of the configurations that are normally implemented in a roadworthiness test centre, specifying two main areas, as follows:

- **Office**
Where the Personal Computers used in the initial (e.g. booking) and final (e.g. result filing) stages of testing are installed.
- **Car Testing Station**
Where the measuring equipment connected to the Personal Computers used in order to regulate / synchronize the main test operations (measurements) is installed.

The main parts of the document are specifically:

- **System Configuration**
Indications on the parts, Personal Computers and equipment that can be connected in the MOT testing centre.
- **Definition of System Data**
Definition of data and their conventions in the context of a road worthiness test, with reference to departmental regulations.
- **Activities between “Office ↔ Testing Station”**
Specifying the method of dialogue between components used in the office and in the Testing Station.
- **Activities in the “Testing Station”**
Definition of the possible methods of dialogue between the components in the Testing Station.
- **Appendices**
Specifications and rules involved in MCTCNet protocol application

Note that equipment type approvals, software eligibility certificates and RT system approvals issued by CSRPAD following compliance checks on the relevant technical specifications and MCTCNet2, do not exonerate the manufacturer from the need to maintain these requirements, including after any subsequent updates. In particular, the firmware (where applicable) and software version subject to checking shall be specified at the reporting stage. Whenever the manufacturer or software house needs to issue a new version with amendments that will have an impact on the above compliances, CSRPAD will be asked to update the type approval in advance.

1.2 Conventions

Convention	Description
(§ paragraph)	This means refer to the section indicated after the symbol. E.g. (§ 1.2) indicates section 1.2

1.3 Terminology

The abbreviations and terminology used in this document are described in the following list.

Abbrev.	Meaning
SCA	Car Testing Station
PCPrenotazione	Personal Computer used for ‘Office’ operations
SW PCPrenotazione	Software installed in PCPrenotazione, which controls the initial (booking) and final (filing) stages of a test.
PCStazione	Personal Computer used in Control Station for managing test operations
SW PCStazione	Software installed in PCStazione, which controls and synchronises the measurement tests that constitute the central stage of a roadworthiness test.
PCApparecchiatura	Measurement equipment that can be connected in a network (Rete). Uses software similar to the “SW PCStazione” software. <i>PCApparecchiatura is a specific PCStazione that must be used for MCTCNet communications from one and only one device. One PCApparecchiatura cannot therefore be shared by several devices.</i>
RilevFreni	Measuring instrument for recording braking efficiency
RilevSospensioni	Measuring instrument for recording suspension efficiency
RilevDeriva	Measuring instrument for recording drift
AnalizGAS	Measuring instrument for analysing gases produced by vehicles with petrol, methane or LPG fuel systems
AnalizOPA	Measuring instrument for analysing the opacity level of exhaust fumes produced by vehicles with diesel fuel systems
RilevGIRI	Measuring instrument for recording engine rpm
RilevFONO	Measuring instrument for recording noise level
RilevFARI	Measuring instrument for recording brightness
RilevVEL	Measuring instrument for recording speed
RilevFOT	License plate recognition system
RilevOBD	Diagnostic instrument for confirming control unit states
Rete	Identifies network connection between units with “Server” or “Client” characteristics sharing resources: file exchange discs in this case
RS	Identifies a connection between units that communicate by exchanging characters
Dir	Identifies a connection between units that communicate via a mixed system: file and protocol (physical/logical) defined by the equipment manufacturer

“.INI”	Indicates that the data in the file respect the conventions established for files with this extension, typically used in Windows ® systems.
“XXX”	Generally indicates the extension assigned to a given data file referring to a specific device
[Sezione]	This is the convention used in “.INI” files to indicate the beginning of a new homogeneous data group.
Entry=	This is the convention used with “.INI” files to define a specific data item in a specific Section.
TIPO	The characters indicated in the column designated “.TIPO” determine the code of the value to be allocated to the “.Entry”, as summarised under point 1.5.1.
DIM	The values indicated in the column designated “.SIZE” indicate the maximum size of the value allocated to the “.Entry” in terms of number of characters .
AAAnnnnn	Indicates filename with “.PRE” extension assigned by PCPrenotazione to an activated booking for the testing stage (AA = year, nnnnnn = progressive number, e.g. 09000001.PRE)
HW	Abbreviation for the term “.Hardware”, which identifies physical parts of a system (Personal Computer, cards, etc.)
SW	Abbreviation for the term “.Software”, which identifies logical parts of a system (Application programs, communication programs etc.)

1.3.1 Type of data

The following table contains a key to “Data Type” entries in the tables shown in the specific “Sections” and their “Entries”.

TIPO OF DATA	DESCRIPTION
C	Alphanumeric character string of fixed length (e.g.: CAP = C - 5)
D	DATE, IN THE FORMAT “DDMMYYYY”
E	RESULT FLAG FOR A SINGLE TEST ‘R’ = REGULAR ‘I’ = IRREGULAR ‘N’ = NOT REQUIRED
H	TIME, IN THE FORMAT “HHMMSS”
L	LOGIC, “N” = No / “Y” = Yes
N	NUMERICAL, any value shown in brackets represents the number of decimal places that must be present (e.g. for the Entry PotMaxkW of TIPO = N (2) DIM = 6 the value "9.99" is correct while the values "009,99" and "14.8" are not). Decimal places are separated by the character “.” (2E Hex). This formatting should be considered valid also for numerical fields used under the RS protocol. For example, in the FS command sent from the PCStazione to the RS without Result sound meter, for the ScaMin field the correct value is “60.0” while values “060.0” or “60” are incorrect.
S	Variable STRING with a maximum length of 50 alphanumeric characters (unless otherwise indicated in the “SIZE” column).
“”	The parts of predetermined constant values between inverted commas shown in the fields “description” or “format” should be considered (“” excluded). Examples: “AUTOVETTURA” = CAR, therefore the format of the overall “DescrizioneVeicolo=” entry in the “[DatiLibrettoVeicolo]” section will be: DescrizioneVeicolo=AUTOVETTURAcrlf “ANAB” = low beam, therefore the format of the ‘Headlight’ field of the ‘Select Run state’ for the overall headlight test will be: ..._| etb | ANAB |_....

1.3.2 PCStazione

PCStazione is, by definition, the Personal Computer used by the Control Station to manage testing operations. It runs PCStazione software recognised as compliant by the Ministry of Transport (*from now on, we will not differentiate between the two concepts*).

The PCStazione is responsible for starting and ending the roadworthiness test:

- 1) the first task will be carried out by opening the PRE file in the PRENOTA folder, carrying out and completing vehicle reception (checking the data present and adding missing data), saving the file with the new extension ACC in the ESITO folder, and finally deleting the file PRE from the PRENOTA folder;
- 2) the second task will be carried out by filling in the sections on visual checks and the overall result.

PCStazione is responsible for synchronizing and acquiring the measuring operations carried out by connected devices by means of the MCTCNet RS” or “MCTCNet DIR” protocols.

PCStazione is responsible for **GUARANTEEING**:

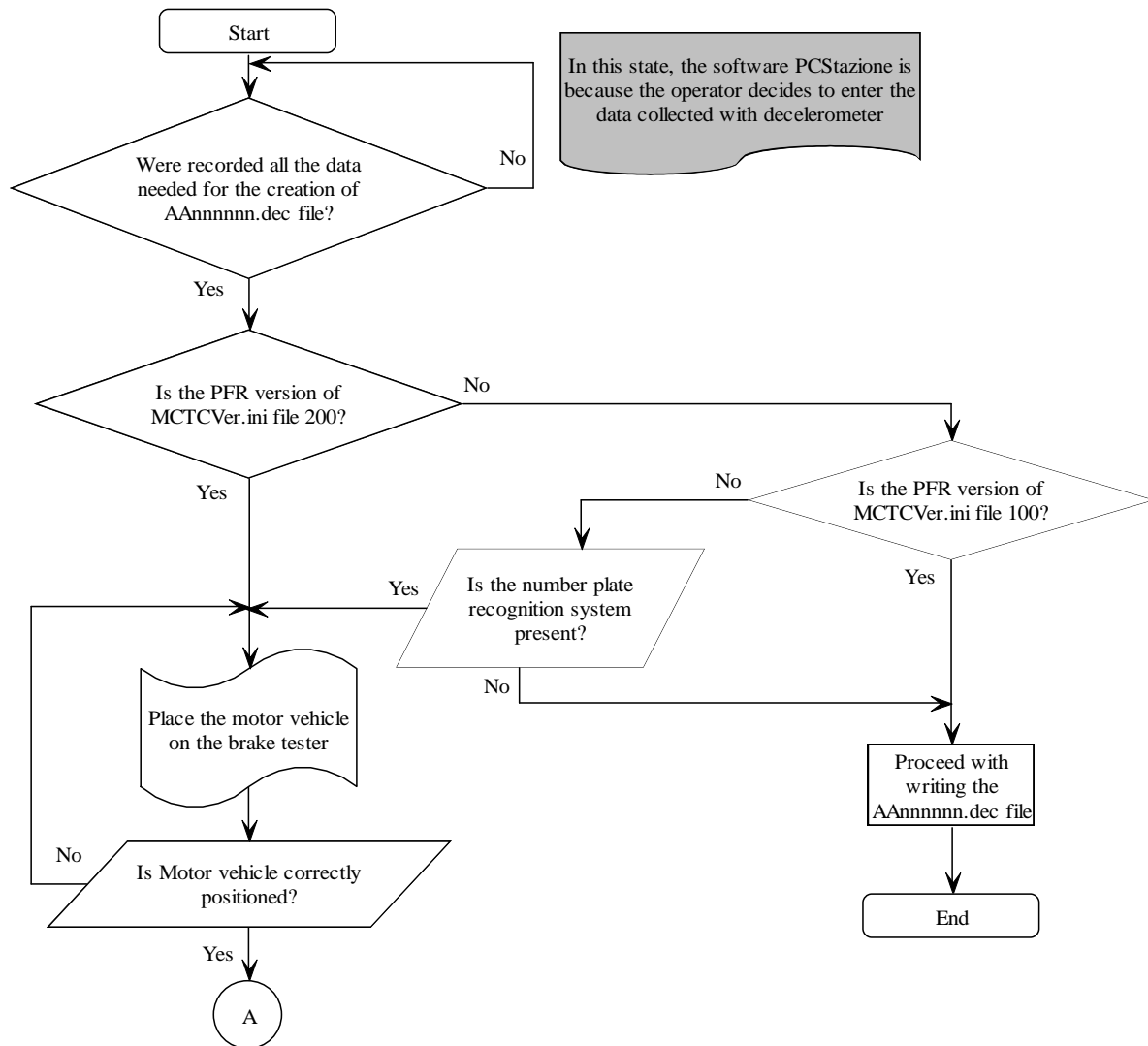
1. The availability of data from individual tests involved in the roadworthiness testing of a specific vehicle, as defined by the file formats for individual devices.
2. determining the result of measurement tests carried out using devices connected in RS Without Result mode (the devices themselves are responsible for the individual tests when the devices are not connected in this mode).
3. Determination of the overall result, with the aid of the technical manager
4. Interchangeability of equipment on the testing line, meaning that a device made by one manufacturer may be disabled and replaced by a similar device made by another manufacturer. By following the instructions in the equipment manuals, the Technical manager of the testing line will be able to:
 - √ disconnect each individual device connected to PCStazione, by means of the relative software module;
 - √ install a new device.
5. All testing centres must be equipped with at least one PCStazione.
6. The PCStazione must be able to manage DIR and RS communication with devices present in the centre required for vehicle roadworthiness testing for which the workshop has requested licenses from the Ministry of Transport.
7. It is possible to install several devices of the same type on a line, and PCStazione must be able to manage them.
8. There may be several PCStaziones on the same vehicle testing line.
9. The PCStazione hardware must not depend in any way on the manufacturer/s of the testing line. The hardware must be freely available on the market and must not contain hardware from a specific testing line equipment manufacturer. It must only be possible to install specific hardware externally on PCStazione by means of the standard external PC ports (serial, parallel, usb etc.), and only if removal of such parts continues to guarantee normal PC operation.
10. Printing of partial or full test results is allowed but is not obligatory. PCStazione may be connected to a network printer if it is not equipped with its own printer.
11. The PCStazione operating system is not defined. Due to this, DIR modules from individual manufacturers may not necessarily be compatible with a general-purpose PCStazione. If DIR modules are incompatible, the line must be equipped with additional PCStaziones running the operating system required by the new DIR modules. This does not apply, however, to RS WITH/WITHOUT RESULT connections and RETE connections.
12. Proprietary software modules (DIR modules from individual Manufacturers) must be installed on the PCStazione to allow connection with the corresponding devices. In practice, all the software used to manage the devices can be installed on PCStazione and therefore PCStazione becomes a PCApparecchiatura virtually and only temporarily during test execution. This means that two tests cannot be carried out simultaneously on the same PCStazione, with the exclusion of the license plate recognition carried out during the braking test, even if the devices are connected in RS Without Result mode. Installation of a new module must not change existing operating system modules or change the operating system configuration. Everything required for regular execution of the DIR module and any specific configurations, must be implemented when the module is run and deactivated, with restoration of the previous configuration, when the module has been executed. Note that a PC is not a PCStazione if it includes proprietary hardware pertaining to a specific device manufacturer that is not freely available on the market.

13. It must be possible to display, and if necessary modify all data input from PCPrenotazione on PCStazione with the single exception of the Licence Plate (Targa) and DataPrimaImmfield fields, which may not be changed in any way. If a booking is made with an incorrect Registration number and/or Registration date, it will be necessary to carry out a new booking procedure.
14. Individual devices must detect any errors in the ACC file and consequently stop measuring operations, but may not make any changes to the ACC file because this must be done from the PCStazione.
15. It must be possible to display all tests on the PCStazione, even if the equipment used is configured in NETWORK mode.
16. In the sole event that TipoVeicolo="MOTOVEICOLO" and CategoriaInternazionale="L2e" or "L5e" or "L6e" or "L7e", where the conditions described in Circular No 64/404 of 19 January 2005 all met, it is possible to determine the result of a particular roadworthiness test even in the absence of the braking test file (AAnnnnnn.PFR) and the photographic image file (AAnnnnnn.FOT). In this case, the PCStazione will have to request the input of data recorded by the Decelerometer and write the associated AAnnnnnn.DEC file. The technical manager will be obliged to enter the reasons for using the decelerometer in the AC2 file notes and also attached the official instrument print-out to the paper documentation on the roadworthiness test.

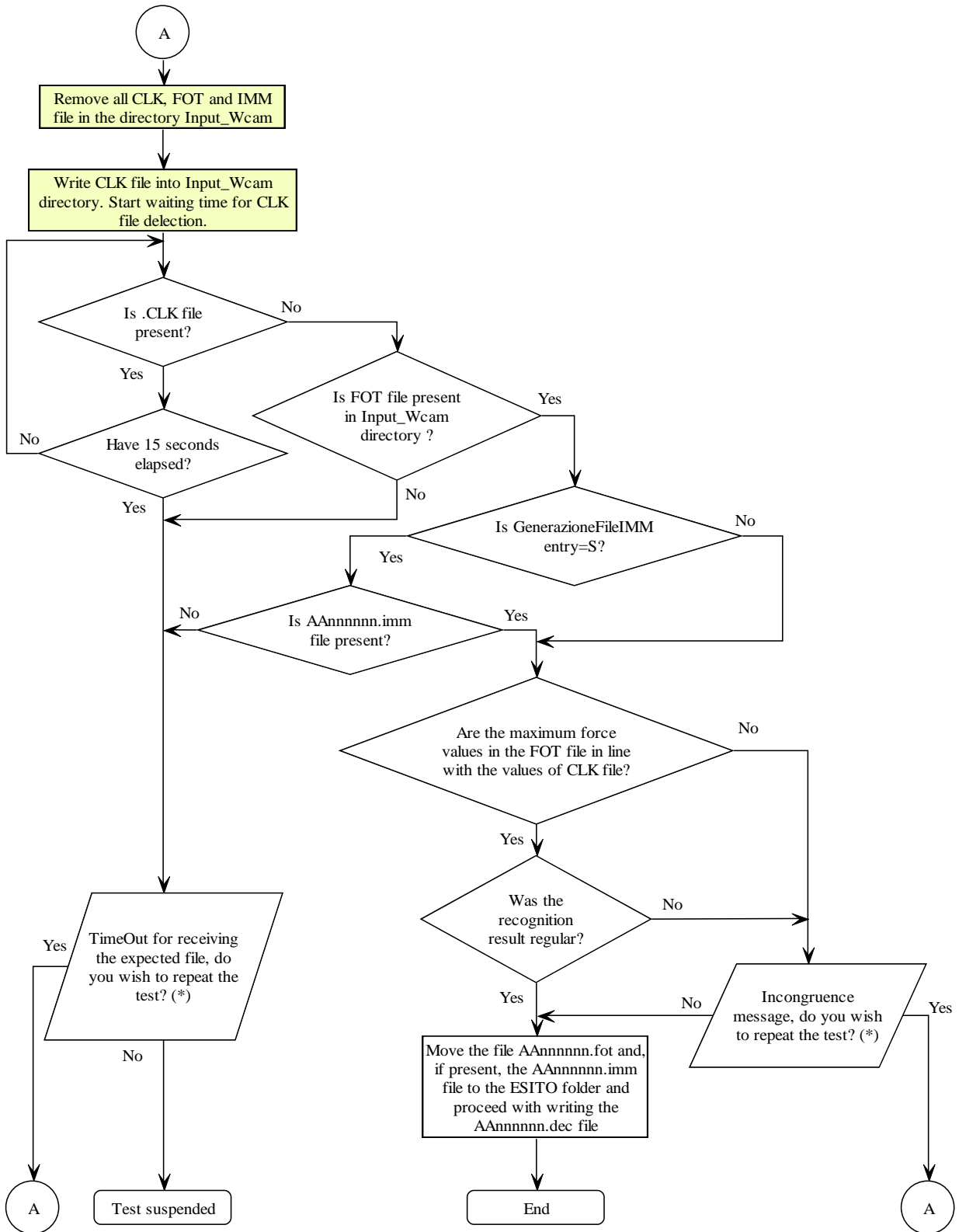
Once the test with the Decelerator device is completed, the technical manager is bound to enter the data recorded in the test in PCStazione. After data entry, PCStazione must ask the technical manager to position the motor vehicle on the brake test bench for which the license plate recognition system is configured. Since the brake test bench is not suited to correct positioning of the motor vehicle, it is possible to arrange special covers to ensure it does not tilt to an extent that affects the outcome of the recognition. As an alternative, it is possible to position the rear axle of the quadricycle near the entrance or exit of the bench provided the image requirements referred to in the RT system user guide are respected.

In order to make it possible to implement synchronism with the RT system, PCStazione must write a file AAnnnnnn.clk in accordance with specifications already issued for the file, with the exception of the following entries, which must comply with the following conventions:

ENTRY	TIPO	DIM	DESCRIPTION
ForzaFrenanteSingolaSx=	N	5	Assumes value of 99999
ForzaFrenanteDx=	N (i)	5	If CategoriaInternazionale <>("L1e" or "L3e" or "L4e") or if CategoriaInternazionale is equal to ("L2e" or "L5e") and AsseRuotaSingola is equal to 1, assumes value of 99999. Otherwise it must not be completed.



Proc_Dec_Diagram_a



(*) The software manufacturer is entitled to formulate the message as it deems fit provided it accurately and unequivocally indicates any error or inconsistency detected

Proc_Dec_Diagram_b

17. The PCStazione must be set up to ensure that:

- √ it does not allow amendment of compulsory measurement data for which manual input is not an option if the device is connected in RS Without Result mode;
- √ for RS Without Result mode only, it enters control symbol “#” in the file for data that have been entered manually, where permitted (in this case, a window must open automatically for the operator to enter the reason for the manual entry);
- √ it checks that the format of data entered in the various files created during testing operations is correct, and that the data are significant;
- √ it notifies the operator that all test files are present in the result folder, and that the overall result can consequently be input.

18. Before establishing the test outcome, PCStazione must verify the syntactic and semantic accuracy of the various files. For the FON file, if the entries on harmful effects are left blank and the notes field does not contain the above wording, PCStazione must not allow the test to conclude and must make it impossible to set the outcome.

1.3.3 PCApparecchiatura

1. PCApparecchiatura is, by definition, a measuring device that can be connected in a network (“Rete”). Extending this concept, a PC containing proprietary hardware and/or software (not necessarily both) required for correct device operation that uses the network to exchange data in accordance with the MCTCNet protocol is a PCApparecchiatura.

2. It should be pointed out that a PC with proprietary hardware and/ or software is only a PCApparecchiatura if it uses the network to deposit files containing the results of measurement tests carried out in the ESITO folder. In other words, a PC with proprietary hardware and/ or software is not a PCApparecchiatura if it is not able to deposit files containing the results of measurement tests carried out in the ESITO folder but must be connected, via any of the permitted modes, with the PCStazione in order to transfer data measured by the device (in this case it is referred to as a Smart Device).

3. A PC with hardware cards belonging to a specific device cannot be used by a second device even if it is only necessary to install software modules.

4. Combining several devices in a single PCApparecchiatura is allowed only if the measuring system is common to several configurations (at present, we are aware of the car – motorcycle gas analyser, the car – tricycle – quadricycle brake tester and the light – heavy vehicle brake tester). It is nevertheless essential to be able to deactivate each individual part in this PC so that a similar test device from a different manufacturer may be connected in the testing line. This part deactivation should not affect the operation of any other existing parts and should not generate any file relating to the MCTCNet protocol.

1.3.4 PCPrenotazione

- 1) PCPrenotazione is essentially an Office Personal Computer that must be used for the following operations:
 - √ Entering bookings.
 - √ Test protocol (see points 8, 9, 10 and 11).
 - √ Supplying booking data to the PCStazione/s (note that the result must be configured by the technical manager, who normally works on PCStazione).
 - √ Managing the “Archiving” stage of completed tests.
 - √ On-line connection with the EDP centre and any other DTT departments.
 - √ Printing of a label for the log book.
 - √ Printing of complete report or individual test reports.

- 2) There are two possible PCPrenotazione ‘system’ configurations:
 - √ System consisting of a single PC that ensures the operation of all seven points listed above and must also act as a network server.
 - √ The made up of two or more PCs connected in a network, where one PC acts as a server and the others act as network clients The seven functions listed above must be usable in the system but may be spread over various PCs.

- 3) PCPrenotazione must print an official copy of the complete test report. The printer may be connected directly to PCPrenotazione, or connected to a network.
- 4) Printouts of all complete test result reports must be signed and stored daily by the Technical Manager.
- 5) A daily backup must be made onto another physical device of individual files produced in the centre during the booking, reception and test stages.
- 6) All data must be stored and accessible, even during the post-test period. They must be accessible in read-only mode except for the anti-forgery code field, in case it has not been possible to log onto the EDP centre due to transmission or reception system faults.
- 7) If configured at the installation stage, the PCPrenotazione software must allow scanning at preset intervals (of between 1 minute and 1 hour) of the ACC files in the result folder to confirm that the overall results section has been completed. If any tests have been completed, the PCPrenotazione operator must be notified and instructed to log onto the EDP centre and update the test protocol register at the same time.
- 8) The PCPrenotazione software must be able to store, display and print data on all vehicles that have already undergone testing and those that have begun the testing procedure.

- 9) PCPrenotazione must request a print-out of the operation log at least once daily, usually at the end of the working day. PCPrenotazione must not allow any operation to be carried out unless the log has been printed (updated to the last day on which test operations have been recorded). The log shall include the following items:
 - √ *Prot. No* (protocol number)
 - √ *Tipo veicolo* (the international vehicle type category must be shown)
 - √ *Targa* (may be left blank in the case of a motorcycle without a CIC code)
 - √ *Numero di telaio* (VIN No of tested vehicle)

- √ *Data di presentazione della domanda* (Date on which the booking was made = DataPrenotazione)
- √ *Data di esecuzione del controllo* (Date on which reception and testing takes place =DataAccettazione)
- √ *Operazioni effettuate* (summary of tests carried out)
- √ *Esito della revisione* (if the test is to be repeated, give a reason)
- √ *Data di invio dati al CED* (date on which the data is sent to the Rome EDP centre)
- √ *Data di restituzione dei documenti all'interessato* (date on which the documents are sent back to the holder)
- √ *Codice antifalsificazione* (Anti-forgery code allocated by the EDP centre following data transmission)

When the value of a column is not determined and the test is in a state where the column field can no longer assume a valid value (for example, an anti-falsification code can never be entered for a test with formal errors) the field must be marked with a horizontal line (e.g. “---”).

Only the following values (in addition to the above horizontal line) are permitted in the Operations performed column:

- 1) A01: when the test procedure was cancelled before requesting testability from the DP centre;
- 2) A02: when the test procedure was cancelled because the DP centre sent notification that the vehicle could not be tested;
- 3) A03: when the test procedure was cancelled after the technical data had been requested from the DP centre without having generated a PRE/PR2 file;
- 4) A04: when the test procedure was cancelled after an irregular outcome from the license plate recognition instrument;
- 5) A05: when the test procedure was cancelled after malfunctioning of a device;
- 6) A06: when the test procedure was cancelled with an uncoded reason (that must be described in the Reason Entry in the section [RevisioneAnnullata]);
- 7) A07: when the test procedure was cancelled automatically by PCPrenotazione because it was not completed on the day it was accepted;
- 8) A08: when the test procedure was cancelled after sending a booking to the DP centre without, however, requesting the technical data;
- 9) A09: when a test whose result had already been sent to the EDP centre is cancelled.
- 10) E01: when the test procedure ends with a formal error;
- 11) REV: when the test procedure ended with a valid outcome, without formal errors and can therefore be sent to the DP centre for printing of the coupon.

The check execution data column must include a date and time which the test was accepted, in other words the date on which PCPrenotazione established the presence of the ACC file or AC2 file.

The operation register must respect the following conventions:

associated MCTCNet file being present. Only input operations can be carried out in the log and not deletions. Any test cancellations must be noted in the log.

- 12) The PCPrenotazione software must display all nominal data on devices used for a specific test in a single window:

Nominal data to be displayed for a device type approved for MCTCNet version 1.00: make, model, serial number, type approval, periodic check due date, product software version.

Nominal data to be displayed for a device type approved for MCTCNet version 2.00 or higher: make, model, serial number, type approval, periodic check due date, product software version, MCTCNet version supported, latest circular for which the software is type-approved.

Nominal data to be displayed for PCPrenotazione and PCStazione: manufacturer's name, product name, approval obtained, date approval obtained, product software version, MCTCNet version supported, workstation number assigned at the installation stage, last circular for which the software is approved.

Data to be displayed for tested vehicle: licence plate of tested vehicle, protocol number, image captured by webcam system (the latter only if the brake test bench is updated to version 2.00).

Note that nothing else must be displayed in this window.

- 13) The PCPrenotazione software must provide a search function that can display tests carried out on vehicles registered prior to 01/01/1964 in a single window, showing the following data: registration date, license plate of booked vehicle and photograph taken. The procedure allowing display of this window must be attached to the mctcnet connection diagram.
- 14) If the PCPrenotazione uses a Database to manage test data, the data must be synchronised with the data in the ACC file, at the time the SAV file is created. This makes it possible to update database data automatically if any differences are encountered.
- 15) PCPrenotazione shall check the syntactic and semantic accuracy of the various files.
- 16) With reference to the test operating procedures on vehicles (CHAPTER III of Circular 3997/604 of 6 September 1999) and the test procedures on mopeds and motorcycles (CHAPTER III of Circular 7938/604 of 29 September 2000), note that in addition to the existing requirements for headlight testing reports, it is also obligatory to enter the measurements in Lux for low and high beam headlights. In particular, even though no minimum and maximum limit is provided for low beam headlights in use on motor vehicles, these measurements must still be carried out and included in the relevant report.

2. System Configuration

This Section describes the hardware and software components that form part of the system, leaving out details on quantities (e.g. the number of brake testers) connected because the MCTCNet protocol requires the presence and connection of a minimum number of devices required to carry out a test but does not set any limit on the number of connected devices. The concept of a “service line” is not considered because if a test centre is equipped with one instrument per type plus two additional gas analysers, for example (regularly entered in the connection diagrams), the test centre cannot be said to consist of three lines.

The list of machinery includes:

➤ Office Side

- ✓ **Office Personal Computer** acting as a network “Server”, if containing the roadworthiness test centre Database, otherwise acting as “Client”, used to manage back-office operations, namely:
 1. input of bookings;
 2. provision of booking data to PCStazione;
 3. manage the test result, with data, received by the PCStazione;
 4. activate the completed tests “Archiviazione” stage.

➤ SCA Side

- ✓ **Station Personal Computer** acting as “Client”, for managing test operations, namely:
 1. receiving booking data from PCPrenotazione;
 2. managing measurements required for testing (brakes, gas, noise, brightness and visual checks);
 3. returning test data to PCPrenotazione with the associated result.
- ✓ **Brake test**, Device connected to PCStazione (in DIR mode) or to PCPrenotazione (in RETE mode) for checking vehicle braking efficiency. The brake test bench may be subject to three different homologations with reference to vehicles of less than 3500 kg in mass:

1. Suitable for M1-M2-N1 category vehicles (motor vehicles)
2. Suitable for L1e-L3e-L4e category vehicles (two wheels)
3. Suitable for L2e-L5e-L6e-L7e category vehicles (three and four wheels)

One bench can only be subject to the first two homologations individually. Because the third is always an extension of the first two, a bench with the third homologation must always have the first or second. It is also possible for a single brake test bench to incorporate the three homologations in the same structure. The brake test bench software must also manage the weighing system: for the first and third, this may be integral with the brake test bench or integral with the suspension test system. For the third type, it is obligatory for it to be integral with the brake test bench. In view of this, MCTCNet2 uses a single template for the results file and to interface the protocols DIR and RETE with the various brake test bench types and/or configurations. Obligatory entries will be identified within the layout/protocol used according to the category of vehicle being tested.

- ✓ **Decelerometer**

Instrument not connected to the MCTCNet network and only used if the category of the vehicle tested is L2e, L5e, L6e, L7e, with manufacturing specifications that do not permit the use of approved MCTCNet devices.

- ✓ **Suspension Tester**, device connected to/integral with PCStazione, or PCPrenotazione (Server) for checking suspension efficiency (not obligatory).
- ✓ **Drift Tester**, device connected to/integral with PCStazione, or PCPrenotazione (Server) for checking vehicle drift efficiency (not obligatory).
- ✓ **Gas Analyser**, device connected to PCStazione or PCPrenotazione (Server) for measuring polluting emissions of motor vehicles with spark ignition engines. Incorporates communication protocols to the speed test and also the top speed measurement procedure if considered appropriate under the technical regulations contained in 211/404.
- ✓ **OPACITY level analyser**, a device connected to PCStazione or PCPrenotazione (Server) for measuring the exhaust gas fume levels of motor vehicles with diesel engines.
- ✓ **Rev counter**, device connected to PCStazione or to PCApparecchiatura or built into devices (GAS, Opacimeter and sound meter) to record engine rpm. The rev counter must always be connected in RS mode if it is not built into a gas analyser, opacimeter or sound meter. The rev counter may be MCTCNet approved in RS mode, and may use the same instrument port. The gas analyser, opacimeter and sound meter devices must be able to synchronise with the rev counter “in tempo real”. If it is not possible to acquire the measurement automatically for technical reasons, manual activation must be possible but the reasons must be given in the NOTES field. The integral rev counter may be type approved as not corresponding to MCTCNet. In this case, other external or integral rev counters must be available on the line to assist the devices that require a rev counter for their tests.
- ✓ **Sound level meter**, device connected to PCStazione or PCPrenotazione (Server) to measure the different noise levels emitted by a noise source.
- ✓ **Headlight beam tester**, device connected to PCStazione or PCPrenotazione (Server) to measure the headlight orientation and brightness.
- ✓ **Speed test**, device connected to PCStazione or PCApparecchiatura to measure the maximum speed of 2 or 3 wheeled mopeds or light quadricycles. Device also complements exhaust gas analysis where the vehicle is required to be in driving condition.
- ✓ **Scantool**, device connected to PCStazione or PCPrenotazione (server) to diagnose the control unit.
- ✓ **License plate tester**, device connected to PCStazione or PCPrenotazione (Server) to identify the license plate of the tested vehicle.

2.1 Connections between system components

The following list indicates the various connections: serial (RS), direct/dedicated (DIR) and Network (RETE), which may be adopted by individual devices as a whole or as alternatives in a test centre. In other words, a device may be connected in all the ways indicated or in one way rather than another on the decision of the manufacturer, taken at design level.

The details of how test lines may be made up (one single-station line, one multi-station line, several single-station lines, etc.), along with the set of the various measurement devices, are the elements making up each individual set-up, where set-up denotes the system configuration best suited to the needs of the specific test centre.

Device	DIR	RETE	RS Senza Esito
RilevFreni	X	X	
RilevSosp	X	X	
RilevDeriva	X	X	
AnalizGAS	X	X	X
AnalizOPA	X	X	X
RilevGIRI			X
RilevFONO	X	X	X
RilevFARI	X	X	X
RilevVEL			X
RilevOBD	X	X	
RilevFOT	X	X	

2.1.1 Network connection specifications

In this document, the term “RETE” [network] connections denotes a physical connection where data exchange occurs by means of sharing resources, in our case, folders and sub-folders on a disk drive, in a “Server – Client” arrangement.

➤ Physical connection

The physical connection will be made with the standard hardware components required for the specific type of centre to be set up (e.g. HUB, Network cards, UTP network cable, etc.).

➤ Network protocol

The most widely used protocols e.g. TCP/IP, Netbeui, IPX/SPX, etc.) will also be used for the local area network (in the centre). The minimum requirement is for PCPrenotazione to support the TCP/IP protocol.

2.2 Concept of interchangeability

Compliance with guidelines on “metodo di collegamento” and “definizione dei dati”, described in subsequent chapters of this document, leads to interchangeability between components installed in the test centre.

More specifically, it may be said that interchangeability is complete as far as “dati” are concerned. The level of interchangeability achieved for the devices, on the other hand, is “condizionata”, in other words it must be confirmed when it is decided to replace a device from one manufacturer with the same device from another manufacturer.

If we analyse (Table 1) the case sample from the viewpoint of “PCStazione”, various combinations may be created. To achieve interchangeability, it is necessary to confirm and satisfy the condition/s that arise depending on the devices chosen.

As an example, some possible combinations may be as follows:

From “RilevGas” type a	A “RilevGas” type b	Condition
Rete	Rete	HW / SW none
Rete	RS 232	HW: presence of a free RS232 serial interface SW: Configure PCStazione to manage “RilevGAS” with RS connection (“Senza Elaborazione Esito” or “Con Elaborazione Esito”, § 5.1)
Rete	Dir	HW: Presence of physical connection indicated by the manufacturer SW: Install the “modulo SW” supplied by the manufacturer (which must be compatible at operating system level) and configure the PCStazione to manage “RilevGAS” with a Dir connection
RS 232	RS 232	HW: none SW: RS Connection (“Senza Elaborazione Esito”)
RS 232	Dir	HW: presence of physical connection indicated by the manufacturer SW: Install the “modulo SW” supplied by the manufacturer and configure the PCStazione to manage “RilevGAS” with a Dir connection
.....

Table 1 - Examples of interchangeability and their conditions

3. Definition of System Data

The term 'system data' denotes all data that are used to identify a test: from booking to filing Ministry of Transport regulations were considered when defining the data.

The convention used to represent data contained in interchange files reflects the specifications of the "INI"; this convention is used with Windows ® systems.

Data contained in "INI" files are "ascii" characters, with easily-read mnemonic formats, subdivided into paragraphs and sub-paragraphs, designated respectively: "Sezioni" and "Entry".

The data description is compiled in a table, following the rule of subdividing data according to the type of device used at each specific stage of testing.

The basic elements for reading the above tables are:

- **[Sezione]** This is the convention used in "INI" files to indicate the beginning of a new homogeneous data group. The "Sezione" syntax provides the name assigned to the "Sezione", included between the characters "[“ and “]”. For example, the "Prenotazione" "Sezione" will be: [Prenotazione]
- **Entry=** This is the convention used with "INI" files to define a specific data item in a specific "Sezione". The syntax of "Entry" provides the name assigned to an "Entry" with the character "=" followed by the alphanumeric value (Ascii characters and/or numbers) allocated to the "Entry", followed by the control characters CR and LF (hex 0D and hex 0A respectively). For example, assigning a date to the relevant "Entry" will give "date=01011999crlf".
- **TIPO** According to the vehicle type to be tested (TipoVeicolo Entry =) the entries necessary for the purposes of setting the devices correctly and also for determining the test result have been identified. The presence of the symbols (l) for "LEGGERO", (m) for "MOTOVEICOLO" and (p) for "PESANTE" identify that Entry as useful and necessary only for that or those vehicle type/s. The entries identified by symbols (l), (m), (p) must **be present only if** the booked-in vehicle corresponds to the indicated type. For example, an entry identified as (m) must be written in the file only if the vehicle type is "MOTOVEICOLO". The following definitions are adopted for all entries present:
 - √ The characters indicated in the column designated "TIPO" determine the code of the value to be allocated to the "Entry", as summarised under point 1.5.1;
 - √ In the following pages, if the symbol (*) occurs in the TIPO column, this means that the corresponding ENTRY is NOT OBLIGATORY;
 - √ if the symbol (i) occurs in the TIPO column, this means that the corresponding ENTRY is OBLIGATORY when certain conditions occur, to be specified in the corresponding description.
 - √ In the absence of the symbols (*) and (i) the Entry should be considered OBLIGATORY unless otherwise specified.
- **DIM** The values indicated in the column designated "DIM" indicate the maximum size of the value allocated to the "Entry" in terms of number of characters. In the event that no size ("...") is indicated, it means that the number of characters is variable, with a maximum size of 50.

3.1.1 File validation by software modules

The following rules are established for validating the files included in this specification:

- 1) The software of DIR, RETE approved devices must check all sections contained in ACC or AC2 files. Note that until a test result is assigned, the format of all entries relating to visual check sections must be confirmed only if completed. It should be clarified, in particular, that the required entries must be present but can be completed in accordance with checks already carried out by the technical manager, irrespective of the vehicle category.
- 2) Before allowing assignment of an overall result, the PCStazione Software must check the conventions of all the results files in the Results folder. For results files generated with version 2.00 software or higher, the PCStazione must indicate any inconsistencies between the Entry values in File AC2 and in the results file as formal errors. AA9nnnnn.xxx files are excluded from controls as indicated in point 4.2.4.
- 3) The PCPrenotazione software must check the conventions of all the files relating to a test, contained in the results file, only when an overall result has been assigned by a PCStazione in the line.
- 4) Only the required sections must be present in all the files described by this specification.
- 5) The section titles must begin with the character “[“ and end with the character “]”. Spaces are not allowed before and after the two characters “[“ and “]”.
- 6) The number of characters making up a licence plate entry (PRE, PR2, ACC, AC2, CLK, FOT files) must not be less than 4.
- 7) On start-up, and periodically, with an interval not greater than 10 minutes, the PCPrenotazione and PCStazione must check the relevant MCTC directory, for the presence of folders and files that are incompatible with the protocol, and arrange for their deletion. Files using the AAnnnnnn.XXX convention where the year (YY) does not correspond to the current year must be deleted (this does not apply to sav and rev files contained in the Archivio folder and subfolders).
- 8) The PCStazione and PCPrenotazione software must report a format discrepancy in cases where the opacimeter gives a measured value for a single acceleration, without giving a value for the previous acceleration. e.g. the entry ValoreK6= is entered, but not ValueK5=
- 9) If “NESSUNA” (none) is entered in the booking file “PRE” for petrol vehicle emissions directive and the vehicle was registered after 01/01/1975, the PCStazione must not allow the vehicle to be accepted and must report the inconsistency. The gas analyser software must not allow “NESSUNA” to be entered for the directive if the registration date in the reception file is later than or equal to 01/01/1975.
- 10) If the value of the PosAssiStaz entry is “NNNNNNNNNN”, vehicle category other than “L1e”, “L3e” and “L4e” and vehicle is not four wheel drive (4WD), there is an obligation for the PFR file notes to specify why it has not been possible to measure the efficiency of the parking brake.
- 11) Alimentazione_1 can never be completed with the value NESSUNA. Note that tests must be allowed for vehicles only with methane or LPG fuel systems. If a vehicle has a petrol or diesel fuel system, this must always be indicated in Alimentazione_1. The Alimentazione_2 entry can never be completed with the following values:
“BENZINA”

“DIESEL”

“MISCELA”

- 12) Any notes entered in the ACC or AC2 file must be at least 10 characters long, otherwise it must not be possible to complete the test.
- 13) Amendment of data acquired by the ACC file is not allowed for DIR and RETE approved software. All equipment must use data present in the ACC file to set the test to be carried out. If one or more data received do not comply with the vehicle subject to testing, they can only be amended via the PCStazione units.
- 14) ACC or AC2 files in the shared directory c:\MCTC\ESITO must not be deleted (even temporarily), much less opened in exclusive access mode by software in an MCTCNet line.
- 15) For each Section, the check should be carried out observing the following guidelines:
 - √ The term “entry” denotes the string which goes from the first character of a row to the character preceding the “=” sign (Spaces are not allowed at the beginning of the row and before the “=” sign)
 - √ Entries must always be present (as a name), including those for Visual Checks, unless otherwise specified or required by the presence of characters (l), (m) or (p)
 - √ Only the entries specified in the MCTCNet protocol must be present
 - √ A new paragraph is defined by the sequence <cr><lf> (0Ahex and 0Dhex)
 - √ Empty rows are allowed (made up only of <cr><lf>)
 - √ The character SPACE is not a null character
 - √ Entry values are delimited by the entry’s “=” sign and by <cr><lf>
 - √ Spaces are not allowed after the equals sign and before <cr><lf>
 - √ The order of entries within the same Section does not matter
 - √ Lines which do not contain the “=” sign and that are not recognized as a Section heading are invalid, with the exception of empty rows
 - √ The check on entries in all files must be case sensitive.
 - √ All alphanumeric characters in the extended ASCII table are permitted (specification 1252 Windows Western Europe) except the first 32 characters (valid characters are those from 32 to 255). The file must also be saved in ANSI format.
 - √ The MCTCNet file extension may be lower case (xxx) or upper case (XXX).
- 16) If the technical manager needs to change the VIN No or International Category of the vehicle after it has been accepted, PCStazione must delete all results files for tests carried out using devices connected in RSSE mode or that have used complimentary devices connected in the same mode (rev counter or speed test). Note also that all operations for reception, amendment of data relating to a vehicle that has already been accepted, completion of visual checks and determination of the overall result of a test must be carried out by means of the most up to date PCStazione or by means of a PCStazione 2.00, if present in the test centre.
- 17) The validation conditions, for which reference is made to the ACC and/or AC2 file should be considered applicable also to the PRE and/or PR2 file, unless otherwise required by the technical specification (e.g.: it is only compulsory to complete the “AltezzaAnab=” in theAC2 fileand not in the corresponding PR2 file).

- 18) In all technical annexes relating to MCTCNet2, the use of the term petrol written in lower case and not shown between inverted commas (i.e. not referring to the constant “BENZINA”, which may be used in entries relating to the fuel system), always refers to spark ignition vehicles (i.e. Petrol and/or LPG and/or Methane-driven).
- 19) With regard to formal validation of data contained in AAnnnnnn.xxx files, the order in which any inconsistencies should be indicated is not specified. It is irrelevant whether a discrepancy in the protocol is indicated with priority over another discrepancy but it is crucial for the purposes of obtaining a software eligibility, approval or type-approval certificate that discrepancy should be indicated and that the software should not allow the test to continue.
- 20) In the context within which MCTCNet2 is applied, it is not required to type approve equipment relating to tests to be carried out for heavy vehicles. Within the MCTCNet2 environment at companies authorised under Article 80, the specific equipment software packages (i.e. excluding PCP and PCS) must not allow the test to be carried out if the value present in the TipoVeicolo entry is “PESANTE”.
- 21) In the event of uncertainties due to the registration date, all software modules involved must notify the technical manager of the inconsistency, so that the manager can validate the formal checks, the equipment settings and the correct legal limits for test vehicles. Examples during interim period:
 - √ if the known registration date for the vehicle is 00001986, the PCPrenotazione must ask the operator whether the PRE file must contain fuel system BENZINA NO CAT or BENZINA<86;
 - √ if the registration date known for the vehicle is 00002002, the gas tester software module must ask the operator if the vehicle is prior to 1 July or not (if software is version 1.00 or if software is version 2.00 only if DirettivaEmissioniGasBenzinaAuto <> ”98/69/CEEB”)
- 22) Use of suspension tests and drift tests (non-obligatory devices) during testing is regulated by current MCTCNet protocol specifications. In particular, in the case of a DIR brake tester with suspension test active, the software must allow the test to start only if:
 1. in addition to the ACC file in the DIR_PFR folder (and the DIR_PES folder for the MCTCNet 1 version) the ACC file is also present in the DIR_SOS folder;
 2. the ACC files in the above folders display the same values for individual entries and their format and semantics are correct.A similar check must be carried out if the drift test is also activated, considering the DIR_DER folder in this case. All intermediate configurations are naturally considered (only brakes and weight; brakes, weight and drift; etc).

With the aim of ensuring correct integration of the suspension and/or drift test in the MCTCNet protocol, PCStazione must also offer similar configurations that limit writing of the ACC files into the folders dedicated to the configured devices, i.e. DIR_SOS for the suspension test, DIR_DER for the drift test.
- 23) If PCPrenotazione finds any file with numbering that is the same as that of a corrected SAV or REV file in the PRENOTA and/or ESITO folder, it must be deleted.
- 24) Once the overall result has been confirmed on PCStazione, PCPrenotazione must check the compatibility of the files identified in the ESITO and PRENOTA folders with regard to the type of vehicle being tested and the status of the inspection. For example, if the

simultaneous presence of a OPA and a GAS file or a PRE file and an ACC file is identified, or the lack of a file necessary for the type of vehicle being inspected, the operator must be notified of the error in the convention and apply the provisions laid down in paragraph 4.1.1.7 of the MCTCNet2 specification.

- 25) The PCPrenotazione must include a function that makes it possible to establish whether a SAV or REV file has been generated by a certified PCPrenotazione.
- 26) Where reference is made to values coded in hexadecimal format whether directly included in the file entries or sent as required fields by the RS communication protocol, these must always be shown in uppercase.

3.1.2 Resolution of measuring data

Where a difference is noted between the resolutions of measurement values indicated in MCTCNet and requirements in previous standards (e.g. DM628/96), the manufacturer must comply with MCTCNet as follows:

- If the device resolution is lower than that required by MCTCNet, add zeros
- With reference of point 9 of CHAPTER I of circular 3997/604 of 6 September 1999 and paragraph 3.1.2 of the technical annex to Executive Directive 3986 of 11 August 2009, this is to clarify that according to the above circulars the rounding-offs specified to values recorded or calculated by the devices must be printed in the relative reports, maintaining the format required by the MCTCNet standard. For example, if the CoCorr value calculated and displayed, during the test, by the gas tester is 1.259 %, at the end of the test it must be rounded down to 1.2 % before being compared with the relevant limit for determining the test result. With reference to the example shown, note that the rounding off is based on the figure following the significant figure without taking into account additional decimal places. In the example, therefore, the “9” should be ignored for the purposes of rounding off. The rounded off value will then be written into the file AAnnnnnn.gas, in the format N5(3) (or 1.200), and similarly printed in the overall report.
- The flow diagram for the opacimeter test allows the cleansing revs to remain valid for the purposes of determining a positive test outcome. In this case, because the individual measured values and not the average values must be compared with the K limit directly, it will be necessary to round off before the comparison. In this case only, the “OpacitaMedia=” entry (referred to in section 2.2 of this document) must not be completed and will not therefore be present in the test report.

3.1.3 Entry validation

When validating entries, note that both the PCStazione and the device must check that the syntax and semantics of input data are correct. Where entry values are included on a list provided by MCTCNet, a check must be run to ensure the entry value is on the list, taking into account lower and upper case.

3.2 Implementing computer security

3.2.1 INTRODUCTION

Adoption of the MCTCNet protocol in all test centres involves introducing a telematic monitoring system. The aim of the design is to create and manage a centralised database of REV files that can be supplied with all data on individual vehicle tests carried out by all test centres for analysis by the competent authorities.

Organisation of measured data into a database makes it possible to define the type and structure of subsequent queries to ensure flexibility, updatability and expandability.

3.2.2 PROTECTION OF INDIVIDUAL TEST DATA

The following method is used to protect individual test data against attempts to tamper with their contents. This is applied to:

- DIR devices
- RETE devices
- PCPrenotazione
- PCStazione (only files saved by this PC containing reports on tests obtained from RS Senza Esito and Decelerometer devices as well as the ACC file for the 200 version, containing, amongst other things, visual inspections (during the transitional stage, the ACC for the 100 version must never be signed))

AAAnnnnn.DER and AAAnnnnn.SOS files are excluded from protection because these instruments are not obligatory and cannot be type-approved.

For all these devices, the file relating to outcome is protected by means of an anti-forgery code linked with the file, known as a checksum: this code is calculated by using several encryption algorithms, including SHA-256 and RSA-1024 (according to the standard PKCS #1-V1.5).

The first algorithm is used to calculate a unique identification code (known as a hash or message digest) of the file contents. In this way, it is possible to guarantee file protection against subsequent amendments because the value of the calculated identification code is different to that of the original file.

The second algorithm (1024 bit RSA) is used to encrypt the above identification code. This algorithm is known as a public key (or asymmetric key) algorithm because it is based on the use of a pair of different keys, one defined as private and the other defined as public. This encryption algorithm uses two different keys for encrypting and decrypting: if the first key is used for encrypting, the second must necessarily be used for decrypting and viceversa. Because this algorithm requires that the size in bits of the data to be processed is equal to the size of the keys used (1024 bit in our case), and because the use of SHA-256 produces a data item with size equal to 256 bit, the missing bits must be filled in according to a certain standard so that the RSA can operate correctly. The reference standard to be used to fill in the missing bits is EMSA-PKCS #1-V1.5.

Lastly, given that the checksum obtained by using the previously described algorithms is in binary format that is not, by nature, suitable for storage in the result file, Base-64 coding is used to store the checksum in the file. A Checksum entry is added for this purpose at the end of the last entry in the final section, as the last key in the section, with the following format:

Checksum=	S	236	<p>Checksum made up respectively of:</p> <ul style="list-style-type: none"> • 172 characters (fixed size): message digest calculated, encrypted and decoded with Base64 coding • 5 characters (fixed size): numerical identification of public key registration. • 8 characters (fixed size): published key registration date in the form DDMMYYYY • 1 character (fixed size). Identifies the MCTCNet protocol used. May assume only values 1, 2; 3 or 4 with the following meaning: 1=Prot. RSSE; 3=prot. DIR; 4= prot.RETE. • 50 characters (maximum size): type approval number of the device that generated the file
-----------	---	-----	---

The Checksum entry must end with the control characters CR LF (respectively 0D hex and 0A hex) and nothing else must be present after these two control characters. It should also be specified that the value of the Checksum entry mentioned above must not contain any space or separation character between the constituent fields. The registration numerical identifier must contain exactly 5 characters: if the number is not made up of 5 characters, the remaining initial 0s must be inserted. The type approval number entered at the end of the Checksum entry value must also correspond fully to the type approval number supplied to the administration at the time of homologation/type approval. In particular, any blank spaces and upper and lower case letters must correspond exactly. If this correspondence is not respected, the files cannot be considered valid. Note also that more than one type approval number may be granted for a device (for example, a gas analyser may be type approved for cars and/or for motorbikes). For this reason, the type approval number to be used to generate the checksum must be consistent with the type of vehicle being tested whether it relates to date in a file or relates to data for a serial communication.

With regard to the RSSE specifications, please note that:

- in response to the ID command, any type approvals granted for the device are received, separated by the character “-“ (2D Hex);
- the type approval number consistent with the type of vehicle being tested is received in response to the TG command.

In all cases, all type approval numbers for which the manufacturer has stated compliance shall be included in the entry relating to the type approval number, present in all results files, separated exclusively by the character “-“ (2D Hex). PCPrenotazione and PCStazione will be responsible for checking that the type approval number used to make the checksum is included amongst those listed in the specific result file entry.

3.2.2.1 Public key infrastructure

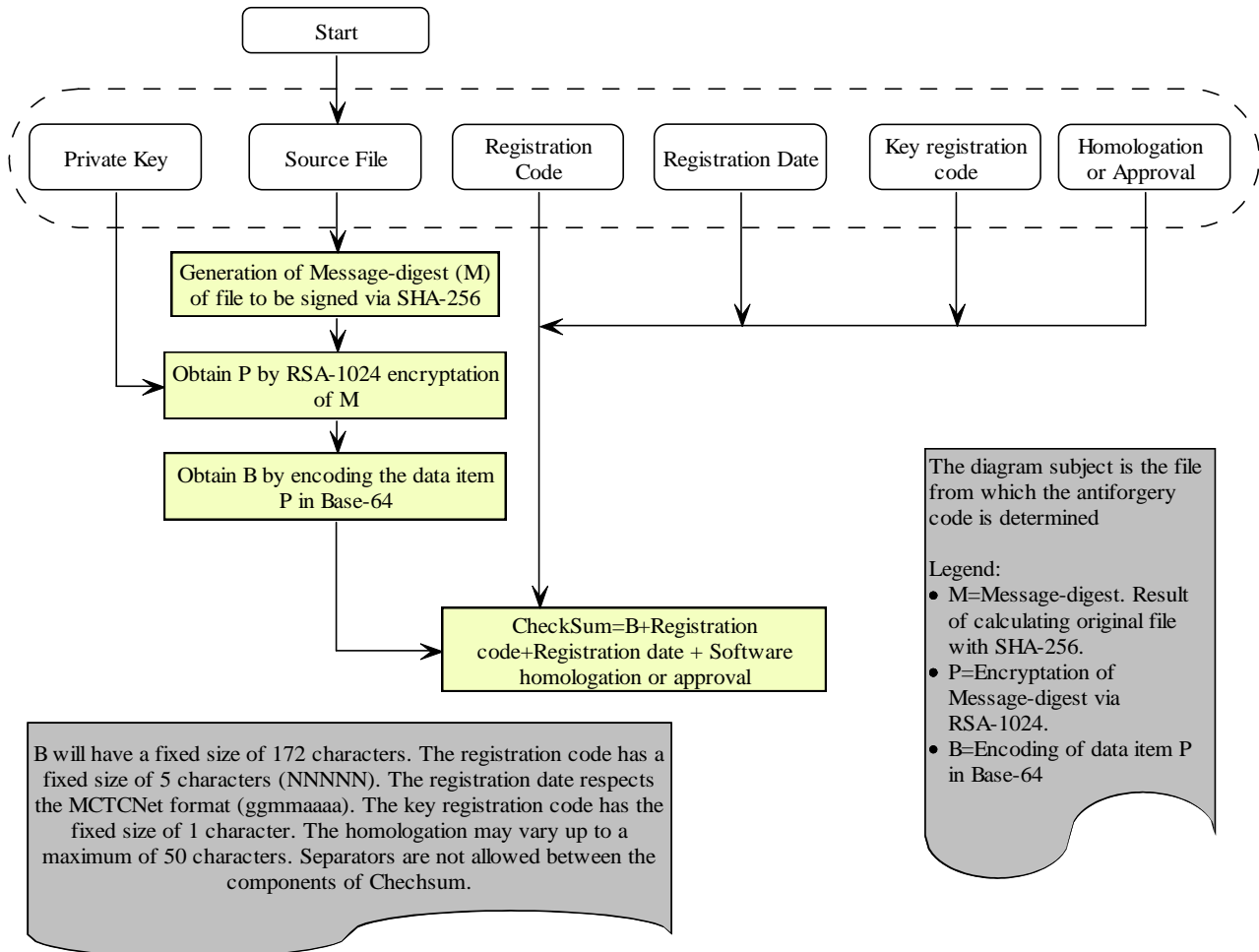
The public key infrastructure must guarantee a set of principles that make the use of the keys more secure:

- The administration must maintain two public electronic lists: the first must contain all valid public keys with the homologation/approval numbers of the corresponding devices, the second must contain all revoked public keys (with their homologation/approval numbers) that are therefore no longer valid, together with their corresponding revocation keys.
- The key pair (private and public) must be generated at the homologation/approval stage and a copy of the public key must be loaded to the appropriate area on the CSRPAD website.
- If a key is compromised, the manufacturer must generate a new key pair, and update the public key on the CSRPAD website. The previous key will be revoked twenty days after its replacement. The manufacturer must arrange to update all software and/or hardware containing the revoked key during this interim period, during which both keys are accepted.
- All PCPrenotazione software packages must contain a list of homologation/approval numbers with their relevant public keys so that the authenticity of any file can be checked (including the public key registration date and the licence plate required for unequivocal identification of a valid public key). They are also obliged to update the list of public keys at least every 15 days.
- PCPrenotazione software is obliged to ask the user to update the public key list if the required public key is found not to be present in its archive during the file checking stage (see `diagramma_checksum_b`).
- PCPrenotazione must be able to manage the history of individual public keys for each device installed in the test centre.

3.2.2.2 Calculating the anti-forgery code

The checksum must be calculated by homologated MCTCNet2 devices (in DIR and RETE mode), as well as by PCStazione for the DEC, GOM and ACC files and for all files relating to tests with homologated equipment in RS Senza Esito mode. The “SAV” and “REV” files will also be subject to a checksum, as required in Paragraph 4.1. The PRE, PR2 and CLK are not subject to signing of the anti-forgery code. The checksum is calculated in accordance with the following steps:

- Generation of a message-digest **M**, by applying the algorithm hash SHA-256 to the file. The message **M** formed in this way will be a sequence of 256 bits (32 bytes), that unambiguously identifies the original file.
- Encryption of the message **M** by means of the algorithm RSA-1024, using the private key specified at the homologation/type approval stage to obtain a new message defined as **P**, thus obtaining a 1024 bit sequence.
- The encrypted message **P** obtained during the previous step will be a binary sequence that is not suitable for inserting in a text file. Coding must therefore be applied using the Base 64 standard, to obtain a new fully ASCII message **B**. Once stored with the Base 64 code the initial 1024 bits of the encrypted message-digest will give rise to a 172 character sequence.
- It is now necessary to add the public key licence plate and date, followed by identification of the protocol used and the homologation/certification number to the message **B**. The resulting checksum may be attached to the end of the file by means of the appropriate Checksum entry. The type of protocol with which a pair of keys is associated is identified by inserting a single character identifying the protocol (1=RSSE; 2=RSCE; 3=DIR; 4=RETE). Note that PCPrenotazione and PCStazione are identified only in RETE mode, meaning that only one pair of keys can be combined and the identification is always “4”.

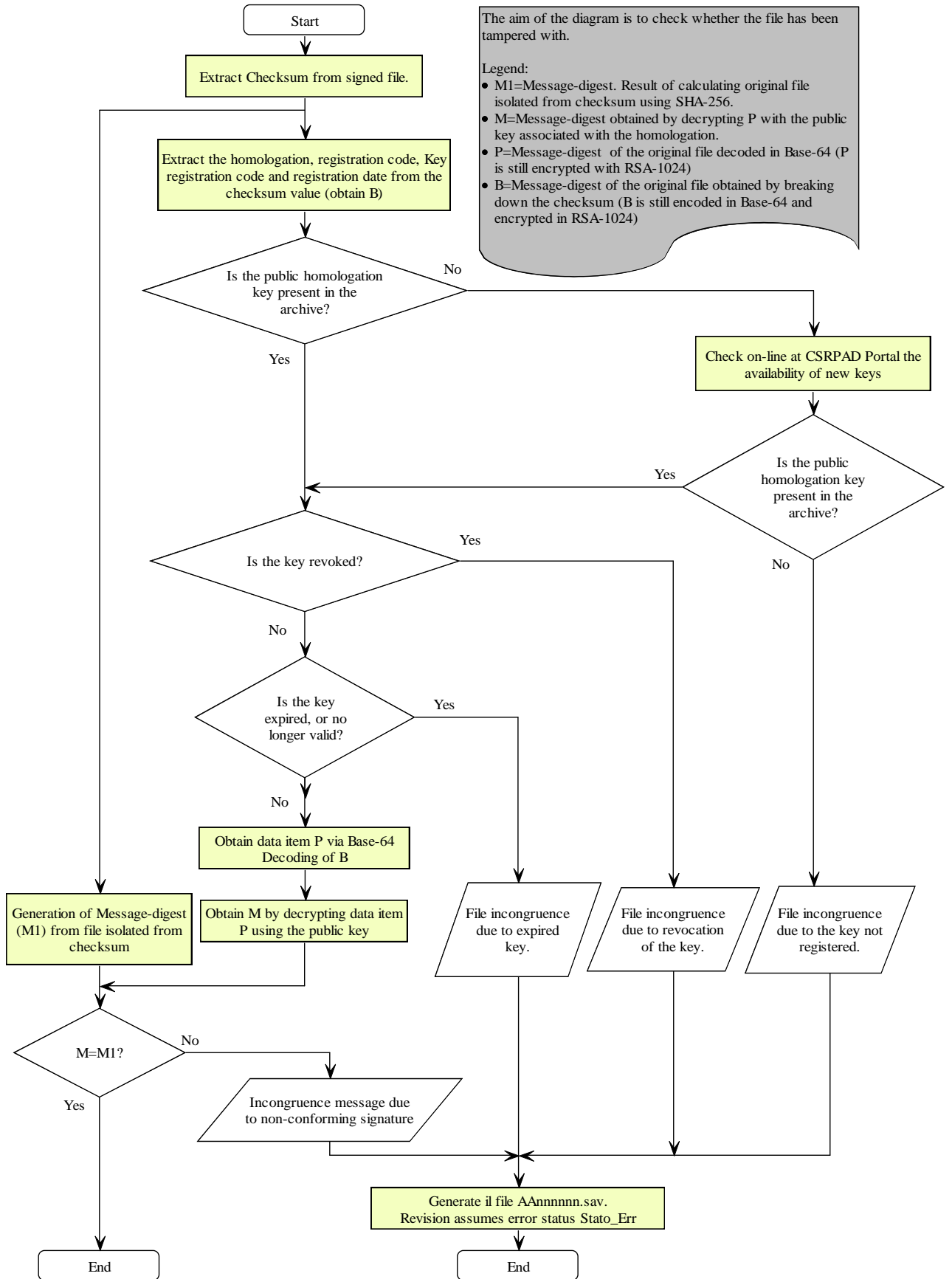


Diagram_Checksum_a

3.2.2.3 Checking the anti-forgery code

The operation to check the anti-forgery code must be carried out only by PCPrenotazione to establish the authenticity of test files and the use of type-approved devices. The checksum is checked in accordance with the following steps:

- Separate the original file contents from the part containing the checksum. All file rows must be considered in this purpose except for that containing the Checksum entry with its content.
- Obtain the file checksum by considering the value of the Checksum entry, separating message **B** from the type approval/certification number from the Checksum. For this purpose, **B** must be considered equivalent to the first 172 characters of the checksum. The resulting message **B** is the message encoded in Base 64 format, described in the previous section.
- Obtain the public key identification and registration date and the type approval/certification number of the instrument that produced the file from the resulting checksum. Use these fields to obtain the corresponding public key associated with the instrument. If this does not exist or has been revoked, the file should be considered invalid, because it has been generated by an instrument that is non-compliant with MCTCNet (or no longer valid).
- Generate a message-digest of the file obtained during the previous step, defined as **M1**, applying the hash algorithm SHA-256. The resulting message **M1** formed in this way will be the unique sequence associated with the file to be used as a term of comparison in subsequent steps.
- Decipher **B** using the Base 64 standard to obtain a binary message **P**. Message **B** is stored in ASCII format using Base 64 coding, and the algorithm RSA requires the message to be in binary format to perform decryption.
- Decrypt **P** by means of the RSA algorithm, using the public key belonging to the type approval/certification indicated in the file. Following decoding, the original message-digest **M** is obtained, which represents the other part of the comparison.
- Compare **M1** and **M**: if these are the same, the file is authentic; if they are different, it means that the file has been altered. **M** is the message-digest generated by whoever authenticated the file as described in the previous section, while **M1** is the message-digest generated by whoever carried out the check. The message-digest, as mentioned above, is a fingerprint of the file. If two fingerprints are the same, it means that the person responsible for checking is working with exactly the same file as the person who generated it.



Diagram_Checksum_b

3.2.3 DATA PROTECTION TO BE APPLIED TO RS INSTRUMENTS

The following encryption method is used to protect individual test data against attempts to tamper with their contents. This is applied to:

- RS Without Result devices

The encryption includes:

- Secret seed associated with each homologation number of RS Without Result devices, similar to the principle adopted to protect data transmitted via ini file.
- SHA-1 hash of: secret seed, licence plate, VIN No, reception date and category of vehicle to be tested. See appendix B.
- RC4 symmetrical encryption based on a session key obtained from hash, see Appendix C.

The encryption method used is based on sharing the secret seed between PCPrenotazione and the device. The secret seed must be revealed only to designated parties: from the device manufacturer to the Administration issuing the device type approval. The administration will make a list of secret seeds available to all accredited PCPrenotazioni by means of procedures that may be downloaded from the CSR PAD website, similar to those adopted for RSA encryption Public keys. A registration identification (N5), a seed registration date (D8) and the type approval number of the device using it (S50) will therefore correspond to each secret seed.

3.2.3.1 Application of RS encryption

For simplicity, a software or instrument connected to an RS approved device will be referred to as the Master. According to the test centre configurations, the Master may therefore be the PCStazione software or the host device using it, for example a RS Without Result proved rev counter.

At the beginning of the communication session, the Master communicates the VIN No, reception date and category of vehicle being tested to the RS Without Result device.

“The device generates the message SHA-1 hash formed by linking its secret seed, licence plate, the VIN No, the reception date and the vehicle category (completion of the missing bits to form a data block of minimal length must be carried out at the end and not for individual fields and is specified by SHA-1)”.

The secret seed used by the device to generate the hash SHA-1 must be 8 hexadecimal characters (written in upper case).

The device returns the hash to the Master, which obtains the fixed 104 bit part of the RC4 session key from the hash that is used to encrypt the next stage of communication.

The hash will always be shown in the relevant file Entry produced by the Master.

At the end of the test PCPrenotazione calculates the SHA-1 hash in turn, using the device secret seed, the licence plate, the VIN No, the reception date and the vehicle category. The secret seed used by PCPrenotazione is the one downloaded in safe mode from the Administration website. The secret seed used by PCPrenotazione is the one downloaded in safe mode from the Administration website. If it is found that the hash produced by PCPrenotazione is not the same as the one theoretically produced by the device and shown in the relevant entry, PCPrenotazione must report the inconsistency and consider the test completed as specified in paragraph 4.1.1.7 (Formal errors).

3.2.3.1.1 Communication between Master and RS without result approved device

After the ID command, the Master sends the device the licence plate (TG) command to transfer the licence plate, VIN No, acceptance date and vehicle category (see RS Senza Esito flow diagrams).

In responding to the TG command, the device returns a 160 bit hash to the Master, calculated from a string obtained by linking the secret seed, licence plate, VIN No, reception date and category.

The Master obtains the secret part of the RC4 key from the 26 hash characters selected using the table:

RC4 key	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Hash	2	3	5	6	8	9	11	12	14	15	17	18	20	22	23	25	26	28	29	31	32	34	35	37	38	40

The table is used to generate a string of hexadecimal characters made up with the first character equal to the second character of the hash, the second character equal to the third character of the hash, the third character equal to the fifth character of the hash, and so on.

13 bytes (=104 bit) are obtained from the resulting string of 26 hexadecimal characters, to be used as the fixed part of the RC4 key.

During the subsequent stage of communication, all the question strings sent by the Master to the device are uncoded because there is no need for protection.

All the responses sent by the device to the Master after the TG command, used to confirm execution of the command and therefore lacking variable information content (e.g. response to automatic serial command during gas analysis) are identical to those used by the uncoded MCTCNet protocol.

Response:

STX	Tipo	E T B	Add	E T B	Com	CRC-H	CRC-L	ETX
------------	------	----------------------------------	-----	----------------------------------	-----	--------------	--------------	------------

In all other cases, the responses sent by the device to the Master consist of an uncoded part and an encrypted part.

In particular, instead of an uncoded response string in the following format:

STX	Tipo	E T B	Add	E T B	Com	E T B	Dato 1	E T B	Dato n	CRC-H	CRC-L	ETX
------------	------	----------------------------------	-----	----------------------------------	-----	----------------------------------	--------	----------------------------------	--------	--------------	--------------	------------

The device sends the following encrypted string to the Master:

Response:

STX	Tipo	E T B	Add	E T B	Com	E T B	Vettore IV	E T B	Dato 1 cifrato	E T B	Dato n cifrato	E T B	CRC-32		
													CRC-H	CRC-L	ETX

Where:

Field	Description	E.g. Formato
Tipo	Response from device of the required type (e.g. "GAS")	
Add	Numerical device address	
Com	Command executed (e.g. "VA")	
Vettore IV	Initialisation vector IV, uncoded	"15AF7B"
Dato 1 encrypted	Dato 1 encrypted with RC4	
Dato n cifrato	Data n encrypted with RC4	
CRC-32	Checksum CRC-32 on Dato 1...Dato n, encrypted with RC4	"23D19B3F"

The "Vettore IV" field is a string of 6 characters representing the 3 bytes of the initialisation vector in hexadecimal format. The device must generate a different initialisation vector for each response string within the same communication session and this should never be repeated within the same session.

The "Dato 1 cifrato" is the result of RC4 encryption of the uncoded "Dato 1" field. The result of RC4 encryption must be inserted as a character string in hexadecimal format. As a result of this, the

size of the “Dato 1 cifrato” field in characters is twice the original size of the “Dato 1” field. The same applies to subsequent data fields, up to “Dato n”.

The field “CRC-32” is a string of 8 characters representing RC4 encryption of a 4 byte checksum in hexadecimal format, calculated from the sequence of characters obtained by linking data from “Dato 1” to “Dato n” inclusive (the “ETB” separation characters must not be considered). The calculation is based on the 04C11DB7 Hex generator polynomial, recommended by IEEE for use in Ethernet.

3.2.3.1.2 RS Checksum Entry format

The ChecksumRS entry must be completed for all devices that use RC4 encryption and will consist of data received in response to the TarGa (TG) command, as described below:

ChecksumRS=	S	92	<p>Checksum made up respectively of:</p> <ul style="list-style-type: none"> • 28 characters (fixed size): message digest calculated, encrypted and decoded with Base64 coding • 5 characters (fixed size): numerical identification of public key registration. • 8 characters (fixed size): published key registration date in the form DDMMYYYY • 1 character (fixed size): identifies the MCTCNet communication protocol used. May assume only values 1 or 2 with the following meaning: 1=Prot. RSSE • 50 characters (maximum size): type approval number of the device that generated the file
-------------	---	----	--

3.2.4 Further information on computer security

Before making a connection with the EDP centre, PCPrenotazione must communicate any inconsistency in the tests by checking the anti-forgery code to ensure it is unaltered and an approved device is being used. If the anti-forgery code is inconsistent, the PCPrenotazione must consider that the test is subject to “Stato Err”, creating a AAnnnnnn.SAV file as indicated under point 4.1.1.7 of the specification.

By implication, all the Anti-forgery Code keys must be reported in the SAV files, together with the sections to which they refer, though it is now necessary to input a key that identifies the beginning and end of the contents of each individual file to be entered in AAnnnnnn.sav. This is to recognise which lines must be examined to check the various Checksums. The presence of checksum keys (and the check) is, of course, required only for “200” version files.

During writing of the AAnnnnnn.sav file, PCPrenotazione will be responsible for delimiting the various files generated during the testing stage in accordance with the following table.

The initial character of the first section of files generated by DIR and RETE approved software modules and all files generated by PCPrenotazione and PCStazione, must always be “[in order to avoid the presence of empty rows.

	Row preceding start of file.	Row after the anti-forgery code in each file.
File AAnnnnnn.PRE	<rev:test tipo=“PRE” version=“100”>	</rev:test>
File AAnnnnnn.PR2	<rev:test tipo=“PR2” version=“200”>	</rev:test>
File AAnnnnnn.ACC	<rev:test tipo=“ACC” version=“100”>	</rev:test>
File AAnnnnnn.AC2	<rev:test tipo=“AC2” version=“200”>	</rev:test>
File AAnnnnnn.FON	<rev:test tipo=“FON” version=“XXX”>	</rev:test>
File AAnnnnnn.FAR	<rev:test tipo=“FAR” version=“XXX”>	</rev:test>
File AAnnnnnn.PFR	<rev:test tipo=“PFR” version=“XXX”>	</rev:test>
File AAnnnnnn.PES	<rev:test tipo=“PES” version=“100”>	</rev:test>
File AAnnnnnn.GAS	<rev:test tipo=“GAS” version=“XXX”>	</rev:test>
File AAnnnnnn.VEL	<rev:test tipo=“VEL” versione=“200”>	</rev:test>
File AAnnnnnn.OPA	<rev:test tipo=“OPA” version=“XXX”>	</rev:test>
File AAnnnnnn.FOT	<rev:test tipo=“FOT” versione=“200”>	</rev:test>
File AAnnnnnn.OBD	<rev:test tipo=“OBD” versione=“200”>	</rev:test>
File AAnnnnnn.DEC	<rev:test tipo=“DEC” versione=“200”>	</rev:test>
File AAnnnnnn.GOM	<rev:test tipo=“GOM” versione=“200”>	</rev:test>
File AAnnnnnn.SOS	<rev:test tipo=“SOS” versione=“XXX”>	</rev:test>
File AAnnnnnn.DER	<rev:test tipo=“DER” versione=“XXX”>	</rev:test>

“The PCPrenotazione for each file to be entered in the SAV file will update the attributed delimiter version with the value defined in the previous table, if indicated, or otherwise with the value 100 if the test file generated is compatible with the MCTCNet1 specification or with the value 200 if the test file generated is compatible with the MCTCNet2 specification.”

If one or more tests are not completed by the acceptance date, at midnight or at least when first restarted PCPrenotazione must save all files present in the PRENOTA and ESITO folders. More

specifically: 1) it will group all files with the same name AAnnnnnn relating to the tested vehicle, 2) it will create the corresponding AAnnnnnn.sav file, with automatic completion of the Reason entry in the [RevisioneAnnullata]section, 3) it will file it in the ARCHIVIO folder, 4) it will delete all files from the PRENOTA and ESITO folders.

Similarly, if the test is cancelled voluntarily by the technical Manager, all files, with the exception of the IMM file, present at the time of deletion in the PRENOTA and ESITO folders relating to the vehicle whose test has been cancelled must be grouped to create the corresponding SAV file (as defined in paragraph 4.1.1.6).

“Note that if the test is not completed, any partial files in the PRENOTA (PRE and PR2) and ESITO (ACC, AC2, FON, FAR SOS etc.) folders for the tested vehicle shall be entered in the SAV file, with the exception of the IMM file. If the test is completed, on the other hand, apart from the individual test files, only the AC2 file (if at least the PCStazione has been updated to version 200) and the ACC file if at least one instrument in 100 version is present, shall be entered in the SAV file.”

The content between inverted commas must always be given in upper case, conversely rev, test and type must always be given in lowercase.

This method will allow the EDP Centre the option of checking individual files.

The PES file will only be present during the transitional period if the brake test bench used during testing is not yet updated to the 200 version.

3.3 Test data

The sections and their entries making up the “AAnnnnnn.XXX” files used in the exchange of information between PCPrenotazione and PCStazione/s, by means of subfolders, are described below: **PRENOTA** and **ESITO**.

Altogether, the sections are treated as three blocks:

- Version identification data
- Booking and reception data
- Test or measuring data

3.3.1 Version identification data

Identification data denotes the data used to establish the “MCTCNet” protocol version used to exchange data between the components of a MCTC test centre.

3.3.1.1 Section ⇒ IdentificazioneProtocollo

Section name = [IdentificazioneProtocollo]

ENTRY	TIPO	DIM	DESCRIPTION
Version=	N	3	“MCTCNet” protocol version number (e.g. 100 = 1.0.0)
Data=	D	8	Version issue date

The booking and reception files relating to version 1.00 of MCTCNet, i.e. AAnnnnnn.pre and AAnnnnnn.acc must contain Versione=100 and Data=02111999.

The booking and reception files relating to version 2.00 of MCTCNet, i.e. AAnnnnnn.pr2 and AAnnnnnn.ac2 must contain Versione=200 and Data=11082009.

3.3.2 Booking and reception data

Booking data are divided into the following sections:

- Booking
- Vehicle data from log book

3.3.2.1 Section ⇒ Prenotazione

This Section defines data on Booking and the vehicle owner.

Section name = [Prenotazione]

ENTRY	TIPO	DIM	DESCRIPTION
DataAccettazione=	D (i)	8	OBLIGATORY only in AC2 file. Must not be entered in PR2 file. May be entered in PRE file (consistent with old technical specifications). Date on which the vehicle was accepted on line via PCStazione.
DataPrenotazione=	D	8	Date on which booking is made
Ora=	H	6	Time at which booking is made
Operatore=	S	...	Identification of the operator who made the booking
Linea=	N	2	OBLIGATORY. Number of line to which booking refers. May be set to 0 if all lines are to manage the booking.
TipoRevisione=	S	...	Defines the type of test, and may be only one of those specified in the [TipoRevisione] section of the MCTC.INI file.
CognomeDenominazione=	S	...	Surname of owner, or name if a company (new TIPO
Nome=	S (*)	...	Name of the owner. Entry is not obligatory if not available (in the case of a company)
Indirizzo=	S	...	Address where the owner is resident
CAP=	C	5	Postal code of the city of residence. The 5 characters must be numerical.
Citta=	S	...	Owner's city of residence
Provincia=	C	2	Owner's province of residence Only characters from 65 to 90 included in the ascii table are allowed.
Note=	S (*)	160	Notes

3.3.2.2 Section ⇒ Vehicle data from logbook

This Section defines the technical data of the vehicle to be tested, which may be obtained from the vehicle log book or the vehicle owner handbook.

Section name = [DatiLibrettoVeicolo]

ENTRY	TIPO	DIM	DESCRIPTION
Targa=	S (i)	10	Licence plate number The number of characters making up a licence plate shall be at least 4. For a moped (CategoriaInternazionale="L1e" or "L2e" or "L6e") under the old registration system (without CIC code), the Licence plate entry must not be completed, in all other cases, the Entry is OBLIGATORY.
NProtRegistroRevisioni=	N	6	Indicates protocol allocated at the booking stage in the test protocol register (first column of register)
NomeFileMCTCNet=	N	8	Indicates name of corresponding MCTCNet file (AAnnnnnn)
EstremoPagamento=	S (*)	20	NOT OBLIGATORY. Indicates details for payment relating to booking made in Data Processing Centre by means of PCPrenotazione software.
NumOmologazione=	S	...	Type approval number
TipoVeicolo=	S		OBLIGATORY. May assume one of the following values: "LEGGERO" "PESANTE" "MOTOVEICOLO"
CategoriaInternazionale=	S (i)	...	OBLIGATORY. Specifies the vehicle category, and may be only one of those listed in the file MCTC.INI in the CategorieInternazionali Section. It may assume a value of "L1e" or "L2e" or "L3e" or "L4e" or "L5e" or "L6e" or "L7e" only if TipoVeicolo="MOTOVEICOLO". May assume value of "M1" or "M2" or "N1" or "O1" or "O2" only if TipoVeicolo="LEGGERO". May assume a value of "M2" or "M3" or "N2" or "N3" or "O3" or "O4" only if TipoVeicolo="PESANTE"
DescrizioneVeicolo=	S (*)	..	NOT OBLIGATORY. Defines vehicle classification from among those listed in the table with regard to the international category. Description of vehicle category.
Telaio=	S	20	VIN No.
CodiceCIC=	S (i)	10	Obligatory if CategoriaInternazionale ="L1e" or "L2e" or "L6e", and if the Targa entry consists of 6 characters, otherwise need not be entered. Moped identification code.
Fabbrica=	S	....	Manufacturing factory
Tipo=	S	....	Vehicle type
TipoMotore=	S	....	OBLIGATORY. Engine identification code.
DataPrimaImm=	C	8	Date of first registration of the vehicle. In cases where the day and/or month are not entered in the log book, must be set to "00" (e.g. 00031994 for unknown day, or 00001994 for unknown day and month). Dates with a known day and unknown month are not accepted (e.g. 02001997)
DataRilascio=	D	8	Log book issue date.

DataUltimaRev=	D (*)	8	Last test date.
Alimentazione_1=	S	....	Defines the primary fuel supply type, and may be only one of those specified in the [Alimentazioni] Section of the MCTC.INI file.
Alimentazione_2=	S	....	Defines the secondary fuel supply type, and may be only one of those specified in the [Alimentazioni] Section of the MCTC.INI file.
Km=	N	6	Number of Kilometres travelled.
Tara=	N (*)	5	Unladen weight in kg.
MassaComplessiva=	N	5	OBLIGATORY. Indicates the authorised vehicle mass in kg.
MassaRimorchiabile=	N (i)	5	OBLIGATORY if the vehicle is authorized to tow. If this is not the case, it may however be entered. Maximum towable mass in kg. The brake test benches must consider the Towable axis Entry when making braking efficiency calculations for vehicles authorised for towing and it must never be set to 0. MassaRimorchiabile should be considered not obligatory during the transition period to application of version 200.
Cilindrata=	N (i) (m)	5	OBLIGATORY if DirettivaEmissioneAcusticaMoto="TU393/59" or DirettivaAvvisatoreAcusticoMoto="TU393/59", otherwise must not be completed. Engine capacity in cm ³
PotMaxkW=	N (2) (*)	6	Maximum power in kw.
PotFiscaleCV=	N (*)	3	Power in fiscal horse power.
Decibel=	N (i)	3	OBLIGATORY if Alimentazione_1 <> "ELETTRICO". Otherwise it must not be completed. Indicates the maximum dB limit in the log book. Noise level limit dB(A) – dB(B). Decibels should be considered compulsory even during the transitional period
GiriMotoredB=	N (i)	5	OBLIGATORY. If Alimentazione_1 <> "ELETTRICO". Otherwise it must not be completed. Indicates the engine rpm at which the sound meter test is carried out (rpm). GirimotoredB should be considered obligatory even during the transitional period
Veicolo4WD=	L	1	Presence of 4WD system.
ImpiantoABS=	L	1	Presence of ABS control system.
NumTotalePosti=	N	3	Total Number of passenger seats.
FrenoSoccorso=	S (i) (l )	....	OBLIGATORY only in ACC file. Code for the emergency brake, which may be only one of: "XX" "TT" "LL" "HH" "HT" "STAZIONAMENTO"

AzionamentoFrenoStazionamento=	S (i)	...	Parking brake operating method, which may be only one of: “PEDALE” “MANO” “ELETTRICO” “NON PRESENTE” The value “NON PRESENTE” is permitted only if CategoriaInternazionale=“L1e” or “L3e” or “L4e”
NumTotaleAssi=	N	1	Total number of vehicle axes.
NumeroScarichi=	N (i)	1	OBLIGATORY only with ACC file, or if Alimentazione_1 <> “ELETTRICO”. Otherwise it must not be completed. It indicates the number of exhaust pipes.
DistanzaScarichiMaggiore30cm=	L (i)	1	OBLIGATORY only with ACC file, or if NumeroScarichi > 1. Otherwise it must not be completed. Indicates whether there is a gap greater than 30 cm between the centres of two or more exhaust pipes.
DirettivaAcusticaAuto=	S (l)	...	OBLIGATORY. Defines the sound directive to which the vehicle type approval is subject and may be only one of those listed in the MCTC.INI file, under the DirettiveAcusticheAuto section.
DirettivaEmissioneAcusticaMoto=	S (i) (m)	...	OBLIGATORY only if Alimentazione_1 <> “ELETTRICO”, otherwise must not be completed. Defines the sound directive to which the vehicle type approval is subject and may be only one of those listed in the MCTC.INI file, under the DirettiveEmissioniAcusticheMotoveicoli section.
DirettivaAvvisatoreAcusticoMoto=	S (m)	...	OBLIGATORY. Defines the horn directive to which the vehicle type approval is subject and may be only one of those listed in the MCTC.INI file, under the DirettiveAvvisatoreAcusticoMotoveicoli section.
DirettivaEmissioniGasBenzinaAuto=	S (i) (l)	...	OBLIGATORY if the vehicle fuel system is petrol. Defines the directive to which the vehicle type approval is subject and may be only one of those listed in the MCTC.INI file, under the DirettiveEmissioniGasBenzinaAuto section. Must be set to “NESSUNA” if the vehicle does not run on petrol.
DirettivaEmissioniGasDiesel=	S (i)	...	OBLIGATORY if the vehicle is fuelled with Diesel. Defines the directive to which the vehicle type approval is subject and may be only one of those listed in the MCTC.INI file, under the DirettiveEmissioniGasDiesel section. It shall have the value = “NESSUNA” if the vehicle isn’t diesel.
DirettivaEmissioniGasMotociclo=	S (i) (m)	...	OBLIGATORY if the fuel system is Petrol or Hybrid or Methane or LPG and DirettivaIntenazionale=“L3e” or “L4e” or “L5e” or “L7e”, otherwise must not be completed. Defines the directive to which the vehicle type approval is subject and may be only one of those listed in the MCTC.INI file, under the DirettiveEmissioniGasMotocicli section.
DirettivaEmissioniGasCiclomotore=	S (i) (m)	...	OBLIGATORY if the fuel system is Petrol or Hybrid or Methane or LPG and CategoriaInternazionale=“L1e” or “L2e” or “L6e”, otherwise must not be completed. Defines the directive to which the vehicle type approval is subject and may be only one of those listed in the MCTC.INI file, under the DirettiveEmissioniGasCiclomotori section.
AltezzaAnab=	N (i)	3	OBLIGATORY only in ACC file. Height of the low beam headlight (cm) from the ground.

LimiteK=	N(1) (i)	3	OBLIGATORY if vehicle is diesel, otherwise must not be completed. Only obligatory for the ACC file. Indicates limit K. No greater than 3.0 in any case.
LimitatoreGiriVeicoloFermo=	L (i)	1	OBLIGATORY if vehicle is diesel, otherwise must not be completed. Only obligatory for the ACC file. Indicates whether the vehicle (not in motion, i.e. without gear engaged) cannot reach 3500 rpm because it is electronically limited.
LimiteMinLambdaMinAcc=	N (2) (i) (l)	4	OBLIGATORY only if the vehicle is fuelled with petrol, and if the reference directive is 91/441/EEC or later. Otherwise it must not be completed. However, only obligatory for the ACC file. Indicates the minimum Lambda limit only for tests at accelerated idle speed.
LimiteMaxLambdaMinAcc=	N(2) (i) (l)	4	OBLIGATORY only if the vehicle is fuelled with petrol, and if the reference directive is 91/441 EEC or later. Otherwise it must not be completed. Only obligatory for the ACC file. Indicates the maximum Lambda limit only for tests at accelerated idle speed.
AutorizzatoTraino=	L	1	OBLIGATORY. Indicates whether the vehicle is authorised to tow.
ImpFrenanteServ=	S (i)	...	OBLIGATORY only in ACC file. It indicates the type of braking system of the service brake, and may be one of: "IDRAULICO" "PNEUMATICO" "MECCANICO" "MISTO"
ImpFrenanteStaz=	S (i)	...	OBLIGATORY only in ACC file. If AzionamentoFrenoStazionamento = "NON PRESENTE" must not be completed. It indicates the type of braking system of the parking brake, and may be one of: "IDRAULICO" "PNEUMATICO" "MECCANICO" "MISTO"
ImpFrenanteSocc=	S (i) (l)(p)	...	OBLIGATORY only in ACC file. It indicates the type of braking system of the emergency brake, and may be one of: "IDRAULICO" "PNEUMATICO" "MECCANICO" "MISTO"
NumeroCilindri=	N (i)	2	OBLIGATORY only if Alimentazione_1 <> "ELETTRICO", otherwise must not be completed. Only obligatory for the ACC file. Indicates the number of cylinders.
TempiMotore=	S (i)	...	OBLIGATORY only with ACC file, and only if Alimentazione_1 <> "ELETTRICO". Otherwise, it must not be completed. It indicates the number of engine strokes and may be one of: "2T" "4T" "DIS"
NumGiriMotoreMax=	N (*)	5	NOT OBLIGATORY. Maximum number of engine revolutions (rpm)

PosAssiStaz=	L (i)	9	OBLIGATORY only in ACC file. If AzionamentoFrenoStazionamento =“NON PRESENTE” must not be completed. It indicates the axles on which the parking brake acts. If no flags are set to “S”, this means that the parking brake acts on the differential, and it is not possible to check its efficiency. The numer of S identifies the number of sections for the Parking brake while the position identifies the index in the section name. When the parking brake acts on the single wheel axle, the PosAssiStaz entry must be set to “NNNNNNNNN” so that the brake test bench is not asked to carry out a parking brake efficiency test because the relevant standard does not require this.
TipoCambio=	S (i)	...	OBLIGATORY only in ACC file. Indicates transmission type, which may be only one of: “MECCANICO” “AUTOMATICO” “VARIATORE”
GeneratoreBatteria=	L (i) (m)	1	OBLIGATORY only in ACC file. Indicates whether the vehicle is equipped with a battery (“S”) or whether current is generated by magnetic induction (“N”).
NumeroFari=	S (i) (m)	...	OBLIGATORY only in ACC file. It indicates the number of headlight clusters fitted on the vehicle and may be one of: “1” “2”
TipoFaroUnicoSx=	S (i) (m)	...	OBLIGATORY only in ACC file. Indicates type of headlight fitted, which may be one of: “ANABBAGLIANTE” “ABBAGLIANTE” “MISTO”
TipoFaroDx=	S (i) (m)	...	OBLIGATORY only in ACC file and only if NumeroFari=“2” and may be one of “ANABBAGLIANTE” “ABBAGLIANTE” “MISTO”
AsseRuotaSingola=	S (i) (m)	...	OBLIGATORY only if Categoriainternazionale=“L2e” or “L5e” and may assume only one of the following values: “1” “2” Otherwise it must not be completed. Only obligatory for the ACC file. Indicates axle affected by only one wheel.
Turbo=	L (i)	1	OBLIGATORY if Alimentazione_1= “DIESEL”. Indicates whether the vehicle is turbocharged.
CorrettorePressione=	L (i)	1	OBLIGATORY if Alimentazione_1 “DIESEL”, otherwise must not be completed. Indicates whether the vehicle is equipped with pressure corrector.

ImpiantoFrenoMoto=	S... (i) (m)		OBLIGATORY only in ACC file. If CategoriaInternazionale="L1e", "L3e" and "L4e" may assume one of the following values: "II" "IC" "CC" If CategoriaInternazionale="L2e" or "L5e" can only assume value "TT". If CategoriaInternazionale="L6e" or "L7e" may assume one of the following values: "XX" and "TT".
AzionamentoFrenoServizio=	S (i)	....	OBLIGATORY only in ACC file, and may be one of: "LEVA1_LEVA2" "LEVA1_PEDALE1" "PEDALE" If TipoVeicolo="LEGGERO" may only be set to "PEDALE" If CategoriaInternazionale="L1e", "L3e" or "L4e" may assume only "LEVA1_LEVA2" or "LEVA1_PEDALE_1"
PressioneRiferimento=	N (2) (* (p)	6	Reference pressure in kPa.
SiglaPneumatici=	S	320	List of tyre codes indicated in logbook (for example: Example: 225/45/R18 91V - 225/40/R19 91V
FattoreConversione=	N (1) (* (p)	4	Conversion factor between hydraulic circuit and air circuit.
FrenoSoccorsoPesanti=	S (i) (p)	....	OBLIGATORY only with ACC file. Code for the emergency brake, which may be only one of: "XX" "TT" "STAZIONAMENTO" "NESSUNO" The value "NESSUNO" may be entered only if CategoriaInternazionale="O3" or "O4".

3.3.2.3 Section ⇒ Clearance Test Data

Considering that more than one clearance tester may be installed in a test centre, it must be possible to transfer data required for printing from PCS to PCP so that the technical manager can select the model used for the specific test. The section need be present only if TipoVeicolo<>MOTOVEICOLO. The section must not be present in the PR2 file, but only in the AC2 file.

Section name = **[ProvaGiochi]**

Marca=	S (i)	....	OBLIGATORY only in AC2 file and only if overall result of test entered (Entry EsitoRevisione=) Clearance Tester make
Modello=	S (i)	....	OBLIGATORY only in AC2 file and only if overall result of test entered (Entry EsitoRevisione=) Clearance Tester model
NumOmologazione=	S (i)	....	OBLIGATORY only in AC2 file and only if overall result of test entered (Entry EsitoRevisione=) Clearance Tester Homologation number
NumSerie=	S (i)	....	OBLIGATORY only in AC2 file and only if overall result of test entered (Entry EsitoRevisione=) Clearance Tester Type serial number
DataScadenza=	D (i)	8	OBLIGATORY only in AC2 file and only if overall result of test entered (Entry EsitoRevisione=) ClearanceTester periodic check due date

3.3.3 Test data

Test data is all the data making up the test result obtained by the line devices (measured), with the visual checks carried out by the operator.

Test data are divided into the following sections:

- √ Sections contained in the AAnnnnnn.PFR file
 - Brake test
 - Details relating to the axles on which the service brake acts.
 - Details relating to the axles on which the parking brake acts.
- √ Sections contained in the AAnnnnnn.DEC file
 - Decelerometer test
- √ Sections contained in the AAnnnnnn.GAS file
 - Gas analysis
 - 1st fuel system GAS analysis
 - 2nd fuel system GAS analysis
 - Motor vehicle GAS analysis
- √ Sections contained in the AAnnnnnn.OPA file
 - Analysis of OPACITY level
- √ Sections contained in the AAnnnnnn.FON file
 - Sound level meter
- √ Sections contained in the AAnnnnnn.FAR file

- Headlight test
- Car headlight test
- Motor cycle headlight test
- √ Sections contained in the AAnnnnnn.FOT file
 - License plate photo
- √ Sections contained in the AAnnnnnn.OBD file
 - EOBD test
- √ Sections contained in the AAnnnnnn.VEL file
 - Speed test
- √ Sections contained in the AAnnnnnn.ACC file
 - List of visual check items
 - Overall result entered by technical manager

Although these tests are not required for the purpose of the test result, the suspension test and drift test sections are also defined (contained in the files AAnnnnnn.SOS and AAnnnnnn.DER respectively). These sections may be managed by PCPrenotazione only to complement the service offered during testing but are not assessed when determining the test outcome. The results files are obligatory when the type approval characteristics of the vehicle being tested require this specific test type. For example, the file AAnnnnnn.OPA should not be expected if the vehicle sent for testing runs on petrol. Similarly, if the vehicle is electric only, neither the AAnnnnnn.OPA file nor the AAnnnnnn.GAS file should not be expected. Another example is the top speed test results file, which will be obligatory only for TipoVeicolo="MOTOVEICOLO" **and** CategoriaInternazionale="L1e" or "L2e" or "L6e".

3.3.3.1 Section ⇒ Brake Test

Section name = [ProvaFreni]

ENTRY	TIPO	DIM	DESCRIPTION
Marca=	S	....	Make of Brake meter
Tipo=	S	....	Type of Brake meter
NumOmologa=	S	....	Type approval number of Brake meter
NumSerie=	S	....	Serial number of Brake meter
NumVersioneSoftware=	S	....	Software version number
DataScadenza=	D	8	Due date of Brake meter periodic check
TipoProvaFreni=	S	...	OBLIGATORY. Indicates brake test bench type used for measurement and may be only one of: "RULLI" "PIASTRE"
Targa=	S	10	Licence plate number The number of characters making up a licence plate shall be at least 4.
TipoVeicolo=	S		OBLIGATORY. May assume one of the following values: "LEGGERO" "PESANTE" "MOTOVEICOLO" Indicates the type of vehicle being tested.
CategoriaInternazionale=	S	...	OBLIGATORY. Specifies the vehicle category, and may be only one of those listed in the file MCTC.INI in the CategorieInternazionali Section. It may assume a value of "L1e" or "L2e" or "L3e" or "L4e" or "L5e" or "L6e" or "L7e" only if TipoVeicolo="MOTOVEICOLO". It may assume the value "M1" or "M2" or "N1" or "O1" or "O2" only if TipoVeicolo="LEGGERO". It may assume a value of "M2" or "M3" or "N2" or "N3" or "O3" or "O4" only if TipoVeicolo="PESANTE"
AzionamentoFrenoStazionamento=	S	....	Parking brake operating method, which may be only one of: "PEDALE" "MANO" "ELETTRICO" "NON PRESENTE" The value "NON PRESENTE" is permitted only if CategoriaInternazionale="L1e" or "L3e" or "L4e"
AzionamentoFrenoServizio=	S	...	Parking brake operating method, which may be only one of: "LEVA1_LEVA2" "LEVA1_PEDALE1" "PEDALE" If TipoVeicolo="LEGGERO" may only be set to "PEDALE" If CategoriaInternazionale="L1e", "L3e" or "L4e" may assume only "LEVA1_LEVA2" or "LEVA1_PEDALE_1"

ImpiantoFrenoMoto=	S (i) (m)	...	OBLIGATORY. If CategoriaInternazionale="L1e", "L3e" or "L4e" may assume one of the following values: "II" "IC" "CC" If CategoriaInternazionale="L2e" or "L5e" can only assume value "TT". If CategoriaInternazionale="L6e" or "L7e" may assume one of the following values: "XX" and "TT".
FrenoSoccorso=	S (l)	...	OBLIGATORY. Code for the emergency brake, which may be only one of: "XX" "TT" "LL" "HH" "HT" "STAZIONAMENTO"
ImpFrenanteServ=	S	....	Type of service braking system: "IDRAULICO" "PNEUMATICO" "MECCANICO" "MISTO"
ImpFrenanteStaz=	S (i)	....	Type of parking braking system: "IDRAULICO" "PNEUMATICO" "MECCANICO" "MISTO" OBLIGATORY only if AzionamentoFrenoStazionamento ="NON PRESENTE", otherwise must not be completed.
ImpFrenanteSocc=	S (l)	....	Type of emergency braking system: "IDRAULICO" "PNEUMATICO" "MECCANICO" "MISTO"
Soglia%EffServizio=	N	2	% Efficiency threshold of service brake
Soglia%EffFrenoStaz=	N (i)	2	OBLIGATORY only if AzionamentoFrenoStazionamento <>"NON PRESENTE", otherwise must not be completed. % Efficiency threshold of parking brake
Soglia%EffSoccorso=	N (l) (l)	4	% Efficiency threshold of emergency brake
Soglia%DissServizio=	N (i)	2	OBLIGATORY only if CategoriaInternazionale<>"L1e" or "L3e" or "L4e". Otherwise it must not be completed. % Asymmetry threshold of service brake

Soglia%DissFrenoStaz=	N (i)	2	OBLIGATORY if CategoriaInternazionale <> “L1e” or “L3e” or “L4e”, otherwise must not be completed. % % Parking brake threshold.
Soglia%DissSoccorso=	N (i) (l)	2	% Emergency brake threshold. Entry obligatory in the case of Frenosoccorso=“STAZIONAMENTO” or “TT”. Otherwise it must not be completed.
Soglia%EffFrenoStazComb=	N (i) (l)	2	OBLIGATORY only if AutorizzatoTraino=S, otherwise must not be completed. % Efficiency threshold of combined vehicle parking brake
Soglia%EffFrenoAssePosteriore=	N (m)	2	% Rear axle efficiency threshold with reference to mass of vehicle being tested.
EffFrenoAssePosteriore=	N (m)	2	Rear axle efficiency threshold with reference to mass of vehicle being tested.
ResultEffFrenoAssePosteriore =	E (m) (i)	1	Assumes value of “N” if the vehicle was registered before 01 January 2012. Result of rear axle brake efficiency.
SogliaForzaPedale=	N (i)	3	OBLIGATORY if AzionamentoFrenoServizio= “PEDALE” or “LEVA1_PEDALE1”, otherwise must not be completed Threshold of force applied to the pedal
SogliaForzaStaz=	N (i)	3	OBLIGATORY if AzionamentoFrenoStazionamento <> “NON PRESENTE”, otherwise must not be completed. Threshold of force applied to parking brake
SogliaForzaLeva=	N (i) (m)		OBLIGATORY if AzionamentoFrenoServizio= “LEVA1_LEVA2” or “LEVA1_PEDALE1”, otherwise must not be completed Indicate maximum force limit applicable to the lever during braking force measurement
EffFrenoServizio=	N	2	% Efficiency of service brake
EsitoEffFrenoServizio=	E	1	Result of service brake efficiency
EffFrenoSoccorso=	N (1) (l)	4	% Efficiency of emergency brake
EsitoEffFrenoSoccorso=	E (l)	1	Result of emergency brake efficiency
EffFrenoStazionamento=	N (i)	2	OBLIGATORY only if AzionamentoFrenoStazionamento <> “NON PRESENTE”, otherwise must not be completed. If PosAssiStaz=“NNNNNNNNN” and TipoProvaFreni=“RULLI” the Entry must not be completed, it will be sufficient to complete the visual test StatoMeccanicoFrenoStaz_121. % Efficiency of parking brake
EsitoEffFrenoStazionamento=	E (i)	1	OBLIGATORY only if AzionamentoFrenoStazionamento = “NON PRESENTE”, otherwise must not be completed. If PosAssiStaz=“NNNNNNNNN” and TipoProvaFreni=“RULLI” the Entry must not be completed, it will be sufficient to complete the visual test StatoMeccanicoFrenoStaz_121. Result of parking brake efficiency

EffFrenoStazionamentoComb=	N (i) (l)	2	OBLIGATORY only if AutorizzatoTraino=S, otherwise must not be completed. If PosAssiStaz="NNNNNNNNN" and TipoProvaFreni="RULLI" the Entry must not be completed, it will be sufficient to complete the visual test StatoMeccanicoFrenoStaz_121. % Efficiency of parking brake of combined vehicle
EsitoEffFrenoStazionamentoComb=	E (i) (l)	1	OBLIGATORY only if AutorizzatoTraino=S, otherwise must not be completed. If PosAssiStaz="NNNNNNNNN" and TipoProvaFreni="RULLI" the Entry must not be completed, it will be sufficient to complete the visual test StatoMeccanicoFrenoStaz_121. Result of parking brake efficiency of combined vehicle.
MassaVeicolo=	N	5	OBLIGATORY. Gross measured weight of vehicle in kg
PesoStatico=	N	6	OBLIGATORY. Gross measured weight of vehicle in N.
AutorizzatoTraino=	L (l)	1	OBLIGATORY. Indicates whether the vehicle is authorised to tow.
Veicolo4WD=	L	1	OBLIGATORY. Indicates presence of 4WD system.
ImpiantoABS=	L	1	OBLIGATORY. Indicates presence of ABS control system.
MassaRimorchiabile=	N (i) (l)	5	OBLIGATORY only if AutorizzatoTraino=S.
NumTotaleAssi=	N	1	OBLIGATORY. Total number of axles on the vehicle.
PosAssiStaz	L (i)	9	OBLIGATORY only if AzionamentoFrenoStazionamento <>"NON PRESENTE", otherwise must not be completed. It indicates the axles on which the parking brake acts. If no flags are set to "S", this means that the parking brake acts on the differential, and it is not possible to check its efficiency.
PressAtmosferica=	N (1)	5	Atmospheric pressure in °kpa (may be input manually by putting "#" before the value input, in this case DIM +1)
TempAmbiente=	S	3	Environmental temperature in °C. Only values between -99 and 999 are permitted. (may be input manually by placing "#" before the value input, in this case DIM +1)
UmiditaRelativa=	N	3	Relative humidity in % (may be input manually by placing "#" before the value input, in this case DIM +1)
Note=	S (*)	320	NOT OBLIGATORY.
NumVersioneProtocollo=	N	3	MCTCNet protocol version (e.g.: 200). If file is produced by PCStazione the value corresponds to the MCTCNet version of the Brake Test Bench.
DataVersioneProtocollo=	D	8	OBLIGATORY. Version issue date
TipoCollegamento=	S	...	OBLIGATORY. Indicates configured MCTCNet connection type, from among: "DIR" "RETE"

CircolareApplicata=	S	...	OBLIGATORY. Indicates identification of latest circular to which the installed software version refers. (E.g.: 64/404/2005).
IDChiaveRS=	C	5	Must not be completed.
DataRegChiaveRS=	D	8	Must not be completed.
ChecksumRS=	S	92	Must not be completed.
ModuloChiaveRS=	C	172	Must not be completed.
EsponenteChiaveRS=	C	4	Must not be completed.
CodErrore=	S (*)	....	This field may contain: "Code" or "Code and Description", identifying a specific fault or error in device operation. If this "Entry" is completed, the measurement should be considered invalid
DataMisura=	D	8	Date brake test performed
InizioMisura=	H	6	Time test started
FineMisura=	H	6	Time test completed
Operatore=	S	....	Identification of the Technical Manager responsible for the test

3.3.3.1.1 Section ⇒ DettagliFreniAsse_n

This section defines the detailed values for each vehicle axle. Generation of the sections in progressive order must take into account that "axle number 1" refers to the steering axle.

Section name = [DettagliFreniAsse_n]

ENTRY	TIPO	DIM	DESCRIPTION
ForzaParrRuotaSingola=	N (i) (m)	5	OBLIGATORY only if TipoProvaFreni="RULLI" and if CategoriaInternazionale "L1e" or "L2e" or "L3e" or "L4e" or "L5e". For "L2e" and "L5e", AsseRuotaSingola must correspond to the axle relating to the section. The entry must not be completed unless the above conditions are met. Indicates wheel rolling resistance (in N)
ForzaParrSx=	N (i)	5	OBLIGATORY if TipoProvaFreni="RULLI" and if CategoriaInternazionale<"L1e" or "L3e" or "L4e". For "L2e" and "L5e", AsseRuotaSingola must not correspond to the axle relating to the section. The entry must not be completed unless the above conditions are met. Left parasitic braking force in N (rolling resistance).
ForzaParrDx=	N (i)	5	OBLIGATORY if TipoProvaFreni="RULLI" and if CategoriaInternazionale<"L1e" or "L3e" or "L4e". For "L2e" and "L5e", AsseRuotaSingola must not correspond to the axle relating to the section. The entry must not be completed unless the above conditions are met. Right parasitic braking force in N (rolling resistance).
ForzaFrenanteRuotaSingola=	N (i) (m)	5	OBLIGATORY if CategoriaInternazionale="L1e" or "L2e" or "L3e" or "L4e" or "L5e". For "L2e" and "L5e", AsseRuotaSingola must correspond to the axle relating to the section. The entry must not be completed unless the above conditions are met. Maximum wheel braking force in N.
ForzaSxEstrapolata=	N (p)	5	Left force in N extrapolated to reference pressure.
ForzaDxEstrapolata=	N (p)	5	Right force in N extrapolated to reference pressure.
P1Linea=	N (1) (p)	5	Pressure in kPa measured upstream of load proportioning valve at the time of maximum brakeforce measurement.
P2Cilindri=	N (1) (p)	5	Pressure in kPa measured at brake cylinders at the time of maximum brakeforce measurement.
ForzaFrenanteSx=	N	5	OBLIGATORY if CategoriaInternazionale<"L1e" or "L3e" or "L4e". For "L2e" and "L5e", AsseRuotaSingola must not correspond to the axle relating to the section. The entry must not be completed unless the above conditions are met. Maximum measured left braking force expressed in N

ForzaFrenanteDx=	N (i)	5	<p>OBLIGATORY if CategoriaInternazionale<>"L1e" or "L3e" or "L4e". For "L2e" and "L5e", AsseRuotaSingola must not correspond to the axle relating to the section.</p> <p>The entry must not be completed unless the above conditions are met.</p> <p>Maximum measured right braking force expressed in N</p>
SforzoLeva=	N (i) (m)	3	<p>OBLIGATORY if AzionamentoFrenoServizio="LEVA1_LEVA2" or AzionamentoFrenoServizio="LEVA1_PEDALE1" and the axle in question is number 1 or if AzionamentoFrenoServizio="LEVA1_PEDALE1" and ImpiantoFrenoMoto="CC". Otherwise it must not be completed.</p> <p>Force on the lever with locking of wheels (or of the first wheel) in N. If locking not achieved, it will be the maximum force applied to the lever during measurement</p>
SforzoPedale=	N (i)	3	<p>OBLIGATORY if AzionamentoFrenoServizi="PEDALE" or if AzionamentoFrenoServizio="LEVA1_PEDALE1" and the axle in question is number 2 or if ImpiantoFrenoMoto="CC" or ImpiantoFrenoMoto="IC" and the axle in question is number 1. Otherwise it must not be completed.</p> <p>Force on the pedal with wheel locking (or of the first wheel) in N. If locking not achieved, it will be the maximum force applied to the pedal during measurement</p>
Dissimmetria% Dinamica=	N (i)	2	<p>OBLIGATORY if CategoriaInternazionale<>"L1e" or "L3e" or "L4e". For "L2e" and "L5e", AsseRuotaSingola must not correspond to the axle relating to the section.</p> <p>The entry must not be completed unless the above conditions are met.</p> <p>% Dynamic dysymmetry (imbalance) of braking.</p>
EsitoDissimmetria% Dinamica=	E (i)	1	<p>OBLIGATORY if CategoriaInternazionale<>"L1e" or "L3e" or "L4e". For "L2e" and "L5e", AsseRuotaSingola must not correspond to the axle relating to the section.</p> <p>The entry must not be completed unless the above conditions are met.</p> <p>Result of dynamic dysymmetry of braking</p>
Irreg%MaxRuotaSingola=	N (i) (m)	2	<p>OBLIGATORY only if TipoProvaFreni="RULLI" and if CategoriaInternazionale "L1e" or "L2e" or "L3e" or "L4e" or "L5e". For "L2e" and "L5e", AsseRuotaSingola must correspond to the axle relating to the section. The entry must not be completed unless the above conditions are met.</p> <p>% Wheel irregularity (ovalization).</p>
Irreg%MaxSx=	N (i)	2	<p>OBLIGATORY if TipoProvaFreni="RULLI" and if CategoriaInternazionale<>"L1e" or "L3e" or "L4e". For "L2e" and "L5e", AsseRuotaSingola must not correspond to the axle relating to the section.</p> <p>The entry must not be completed unless the above conditions are met.</p> <p>% Left maximum irregularity (ovalization).</p>

Irreg%MaxDx=	N (i)	2	OBLIGATORY if TipoProvaFreni="RULLI" and if CategoriaInternazionale<>"L1e" or "L3e" or "L4e". For "L2e" and "L5e", AsseRuotaSingola must not correspond to the axle relating to the section. The entry must not be completed unless the above conditions are met. % Right maximum irregularity (ovalization).
FrenoSoccorso=	L (l)	1	Indicates whether the axle is affected by the action of the emergency brake.
PesoStaticoRuotaSingola=	N (i) (m)	5	OBLIGATORY if CategoriaInternazionale="L3e" or "L4e" or "L5e" or if CategoriaInternazionale="L2e" or "L5e" and AsseRuotaSingola correspond to the axle relating to the section. Otherwise it must not be completed.
PesoStaticoSx=	N (i)	5	OBLIGATORY if CategoriaInternazionale<>"L1e" or "L3e" or "L4e". For "L2e" and "L5e", AsseRuotaSingola must not correspond to the axle relating to the section. The entry must not be completed unless the above conditions are met. Left half-axle static weight in N
PesoStaticoDx=	N (i)	5	OBLIGATORY if CategoriaInternazionale<>"L1e" or "L3e" or "L4e". For "L2e" and "L5e", AsseRuotaSingola must not correspond to the axle relating to the section. The entry must not be completed unless the above conditions are met. Right half-axle static weight in N
PesoStaticoAsse=	N (i)	6	OBLIGATORY if CategoriaInternazionale<>"L1e" or "L3e" or "L4e". For "L2e" and "L5e", AsseRuotaSingola must not correspond to the axle relating to the section. The entry must not be completed unless the above conditions are met. Static axle weight in N
PesoDinamicoRuotaSingola=	N (i) (m)	5	OBLIGATORY if CategoriaInternazionale<>"L1e" or "L3e" or "L4e". Otherwise it must not be completed.
PesoDinamicoSx=	N (i) (p)	5	Left half-axle dynamic weight in N
PesoDinamicoDx=	N (i) (p)	5	Right half-axle dynamic weight in N
PesoDinamicoAsse=	N (i) (p)	6	Dynamic axle weight in N

The above section and the associated entries are repeated for each vehicle axle to which it refers, therefore the reference “_n” indicates the axle (DettagliFreniAsse_1 = first axle, DettagliFreniAsse_2 = second axle, ... DettagliFreniAsse_n) . The number of sections present will be equivalent to the number of vehicle axles. If TipoVeicolo="MOTOVEICOLO" the axle number cannot be greater than or equal to 3.

3.3.3.1.2 Section ⇒ DettagliFrenoStazionamentoAsse_n

This Section defines detailed values for each parking brake for each braked vehicle axle.

Section name = [DettagliFrenoStazionamentoAsse_n]

ENTRY	TIPO	DIM	DESCRIPTION
ForzaFrenanteSx=	N	5	Left braking force with wheel locking in N
ForzaFrenanteDx=	N	5	Right braking force with wheel locking in N
ForzaSxEstrapolata=	N (p)	5	Left force in N extrapolated to reference pressure.
ForzaDxEstrapolata=	N (p)	5	Right force in N extrapolated to reference pressure.
P1Linea=	N (1) (p)	5	Pressure in kPa measured upstream of load proportioning valve at the time of maximum brakeforce measurement.
P2Cilindri=	N (1) (p)	5	Pressure in kPa measured at brake cylinders at the time of maximum brakeforce measurement.
SforzoPedale=	N (i)	3	OBLIGATORY if AzionamentoFrenoStazionamento= “PEDALE”, otherwise must not be completed. Force on the pedal upon locking of the wheels (or of the first wheel) in N. If locking not achieved, it will be the maximum force applied to the command at the maximum braking force measured.
SforzoStaz=	N (i)	3	OBLIGATORY if AzionamentoFrenoStazionamento= “MANO”, otherwise must not be completed. Force on the parking brake upon locking of the wheels (or of the first wheel) in N. If locking not achieved, it will be the maximum force applied to the command at the maximum braking force measured.
Dissimmetria%Dinamica=	N	2	OBLIGATORY if section does not refer to axle indicated in AsseRuotaSingola. % Dynamic asymmetry (imbalance) of braking.
EsitoDissimmetria%Dinamica=	E (i)	1	OBLIGATORY if section does not refer to axle indicated in AsseRuotaSingola. Result of dynamic asymmetry.
FrenoSoccorso=	L (l)	1	Indicates whether the parking brake is also considered the emergency brake

The above Section and associated entries are repeated for each vehicle axle to which it refers, therefore the reference “_n” indicates the axle (DettagliFrenoStazionamentoAsse_1 = primo asse, DettagliFrenoStazionamentoAsse_n). The number of sections present will be equivalent to the number of vehicle axles on which the parking brake acts. If PosAssiStaz = “NNNNNNNNN” and TipoProvaFreni= “RULLI” no section need be present on DettagliFrenoStazionamentoAsse_n.

3.3.3.2 Section ⇒ Decelerometer test

Section name = [ProvaDecelerometro]

ENTRY	TIPO	DIM	DESCRIPTION
Marca=	S	....	Decelerometer make.
Tipo=	S	....	Decelerometer type.
NumOmologa=	S	....	Decelerometer homologation number.
NumSerie=	S	....	Decelerometer serial number.
NumVersioneSoftware=	S	....	Decelerator software version number.
DataScadenza=	D	8	Decelerometer periodic control due date.
Targa=	S	10	Licence plate number The number of characters making up a licence plate shall be at least 4.
Decelerazione=	N (1)	4	Deceleration measured by Decelerometer device m/sec. The data must always be interested with # beforehand.
LimiteDecelerazione=	N (1)	3	Minimum deceleration limit.
SforzoLeva=	N (i)	3	OBLIGATORY if AzionamentoFrenoServizio="LEVA1_LEVA2" or if AzionamentoFrenoServizio="LEVA1_PEDALE1" Otherwise it must not be completed. Maximum force on lever in N, during operation.
SforzoPedale=	N (i)	3	OBLIGATORY if AzionamentoFrenoServizio="PEDALE" or if AzionamentoFrenoServizio="LEVA1_PEDALE1". Otherwise it must not be completed. Maximum force on lever in N, during measurement.
Esito=	E	1	Result of the test.
NumVersioneProtocollo=	N	3	MCTCNet protocol version (e.g.: 200 = 2.00).
DataVersioneProtocollo=	D	8	Version issue date
DataMisura=	D	8	Date test performed.
InizioMisura=	H	6	Time test started.
FineMisura=	H	6	Time test completed.
Operatore=	S	....	Identification of the Technical Manager responsible for the test
Note=	S (*)	320	NOT OBLIGATORY. Notes relating to the test carried out.

3.3.3.3 Section ⇒ Suspension

Section name = [Sospensioni]

ENTRY	TIPO	DIM	DESCRIPTION
Marca=	S	....	Make of suspension tester
Tipo=	S	....	Type of suspension tester
NumOmologa=	S	....	Type approval number of suspension tester
NumSerie=	S	....	Serial number of suspension tester
NumVersioneSoftware=	S	....	Software version number
DataScadSospensioni=	D	8	Due date of suspension tester periodic check
Note=	S (*)	320	NOT OBLIGATORY.
NumVersioneProtocollo=	N	3	OBLIGATORY. MCTCNet protocol version (e.g.: 200 = 2.00).
DataVersioneProtocollo=	D	8	OBLIGATORY. Version issue date
TipoCollegamento=	S	...	OBLIGATORY. Indicates configured MCTCNet connection type, from among: “DIR” “RETE”
CircolareApplicata=	S	...	OBLIGATORY. Indicates identification of latest circular to which the installed software version refers. (E.g.: 64/404/2005).
CodErrore=	S (*)	....	This field may contain: “Code” or “Code and Description”, identifying a specific fault or error in device operation. If this “Entry” is completed, the measurement should be considered invalid
DataMisura=	D	8	Date suspension test implemented
InizioMisura=	H	6	Measurement start time, corresponding to vehicle positioning on device.
FineMisura=	H	6	Measurement end time, corresponding to vehicle leaving device.
Operatore=	S	....	Test operator identification

3.3.3.3.1 Section ⇒ Axle mountings_n

This section defines the detailed values for each vehicle axle. Generation of the sections in progressive order must take into account that "axle number 1" refers to the steering axle.

Section name = [SospensioniAsse_n]

ENTRY	TIPO	DIM	DESCRIPTION
Aderenza%Sx=	N	2	Aderenza % sinistra
Aderenza%Dx=	N	2	Aderenza % destra
Differenza%=	N	2	% difference between grips

The above section and the associated entries are repeated for each vehicle axle to which it refers, therefore the reference “_n” indicates the axle (SospensioniAsse_1 = first axle, SospensioniAsse_2 = second axle, ... SospensioniAsse_n).

3.3.3.4 Section ⇒ Drift

Section name = [Deriva]

ENTRY	TIPO	DIM	DESCRIPTION
Marca=	S	....	Make of drift tester
Tipo=	S	....	Type of drift tester
NumOmologa=	S	....	Type approval number of drift tester
NumSerie=	S	....	Serial number of drift tester
DataScadenza=	D	8	Drift tester periodic check due date
NumVersioneSoftware=	S	....	Software version number
Note=	S (*)	320	NOT OBLIGATORY.
NumVersioneProtocollo=	N	3	OBLIGATORY. MCTCNet protocol version (e.g.: 200 = 2.00).
DataVersioneProtocollo=	D	8	OBLIGATORY. Version issue date
TipoCollegamento=	S	...	OBLIGATORY. Indicates configured MCTCNet connection type, from among: "DIR" "RETE"
CircolareApplicata=	S	...	OBLIGATORY. Indicates identification of latest circular to which the installed software version refers. (E.g.: 64/404/2005).
CodErrore=	S (* )	....	This field may contain: "Code" or "Code and Description", identifying a specific fault or error in device operation. If this "Entry" is completed, the measurement should be considered invalid
DataMisura=	D	8	Date drift test performed
InizioMisura=	H	6	Measurement start time, corresponding to vehicle positioning on device.
FineMisura=	H	6	Measurement end time, corresponding to vehicle leaving device.
Operatore=	S	....	Test operator identification

3.3.3.4.1 Section ⇒ Axle drift_n

This section defines the detailed values for each vehicle axle. Generation of the sections in progressive order must take into account that "axle number 1" refers to the steering axle.

Section name = [DerivaAsse_n]

ENTRY	TIPO	DIM	DESCRIPTION
Deriva=	S	6(2)	Axle drift in m/Km. If drift is negative, add the character "--" (2D hex) before the measured value (e.g. "-5.00") The permitted values are between "-99.99" and "99.99".

The above section and the associated entries are repeated for each vehicle axle to which it refers, therefore the reference "_n" indicates the axle (DerivaAsse_1 = first axle, DerivaAsse_2 = second axle, ... DerivaAsse_n).

3.3.3.5 Section ⇒ GAS Analysis

Section name = [GasAnalysis]

ENTRY	TIP O	DIM	DESCRIPTION
MarcaAnalizzatore=	S	....	GAS analyser make
TipoAnalizzatore=	S	....	Model of GAS analyser
NumOmologaAnalizzatore=	S	....	Type approval number of Gas analysis device
NumSerieAnalizzatore=	S	....	Serial number of GAS analyser
NumVersSoftwareAnalizzatore=	S	....	GAS analyser software version number
DataScadenzaAnalizzatore=	D	8	GAS analyser periodic check due date
MarcaContagiri=	S	....	Rev counter make
TipoContagiri=	S	....	Rev counter model
NumOmologaContagiri=	S	....	Rev counter type approval number
NumSerieContagiri=	S	....	Rev counter serial number
NumVersioneSoftwareContagiri=	S	....	Rev counter software version number
DataScadenzaContagiri=	D	8	Rev counter periodic check due date
TipoCollegamentoContagiri=	S (i)	....	OBLIGATORY May assume one of the following values: “ESTERNO” “INTEGRATO” Identifies rev counter connection method.
NumVersioneProtocolloContagiri=	N (i)	3	OBLIGATORY only if TipoCollegamentoContagiri = “ESTERNO”. Otherwise it must not be completed. External rev counter MCTCNet protocol version (e.g.: 200 = 2.00).
MarcaProvaVelocita=	S (i) (m)	....	OBLIGATORY if CategoriaInternazionale “L1e” or “L2e” or “L6e”, or if DirettivaEmissioniGasMotociclo= “NESSUNA”, otherwise must not be completed. Indicates speed test bench manufacturer
TipoProvaVelocita=	S (i) (m)	....	OBLIGATORY if CategoriaInternazionale “L1e” or “L2e” or “L6e”, or if DirettivaEmissioniGasMotociclo= “NESSUNA”, otherwise must not be completed. Indicates speed test bench model
NumOmologaProvaVelocita=	S (i) (m)	....	OBLIGATORY if CategoriaInternazionale “L1e” or “L2e” or “L6e”, or if DirettivaEmissioniGasMotociclo= “NESSUNA”, otherwise must not be completed. Indicates speed test bench type approval number
NumSerieProvaVelocita=	S (i) (m)	....	OBLIGATORY if CategoriaInternazionale “L1e” or “L2e” or “L6e”, or if DirettivaEmissioniGasMotociclo= “NESSUNA”, otherwise must not be completed. Indicates speed test bench type serial number
NumVersioneSoftwareProvaVelocita=	S (i) (m)	....	OBLIGATORY if CategoriaInternazionale “L1e” or “L2e” or “L6e”, or if DirettivaEmissioniGasMotociclo= “NESSUNA”, otherwise must not be completed. Indicates speed test bench type software version number

NumVersioneProtocolloProvaVelocita=	N (i) (m)	3	OBLIGATORY if CategoriaInternazionale “L1e” or “L2e” or “L6e”, or if DirettivaEmissioniGasMotociclo= “NESSUNA”, otherwise must not be completed. Indicates MCTCNet protocol version number used by the speed test (e.g.: 200 = 2.00).
DataScadenzaProvaVelocita=	D (i) (m)	8	OBLIGATORY if CategoriaInternazionale “L1e” or “L2e” or “L6e”, or if DirettivaEmissioniGasMotociclo= “NESSUNA”, otherwise must not be completed. Speed tester periodic check due date
Targa=	S	10	Licence plate number. The number of characters making up a licence plate shall be at least 4.
TipoVeicolo=	S		OBLIGATORY. May assume one of the following values: “LEGGERO” “PESANTE” “MOTOVEICOLO”
CategoriaInternazionale=	S (i)		OBLIGATORY. Specifies the vehicle category, and may be only one of those listed in the file MCTC.INI in the CategorieInternazionali Section.
DirettivaEmissioniGasMotociclo=	S (i) (m)		OBLIGATORY if CategoriaInternazionale = “L3e” or “L4e” or “L5e” or “L7e”, otherwise must not be completed. Defines the directive to which the vehicle type approval is subject and may be only one of those listed in the MCTC.INI file, under the DirettiveEmissioniGasMotocicli section.
DirettivaEmissioniGasCiclomotore=	S (i) (m)	...	OBLIGATORY if CategoriaInternazionale = “L1e” or “L2e” or “L6e”, otherwise must not be completed. Defines the directive to which the vehicle homologation is subject and may be only one of those listed in the MCTC.INI file, under the DirettiveEmissioniGasCiclomotori section.
DirettivaEmissioniGasBenzinaAuto=	S (l)	...	Defines the directive to which the vehicle type approval is subject and may be only one of those listed in the MCTC.INI file, under the DirettiveEmissioniGasBenzinaAuto section.
NumGiriMin=	N	4	Number of revolutions (revs/min) at idle speed (at any event not greater than 1000 unless otherwise indicated by the maker)
NumMinGiriMinAcc=	N (i) (l)	4	OBLIGATORY only if DirettivaEmissioniGasBenzinaAuto= “91/441/CEE” or later. Otherwise it must not be completed.
NumMaxGiriMinAcc=	N (i) (l)	4	OBLIGATORY only if DirettivaEmissioniGasBenzinaAuto= “91/441/CEE” or later. Otherwise it must not be completed.
LimiteCO2=	N (2) (m) (i)	5	OBLIGATORY if DirettivaEmissioniGasMotociclo= “NESSUNA” or DirettivaEmissioniGasCiclomotore= “NESSUNA”, otherwise must not be completed. Minimum CO2 limit (% vol.) for euro 0 motor vehicles
LimiteCOCorrettoMin=	N (1) (i)	3	OBLIGATORY only if DirettivaEmissioniGasBenzinaAuto <> “NESSUNA” or if DirettivaEmissioniGasMotociclo= “97/24/CE” or later or if DirettivaEmissioniGasCiclomotore= “97/24/CE” or later, otherwise must not be completed. Corrected CO limit at idle speed (% vol.)

LimiteCOCorrettoMinAcc=	N (1) (i) (l)	3	OBLIGATORY only if DirettivaEmissioniGasBenzinaAuto="91/441/CEE" or later. Otherwise it must not be completed. Corrected CO limit at idle speed (% vol.)
LimiteMinLambdaMinAcc=	N (2) (i) (l)	4	OBLIGATORY only if DirettivaEmissioniGasBenzinaAuto="91/441/CEE" or later, otherwise must not be completed. Indicates the minimum Lambda limit only for tests at accelerated idle speed.
LimiteMaxLambdaMinAcc=	N (2) (i) (l)	4	OBLIGATORY only if DirettivaEmissioniGasBenzinaAuto="91/441/CEE" or later, otherwise must not be completed. Indicates the maximum Lambda limit only for tests at accelerated idle speed.
NumeroScarichi=	N (i)	1	OBLIGATORY if Alimentazione_1 <> "ELETTRICO". Otherwise it must not be completed. It indicates the number of exhaust pipes.
NumeroCilindri=	N	2	OBLIGATORY. Indicates the number of cylinders
TempiMotore=	S		OBLIGATORY if Alimentazione_1 <> "ELETTRICO". It indicates the number of engine strokes and may be one of: "2T" "4T" "DIS"
TempMinOlioMotore=	N (* (l)	2	Minimum engine oil service temperature (°C)
PressAtmosferica=	N (1)	5	Atmospheric pressure (kpa) (may be input manually by placing "#" before the value input, in this case DIM +1).
TempAmbiente=	S	3	Environmental temperature in (°C). Only values between -99 and 999 are permitted. (may be input manually by placing "#" before the value input, in this case DIM +1)
UmiditaRelativa=	N	3	Relative humidity in % (may be input manually by placing "#" before the value input, in this case DIM +1)
Note=	S (*	320	NOT OBLIGATORY.
NumVersioneProtocollo=	N	3	MCTCNet protocol version (e.g.: 200). If file is produced by PCStazione the value corresponds to the MCTCNet version of the analyser.
DataVersioneProtocollo=	D	8	OBLIGATORY. Version issue date
TipoCollegamento=	S	...	OBLIGATORY. Indicates configured MCTCNet connection type, from among: "DIR" "RETE" "RS SENZA ESITO"
CircolareApplicata=	S	...	OBLIGATORY. Indicates identification of latest circular to which the installed software version refers. (E.g.: 64/404/2005).

IDChiaveRS=	C (i)	5	OBLIGATORY if TipoCollegamento = "RS SENZA ESITO" and NumVersioneProtocollo=210. Otherwise must not be completed. Identification released at moment when key used by analyser is registered
DataRegChiaveRS=	D (i)	8	OBLIGATORY if TipoCollegamento = "RS SENZA ESITO" and NumVersioneProtocollo=210. Otherwise must not be completed. Registration date of key used by analyser.
IDChiaveContagiriRS=	C (i)	5	OBLIGATORY only if TipoCollegamentoContagiri = "ESTERNO" and NumVersioneProtocolloContagiri = 210. Otherwise must not be completed. Identification released at moment when key used by sound meter is registered
DataRegChiaveContagiriRS=	D (i)	8	OBLIGATORY only if TipoCollegamentoContagiri = "ESTERNO" and NumVersioneProtocolloContagiri = 210. Otherwise must not be completed. Registration date of key used by sound meter.
IDChiaveProvaVelocitaRS=	C (i) (m)	5	OBLIGATORY only if CategoriaInternazionale "L1e" or "L2e" or "L6e", or if DirettivaEmissioniGasMotociclo="NESSUNA" and also NumVersioneProtocolloProvaVelocita = 210, otherwise must not be completed. Identification released at moment when key used by the speed test is recorded.
DataRegChiaveProvaVelocitaRS=	D (i) (m)	8	OBLIGATORY only if CategoriaInternazionale "L1e" or "L2e" or "L6e", or if DirettivaEmissioniGasMotociclo="NESSUNA" and also NumVersioneProtocolloProvaVelocita = 210, otherwise must not be completed. Registration date of key used by speed test.
ChecksumRS=	S	92	OBLIGATORY if TipoCollegamento = "RS SENZA ESITO" and NumVersioneProtocollo=200. Otherwise must not be completed. Otherwise it must not be completed. Checksum produced by the gas analyser
ModuloChiaveRS=	C	172	OBLIGATORY if TipoCollegamento = "RS SENZA ESITO" and NumVersioneProtocollo=210. Otherwise must not be completed. Otherwise it must not be completed. Gas analyser public key module
EsponenteChiaveRS=	C	4	OBLIGATORY if TipoCollegamento = "RS SENZA ESITO" and NumVersioneProtocollo=210. Otherwise it must not be completed. Gas analyser public key exponent
ChecksumContagiriRS=	S	92	OBLIGATORY only if TipoCollegamentoContagiri = "ESTERNO" and NumVersioneProtocolloContagiri = 200. Otherwise it must not be completed. Checksum SHA-1 produced by external rev counter.
ModuloChiaveContagiriRS=	C	172	OBLIGATORY only if TipoCollegamentoContagiri = "ESTERNO" and NumVersioneProtocolloContagiri = 210. Otherwise it must not be completed. External rev counter public key module.
EsponenteChiaveContagiriRS=	C	4	OBLIGATORY only if TipoCollegamentoContagiri = "ESTERNO" and NumVersioneProtocolloContagiri = 210. Otherwise it must not be completed. External rev counter public key exponent.

ChecksumProvaVelocitaRS=	S (m)	92	OBLIGATORY only if CategoriaInternazionale “L1e” or “L2e” or “L6e”, or if DirettivaEmissioniGasMotociclo= “NESSUNA” and also NumVersioneProtocolloProvaVelocita = 200. Otherwise it must not be completed. Checksum SHA-1 produced by external rev counter.
ModuloChiaveProvaVelocitaRS=	C (m)	172	OBLIGATORY only if CategoriaInternazionale “L1e” or “L2e” or “L6e”, or if DirettivaEmissioniGasMotociclo= “NESSUNA” and also NumVersioneProtocolloProvaVelocita = 210. Otherwise it must not be completed. Speed test public key module.
EsponenteChiaveProvaVelocitaRS=	C (m)	4	OBLIGATORY only if CategoriaInternazionale “L1e” or “L2e” or “L6e”, or if DirettivaEmissioniGasMotociclo= “NESSUNA” and also NumVersioneProtocolloProvaVelocita = 210, otherwise must not be completed. Speed test public key exponent.
CodErrore=	S (*)	....	This field may contain: “Code” or “Code and Description”, identifying a specific fault or error in device operation. If this “Entry” is completed, the measurement should be considered invalid
DataMisura=	D	8	Date exhaust gas test performed
InizioMisura=	H	6	Test start time
FineMisura=	H	6	Test end time
Operatore=	S	....	Test operator identification

3.3.3.5.1 Section ⇒ GAS analysis 1st Fuel system

Section name = [AnalisiGasAlimentazione_1]

ENTRY	TIPO	DIM	DESCRIPTION
COMin=	N (3)	5	CO (% vol.) at idle speed
COCorrettoMin=	N (3)	5	Corrected CO (% vol.) at idle speed
CO2Min=	N (2)	5	CO2 (% vol.) at idle speed
HCMin=	N	5	HC (ppm vol.) at idle speed
O2Min=	N (2)	5	O2 (% vol.) at idle speed
NumGiriMotoreMin=	N	5	Number of engine revolutions (rpm) at idle speed (may be input manually by putting “#” before the value input, in this case DIM +1)
COMinAcc=	N (3) (i)	5	OBLIGATORY only if DirettivaEmissioniGasBenzinaAuto=91/441/EEC or later, otherwise CO (% vol.) at fast idle must not be completed.
COCorrettoMinAcc=	N (3) (i)	5	OBLIGATORY only if DirettivaEmissioniGasBenzinaAuto=“91/441/CEE” or later, otherwise must not be completed. Corrected CO (% vol.) - at fast idle speed.
CO2MinAcc=	N (2) (i)	5	OBLIGATORY only if DirettivaEmissioniGasBenzinaAuto=“91/441/CEE” or later, otherwise must not be completed. CO2 (% vol.) at fast idle speed.
HCMinAcc=	N (i)	5	OBLIGATORY only if DirettivaEmissioniGasBenzinaAuto=“91/441/CEE” or later, otherwise must not be completed. HC (ppm vol.) at fast idle speed.
O2MinAcc=	N (2) (i)	5	OBLIGATORY only if DirettivaEmissioniGasBenzinaAuto=“91/441/CEE” or later, otherwise must not be completed. O2 (% vol.) at fast idle speed.
LambdaMinAcc=	N (3) (i)	5	OBLIGATORY only if DirettivaEmissioniGasBenzinaAuto=“91/441/CEE” or later, otherwise must not be completed. Lambda at fast idle speed.
NumGiriMotoreMinAcc=	N (i)	5	OBLIGATORY only if DirettivaEmissioniGasBenzinaAuto=“91/441/CEE” or later, otherwise must not be completed. Number of revolutions (rpm) at fast idle speed (may be input manually by putting “#” before the value input, in this case DIM +1).
TempOlioMotore=	N (1) (i)	5	Obligatory if EsitoCOCorrettoMin=I or EsitoCOCorrettoMinAcc=I or EsitoLambdaMinAcc=I, otherwise must not be completed. Engine oil temperature (may be input manually by putting “#” before the value input, in this case DIM +1)
LambdaMin=	N (3)	5	OBLIGATORY only if DirettivaEmissioniGasBenzinaAuto=91/441/CEE or later. Otherwise it must not be completed. Lambda at idle speed.
EsitoCOCorrettoMin=	E	1	Result of Corrected CO at idle speed.

EsitoCOCorrettoMinAcc=	E (i)	1	OBLIGATORY only if DirettivaEmissioniGasBenzinaAuto=91/441/CEE or later. Otherwise it must not be completed. Result of corrected CO at accelerated idle speed.
EsitoLambdaMinAcc=	E (i)	1	OBLIGATORY only if DirettivaEmissioniGasBenzinaAuto=91/441/CEE or later. Otherwise it must not be completed. Lambda sensor result at first idle.

The section AnalisiGasAlimentazione_1 must be present only if TipoVeicolo="LEGGERO", otherwise it need not be present.

3.3.3.5.2 Section ⇒ GAS analysis 2nd Fuel system

Section name = [AnalisiGasAlimentazione_2]

ENTRY	TIPO	DIM	DESCRIPTION
COMin=	N (3)	5	CO (% vol.) at idle speed
COCorrettoMin=	N (3)	5	Corrected CO (% vol.) at idle speed
CO2Min=	N (2)	5	CO2 (% vol.) at idle speed
NumGiriMotoreMin=	N	5	Number of engine revolutions (rpm) at idle speed (may be input manually by putting “#” before the value input, in this case DIM +1)
COMinAcc=	N (3) (i)	5	OBLIGATORY only if DirettivaEmissioniGasBenzinaAuto=“91/441/CEE” or later, otherwise must not be completed. CO (% vol.) at fast idle speed.
COCorrettoMinAcc=	N (3) (i)	5	OBLIGATORY only if DirettivaEmissioniGasBenzinaAuto=“91/441/CEE” or later, otherwise must not be completed. Corrected CO (% vol.) - at fast idle speed.
CO2MinAcc=	N (2) (i)	5	OBLIGATORY only if DirettivaEmissioniGasBenzinaAuto=“91/441/CEE” or later, otherwise must not be completed. CO2 (% vol.) at fast idle speed.
HCMinAcc=	N (i)	5	OBLIGATORY only if DirettivaEmissioniGasBenzinaAuto=“91/441/CEE” or later, otherwise must not be completed. HC (ppm vol.) at fast idle speed.
O2MinAcc=	N (2) (i)	5	OBLIGATORY only if the reference directive is 91/441 EEC or later. O2 (% vol.) at fast idle speed.
LambdaMinAcc=	N (3) (i)	5	OBLIGATORY only if DirettivaEmissioniGasBenzinaAuto=“91/441/CEE” or later, otherwise must not be completed. Lambda at fast idle speed.
NumGiriMotoreMinAcc=	N (i)	5	OBLIGATORY only if DirettivaEmissioniGasBenzinaAuto=“91/441/CEE” or later, otherwise must not be completed. Number of revolutions (rpm) at fast idle speed (may be input manually by putting “#” before the value input, in this case DIM +1).
TempOlioMotore=	N (1) (i)	5	Obligatory if EsitoCOCorrettoMin=I or EsitoCOCorrettoMinAcc=I or EsitoLambdaMinAcc=I, otherwise must not be completed Engine oil temperature (may be input manually by putting “#” before the value input, in this case DIM +1)
HCMin=	N	5	HC (ppm vol.) at idle speed
O2Min=	N (2)	5	O2 (% vol.) at idle speed

LambdaMin=	N (3) (i)	5	OBLIGATORY only if DirettivaEmissioniGasBenzinaAuto="91/441/CEE" or later, otherwise must not be completed. Lambda at idle speed.
EsitoCOCorrettoMin=	E	1	OBLIGATORY. Result of Corrected CO at idle speed
EsitoCOCorrettoMinAcc=	E (i)	1	OBLIGATORY only if DirettivaEmissioniGasBenzinaAuto="91/441/CEE" or later, otherwise must not be completed. Result of corrected CO at accelerated idle speed.
EsitoLambdaMinAcc=	E (i)	1	OBLIGATORY only if the reference directive is 91/441 EEC or later. Otherwise it must not be completed. Lambda sensor result at first idle.

The entire AnalisiGasAlimentazione_2 section must be present if TipoVeicolo="LEGGERO" and Alimentazione_2= "METANO" or "GPL". Otherwise it need not be present.

3.3.3.5.3 Motor vehicle gas analysis 1st fuel system

Section name = [AnalisiGasAlimentazione_Moto_1]

ENTRY	TIPO	DIM	DESCRIPTION
CO=	N (3)	5	CO (% vol.) at idle speed
COCorretto=	N (3)	5	Corrected CO (% vol.) at idle speed
CO2=	N (2)	5	CO2 (% vol.) at idle speed
HC=	N	5	HC (ppm vol.) at idle speed
O2=	N (2)	5	O2 (% vol.) at idle speed
NumGiriMotore=	N (i)	5	OBLIGATORY only if TipoCambio=MECCANICO, or Categoria Internazionale<>L1e. Indicates number of engine revolutions (rpm) (may be input manually by putting “#” before the value input, in this case DIM +1)
EsitoCOCorretto=	E (i)	1	OBLIGATORY only if DirettivaEmissioniGasMotociclo=“97/24/CE” or later or if DirettivaEmissioniGasCiclomotore=“97/24/CE” or later, otherwise must not be completed. Result of Corrected CO.
EsitoCO2=	E (i)	1	OBLIGATORY if DirettivaEmissioniGasMotociclo=“NESSUNA” or DirettivaEmissioniGasCiclomotore=“NESSUNA”, otherwise must not be completed. CO2 result
KmCondizionamento=	N (3)	5	Indicates km of conditioning travelled. If the conditioning takes place on the road, the value must be preceded by the # symbol (in this case DIM +1)
VelocitaDiProva=	N (1) (i)	4	OBLIGATORY if DirettivaEmissioniGasMotociclo=“NESSUNA” or DirettivaEmissioniGasCiclomotore=“NESSUNA”, otherwise must not be completed. Speed at which the gas analysis was carried out (km/h).

The entire AnalisiGasAlimentazione_Moto_1 section must be present if TipoVeicolo=“MOTOVEICOLO”, otherwise it need not be present.

3.3.3.5.4 Motor vehicle gas analysis 2nd fuel system

Section name = [AnalisiGasAlimentazione_Moto_2]

ENTRY	TIPO	DIM	DESCRIPTION
CO=	N (3)	5	CO (% vol.) at idle speed
COCorretto=	N (3)	5	Corrected CO (% vol.) at idle speed
CO2=	N (2)	5	CO2 (% vol.) at idle speed
HC=	N	5	HC (ppm vol.) at idle speed
O2=	N (2)	5	O2 (% vol.) at idle speed
NumGiriMotore=	N (i)	5	OBLIGATORY only if TipoCambio=MECCANICO, or Categoria Internazionale<>L1e. Indicates number of engine revolutions (rpm) (may be input manually by putting “#” before the value input, in this case DIM +1)
EsitoCOCorretto=	E (i)	1	OBLIGATORY only if DirettivaEmissioniGasMotociclo=“97/24/CE” or later or if DirettivaEmissioniGasCiclomotore=“97/24/CE” or later, otherwise must not be completed. Result of Corrected CO.
EsitoCO2=	E (i)	1	OBLIGATORY if DirettivaEmissioniGasMotociclo=“NESSUNA” or DirettivaEmissioniGasCiclomotore=“NESSUNA”, otherwise must not be completed. CO2 result
KmCondizionamento=	N (3)	5	Indicates km of conditioning travelled. If the conditioning takes place on the road, the value must be preceded by the # symbol (in this case DIM +1)
VelocitaDiProva=	N (1) (i)	4	OBLIGATORY if DirettivaEmissioniGasMotociclo=“NESSUNA” or DirettivaEmissioniGasCiclomotore=“NESSUNA”, otherwise must not be completed. Speed at which the gas analysis was carried out (km/h).

The entire AnalisiGasAlimentazione_Moto_2 section must be present if TipoVeicolo=“MOTOVEICOLO” and Alimentazione_2= “METANO” or “GPL”, otherwise it need not be present.

3.3.3.6 Section ⇒ SPEED test

Section name = [ProvaVelocita]

The speed test may be carried out by means of PCStazione software, proprietary software supplied with the speed test bench, or by means of gas analysis software type-approved for motorcycles. The gas tester data are also present in the AAnnnnnn.VEL file so that they can be printed even when the moped subject to testing is Electric. The following information must be added to the overall report to ensure a simple, clear reading of the test findings:

Speed test carried out by:	Indicate value of the SoftwareMaster Entry
----------------------------	--

ENTRY	TIPO	DIM	DESCRIPTION
MarcaProvaVelocita=	S	....	Indicates speed test bench manufacturer
TipoProvaVelocita=	S	....	Indicates speed test bench model
NumOmologaProvaVelocita=	S	....	Indicates the Speed test bench type approval number. If the speed test bench is recognised as type-approved for 2 and for 3-4 wheels, the Entry must contain both type approvals, separated by the “-” character.
NumSerieProvaVelocita=	S	....	Indicates speed test bench type serial number
NumVersioneSoftwareProvaVelocita=	S	....	Indicates speed test bench type software version number
DataScadenzaProvaVelocita=	D	8	Speed tester periodic check due date
MarcaAnalizzatore=	S (i)	....	OBLIGATORY if SoftwareMaster= “ANALIZZATORE”, otherwise must not be completed. GAS analyser make
TipoAnalizzatore=	S (i)	....	OBLIGATORY if SoftwareMaster= “ANALIZZATORE”, otherwise must not be completed. Model of GAS analyser
NumOmologaAnalizzatore=	S (i)	....	OBLIGATORY if SoftwareMaster= “ANALIZZATORE”, otherwise must not be completed. Type approval number of Gas analysis device
NumSerieAnalizzatore=	S (i)	....	OBLIGATORY if SoftwareMaster= “ANALIZZATORE”, otherwise must not be completed. Serial number of GAS analyser
NumVersSoftwareAnalizzatore=	S (i)	....	OBLIGATORY if SoftwareMaster= “ANALIZZATORE”, otherwise must not be completed. GAS analyser software version number
DataScadenzaAnalizzatore=	D (i)	8	OBLIGATORY if SoftwareMaster= “ANALIZZATORE”, otherwise must not be completed. GAS analyser periodic check due date
Targa=	S	10	Licence plate number. The number of characters making up a licence plate shall be at least 4.

IDChiaveRS=	C (i)	5	OBLIGATORY if NumVersioneProtocollo= 210. Otherwise it must not be completed. Identification released at moment when key used by the speed test is recorded.
DataRegChiaveRS=	D (i)	8	OBLIGATORY if NumVersioneProtocollo= 210. Otherwise it must not be completed. Registration date of key used by speed test.
ChecksumRS=	S	92	OBLIGATORY if NumVersioneProtocollo= 200. Otherwise it must not be completed. Checksum produced by speed test bench.
ModuloChiaveRS=	C	172	OBLIGATORY if NumVersioneProtocollo= 210. Otherwise it must not be completed. Speed test bench public key module.
EsponenteChiaveRS=	C	4	OBLIGATORY if NumVersioneProtocollo= 210. Otherwise it must not be completed. Speed test bench public key exponent.
TipoVeicolo=	S		May assume one of the following values: “LEGGERO” “PESANTE” “MOTOVEICOLO”
CategoriaInternazionale=	S		Specifies the vehicle category, and may be only one of those listed in the file MCTC.INI in the CategorieInternazionali Section.
LimiteVelocita=	N (1)	4	Maximum speed limit expressed in Km/h
VelocitaMassimaMisurata=	N (1)	4	Maximum measured speed expressed in Km/h
SpazioProva=	N	4	Distance travelled during top speed test. Expressed in metres.
DurataProva=	H	6	Duration of top speed test.
PressioneAtmosferica=	N (1)	5	Atmospheric pressure (kpa) (may be input manually by placing “#” before the value input, in this case DIM +1).
TempAmbiente=	S	3	Environmental temperature in °C. Only values between -99 and 999 are permitted. (may be input manually by placing “#” before the value input, in this case DIM +1)
UmiditaRelativa=	N	3	Relative humidity in % (may be input manually by placing “#” before the value input, in this case DIM +1)
EsitoVelocitaMassima=	E	1	OBLIGATORY. Test result
Note=	S (*)	320	NOT OBLIGATORY.
NumVersioneProtocollo=	N	3	Version of MCTCNet protocol used by speed test.
DataVersioneProtocollo=	D	8	OBLIGATORY. Version issue date
SoftwareMaster=	S	...	OBLIGATORY. Indicates the application interfaced with the speed test bench and may be one of: “PCStazione” “ANALIZZATORE”
CircolareApplicata=	S	...	OBLIGATORY. Indicates identification of latest circular to which the installed software version refers. (E.g.: 64/404/2005).
CodErrore=	S (*)	....	This field may contain: “Code” or “Code and Description”, identifying a specific fault or error in device operation. If this “Entry” is completed, the measurement should be considered invalid

DataMisura=	D	8	Date test performed
InizioMisura=	H	6	Test start time
FineMisura=	H	6	Test end time
Operatore=	S	....	Identification of the Technical Manager responsible for the test

3.3.3.7 Section ⇒ OPACITY test

Section name = [AnalisiOpacita]

ENTRY	TIPO	DIM	DESCRIPTION
MarcaOpacimetro=	S	....	Make of Opacimeter
TipoOpacimetro=	S	....	Model of Opacimeter
NumOmologaOpacimetro=	S	....	Type approval number of Opacimeter
NumSerieOpacimetro=	S	....	Serial number of Opacimeter
NumVersSoftwareOpacimetro=	S	....	Version number of Opacimeter software
DataScadenzaOpacimetro=	D	8	Opacimeter periodic check due date
MarcaContagiri=	S	....	Rev counter make
TipoContagiri=	S	....	Rev counter type
NumOmologaContagiri=	S	....	Rev counter type approval number
NumSerieContagiri=	S	....	Rev counter serial number
NumVersSoftwareContagiri=	S	....	Rev counter software version number
DataScadenzaContagiri=	D	8	Rev counter periodic check due date
TipoCollegamentoContagiri=	S	....	OBLIGATORY May assume one of the following values: “ESTERNO” “INTEGRATO” Identifies rev counter connection method.
NumVersioneProtocolloContagiri=	N	3	OBLIGATORY only if TipoCollegamentoContagiri = “ESTERNO”. Otherwise it must not be completed. External rev counter MCTCNet protocol version (e.g.: 200 = 2.00).
Targa=	S	10	Licence plate number. The number of characters making up a licence plate shall be at least 4.
NumGiriMotoreMax=	N	5	OBLIGATORY. Maximum engine revolutions (rpm) (may be input manually by putting “#” before the value input, in this case DIM +1)
LimiteK=	N (1)	3	Limit value indicated on the data plate, or in any event not greater than 2.5 m ⁻¹ or 3.0 m ⁻¹ for turbo
DirettivaEmissioni=	S	...	OBLIGATORY. Defines the directive to which the vehicle type approval is subject and may be only one of those listed in the MCTC.INI file, under the DirettiveEmissioniDiesel section.

NumGiriMotoreMinMis=	N	5	Measured number of revolutions (rpm) at idle speed (may be input manually by putting “#” before the value input, in this case DIM +1)
NumGiriMotoreMaxMis=	N	5	OBLIGATORY. Indicates the lowest number of revolutions among the peaks achieved during the accelerations required to determine the result. (May be input manually by putting “#” before the value input, in this case DIM +1)
TempOlioMotore=	N (1)	5	Engine oil temperature (°C) (may be input manually by putting “#” before the value input, in this case DIM +1)
TempMinOlioMotore=	N (*)	2	NOT OBLIGATORY. Engine oil minimum service temperature (°C)
ValoreK1=	N (2)	5	Peak measurement no. 1 (m ⁻¹)
ValoreK2=	N (2)	5	Peak measurement no. 2 (m ⁻¹)
ValoreK3=	N (2)	5	Peak measurement no. 3 (m ⁻¹)
ValoreK4=	N (2) (i)	5	Peak measurement no. 4 (m ⁻¹). Entry is compulsory in the event that previous tests are unsatisfactory
ValoreK5=	N (2) (i)	5	Peak measurement no. 5 (m ⁻¹). Entry is compulsory in the event that previous tests are unsatisfactory
ValoreK6=	N (2) (i)	5	Peak measurement no. 6 (m-1). Entry is compulsory in the event that previous tests are unsatisfactory.
ValoreK7=	N (2) (i)	5	Peak measurement no. 7 (m-1). Entry is compulsory in the event that previous tests are unsatisfactory.
ValoreK8=	N (2) (i)	5	Peak measurement no. 8 (m-1). Entry is compulsory in the event that previous tests are unsatisfactory.
OpacitaMedia=	N (2) (i)	5	OBLIGATORY only if the three cleansing revs have not been considered for the purposes of determining the test outcome. Otherwise it must not be completed. Average opacity (m ⁻¹)
PressAtmosferica=	N (1)	5	Atmospheric pressure (kpa) (may be input manually by placing “#” before the value input, in this case DIM +1).
TempAmbiente=	S	3	Environmental temperature in °C. Only values between -99 and 999 are permitted. (may be input manually by placing “#” before the value input, in this case DIM +1)
UmiditaRelativa=	N	3	Relative humidity in % (may be input manually by placing “#” before the value input, in this case DIM +1)
Esito=	E	1	OBLIGATORY. Test result
Note=	S (*)	320	NOT OBLIGATORY.
NumVersioneProtocollo=	N	3	MCTCNet protocol version (e.g.: 200). If file is produced by PCStazione the value corresponds to the MCTCNet version of the opacimeter.
DataVersioneProtocollo=	D	8	OBLIGATORY. Version issue date

TipoCollegamento=	S	...	OBLIGATORY. Indicates configured MCTCNet connection type, from among: “DIR” “RETE” “RS SENZA ESITO”
CircolareApplicata=	S	...	OBLIGATORY. Indicates identification of latest circular to which the installed software version refers. (E.g.: 64/404/2005).
IDChiaveRS=	C (i)	5	OBLIGATORY if TipoCollegamento = “RS SENZA ESITO” and NumVersioneProtocollo=210. Otherwise must not be completed. Identification released at moment when key used by opacimeter is registered
DataRegChiaveRS=	D (i)	8	OBLIGATORY if TipoCollegamento = “RS SENZA ESITO” and NumVersioneProtocollo=210. Otherwise must not be completed. Registration date of key used by opacimeter.
IDChiaveContagiriRS=	C (i)	5	OBBLIGATORIA solo se TipoCollegamentoContagiri = “ESTERNO” e NumVersioneProtocolloContagiri = 210, diversamente non deve essere valorizzata. Identification released at moment when key used by sound meter is registered
DataRegChiaveContagiriRS=	D (i)	8	OBBLIGATORIA solo se TipoCollegamentoContagiri = “ESTERNO” e NumVersioneProtocolloContagiri = 210, diversamente non deve essere valorizzata. Registration date of key used by sound meter.
ChecksumRS=	S	92	OBLIGATORY if TipoCollegamento = “RS SENZA ESITO” and NumVersioneProtocollo=200. Otherwise it must not be completed. Checksum produced by the gas analyser
ModuloChiaveRS=	C	172	OBLIGATORY if TipoCollegamento = “RS SENZA ESITO” and NumVersioneProtocollo=210. Otherwise it must not be completed. Gas analyser public key module
EsponenteChiaveRS=	C	4	OBLIGATORY if TipoCollegamento = “RS SENZA ESITO” and NumVersioneProtocollo=210. Otherwise it must not be completed. Gas analyser public key exponent
ChecksumContagiriRS=	S	92	OBLIGATORY only if TipoCollegamentoContagiri = “ESTERNO” and NumVersioneProtocolloContagiri = 200. Otherwise it must not be completed. Checksum SHA-1 produced by external rev counter.
ModuloChiaveContagiriRS=	C	172	OBLIGATORY only if TipoCollegamentoContagiri = “ESTERNO” and NumVersioneProtocolloContagiri = 210. Otherwise it must not be completed. External rev counter public key module.
EsponenteChiaveContagiriRS=	C	4	OBLIGATORY only if TipoCollegamentoContagiri = “ESTERNO” and NumVersioneProtocolloContagiri = 210. Otherwise it must not be completed. External rev counter public key exponent.
CodErrore=	S (*)	....	This field may contain: “Code” or “Code and Description”, identifying a specific fault or error in device operation. If this “Entry” is completed, the measurement should be considered invalid

DataMisura=	D	8	Date test performed
InizioMisura=	H	6	Test start time
FineMisura=	H	6	Test end time
Operatore=	S	....	Identification of the Technical Manager responsible for the test

3.3.3.8 Sound meter section

Section name = [Fonometro]

ENTRY	TIPO	DIM	DESCRIPTION
MarcaFonometro=	S	....	Sound level meter make
TipoFonometro=	S	....	Sound level meter type
NumOmologaFonometro=	S	....	Sound level meter type approval number
NumSerieFonometro=	S	....	Sound level meter serial number
NumVersSoftwareFonometro=	S	....	Sound level meter software version number
DataScadFonometro=	D	8	Sound level meter periodic check due date
MarcaCalibratore=	S	....	Calibrator make
ModelloCalibratore=	S	....	Calibrator model
NumSerieCalibratore=	S	....	Calibrator serial number
ClasseCalibratore=	N	1	Category
DataScadCalibratore=	D	8	Due date of periodic control
MarcaContagiri=	S (i)	....	OBLIGATORY if LivSonoroN1P1 is completed. Rev counter make
ModelloContagiri=	S (i)	....	OBLIGATORY if LivSonoroN1P1 is completed. Rev counter model
NumOmologaContagiri=	S (i)	....	OBLIGATORY if LivSonoroN1P1 is completed. Rev counter type approval number
NumSerieContagiri=	S (i)	....	OBLIGATORY if LivSonoroN1P1 is completed. Rev counter serial number.
NumVersSoftwareContagiri=	S (i)	....	OBLIGATORY if LivSonoroN1P1 is completed. Software version number.
DataScadContagiri=	D (i)	8	OBLIGATORY if LivSonoroN1P1 is completed. Rev counter periodic check due date.
TipoCollegamentoContagiri=	S (i)	....	OBLIGATORY if LivSonoroN1P1 is completed. May assume one of the following values: “ESTERNO” “INTEGRATO” Identifies rev counter connection method.

NumVersioneProtocolloContagiri=	N (i)	3	OBLIGATORY only if TipoCollegamentoContagiri = "ESTERNO" and LivSonoroN1P1 is completed. Otherwise must not be completed. External rev counter MCTCNet protocol version (e.g.: 200 = 2.0.0).
Targa=	S	10	Licence plate number. The number of characters making up a licence plate shall be at least 4.
NumSilenziatoreAspirazione=	S (*)	....	NOT OBLIGATORY. Intake silencer type approval number
NumSilenziatoreScaricoN1=	S (*)	....	NOT OBLIGATORY. Exhaust silencer no 1 type approval number
NumSilenziatoreScaricoN2=	S (*)	....	NOT OBLIGATORY. Exhaust silencer no 2 type approval number
NumCatalizzatore=	S (*)	....	NOT OBLIGATORY. Catalytic converter type approval number
NumeroScarichi=	N (i)	1	OBLIGATORY if Alimentazione_1 <> "ELETTRICO", otherwise must not be completed. It indicates the number of exhaust pipes.
ProvaEseguitaInternamente=	L (i)	1	OBLIGATORY if LivSonoroN1P1 is completed. Otherwise need not be entered. If entered, may take value "S" only if TipoVeicolo="LEGGERO" and DirettivaAcusticaAuto="81/334/CEE" or higher or if TipoVeicolo="MOTOVEICOLO" and DirettivaEmissioneAcusticaMoto="97/24/CE" or higher. Indicate if the exhaust noise level test has not been carried out in open areas.
SogliaLivSonoroAvv7m=	N (1) (i)	5	OBLIGATORY if Directive <> TU 393/59. Otherwise it must not be completed. Horn sound level db(A) measured 7 metres away
SogliaLivSonoroAvv30m	N (1) (i)	5	OBLIGATORY if Directive <> TU 393/59. Otherwise it must not be completed. Horn sound level db(B) measured 30 metres away
RumoreFondo=	N (1)	5	Measured background noise dB(A) / dB(B). When EsitoLivelloSonoro<>"#R", if TipoVeicolo="MOTOVEICOLO" or DirettivaAcusticaAuto="70/157/CEE" the value must be at least 10dB less than the minimum sound level measured at the exhaust.
NumGiriMotoreMinN1=	N (i)	5	OBLIGATORY only if Alimentazione_1 <> "ELETTRICO" and LivSonoroN1P1 is completed. Otherwise need not be entered. Number of revolutions (rpm) measured when idling referring to the first exhaust test that generated maximum sound generation (may be input manually by placing "#" before the value input, in this case DIM +1)
NumGiriMotoreMaxN1=	N (i)	5	OBLIGATORY only if Alimentazione_1 <> "ELETTRICO" and LivSonoroN1P1 is completed. Otherwise need not be entered. This is the number of revolutions (rpm) measured at the highest noise level of those measured during the three tests on the 2nd exhaust pipe (may be input manually by putting "#" before the value input, in this case DIM +1).

LivSonoroN1P1=	N (1) (i)	5	If Alimentazione_1 = "ELETTRICO" must not be completed. Measured noise level, exhaust No 1 test No 1 dB(A)/dB(B).
LivSonoroN1P2=	N (1) (i)	5	OBLIGATORY if LivSonoroN1P1 is completed. Otherwise need not be entered. Measured noise level, exhaust No 1 test No 2 dB(A)/dB(B).
LivSonoroN1P3=	N (1) (i)	5	OBLIGATORY if LivSonoroN1P2 is completed. Otherwise need not be entered. Measured noise level, exhaust No 1 test No 3 dB(A)/dB(B).
NumGiriMotoreMinN2=	N (i)	5	OBLIGATORY if LivSonoroN2P1 is completed. Otherwise need not be entered. Number of revolutions (rpm) measured during the second exhaust test that generated the maximum sound emission (may be input manually by placing "#" before the value input, in this case DIM +1)
NumGiriMotoreMaxN2=	N (i)	5	OBLIGATORY if LivSonoroN2P1 is completed. Otherwise need not be entered. This is the number of revolutions (rpm) measured at the highest noise level of those measured during the three tests on the 2nd exhaust pipe (may be input manually by putting "#" before the value input, in this case DIM +1).
LivSonoroN2P1=	N (1) (i)	5	OBLIGATORY if LivSonoroN1P1 is entered and DistanzaScarichiMaggiore30cm=S and if, in the event of TipoVeicolo="LEGGERO", DirettivaAcusticaAuto=81/334/CEE or later, in the event of TipoVeicolo="MOTOVEICOLO" DirettivaEmissioneAcusticaMoto="97/24/CE" or later, otherwise need not be entered. Measured noise level, exhaust No 2 test No 1 dB(A)/dB(B).
LivSonoroN2P2	N (1) (i)	5	OBLIGATORY if LivSonoroN2P1 is completed. Otherwise need not be entered. Measured noise level, exhaust No 2 test No 2 dB(A)/dB(B).
LivSonoroN2P3=	N (1) (i)	5	OBLIGATORY if LivSonoroN1P2 is completed. Otherwise need not be entered. Measured noise level, exhaust No 2 test No 3 dB(A)/dB(B).
EsitoLivelloSonoro=	E (i)	1	OBLIGATORY. If Alimentazione_1= "ELETTRICO" , must be set to "N". Overall outcome of sound levels recorded from exhaust pipes present (can be entered manually be placing "#" before the value entered, in this case DIM+1)
EsitoAvvisatoreAcustico=	E	1	OBLIGATORY. Result of noise level for horn.
LimiteDecibel=	N (i)	3	OBLIGATORY only if Alimentazione_1 <> "ELETTRICO" and LivSonoroN1P1 is completed, otherwise need not be entered. Specifies the decibel limit to which reference was made to obtain the result of the test.
DistanzaScarichiMaggiore30cm=	L (i)	1	OBLIGATORY if NumeroScarichi > 1. Otherwise it must not be completed.

DirettivaAcusticaAuto=	S (l)	...	OBLIGATORY. Defines the directive to which the vehicle type approval is subject and may be only one of those listed in the MCTC.INI file, under the DirettiveAcusticheAuto section.
DirettivaEmissioneAcusticaMoto=	S (m) (i)	...	OBLIGATORY only if Alimentazione_1 <> "ELETRICO", otherwise must not be completed. Defines the sound directive to which the vehicle type approval is subject and may be only one of those listed in the MCTC.INI file, under the DirettiveEmissioniAcusticheMotoveicoli section.
DirettivaAvvisatoreAcusticoMoto=	S (m)	...	OBLIGATORY. Defines the horn directive to which the vehicle type approval is subject and may be only one of those listed in the MCTC.INI file, under the DirettiveAvvisatoreAcusticoMotoveicoli section.
GiriMotoredB=	N (i)	5	OBLIGATORY if Alimentazione_1 <> "ELETRICO". Otherwise it must not be completed. Number of revolutions to apply to the vehicle.
LivSonoroAvv7m=	N (1) (i)	5	OBLIGATORY if Directive <> TU 393/59. Otherwise it must not be completed. Horn sound level db(A) measured 7 metres away
LivSonoroAvv30m =	N (1) (i)	5	OBLIGATORY if Directive <> TU 393/59. Otherwise it must not be completed. Horn sound level db(B) measured 30 metres away
LivCalibrazione=	E	1	Result of sound meter calibration control dB(A) / dB(B).
PressAtmosferica=	N (1)	5	Atmospheric pressure in kpa (may be input manually by putting "#" before the value input, in this case DIM +1)
TempAmbiente=	S	3	Environmental temperature in °C. Only values between -99 and 999 are permitted. (may be input manually by placing "#" before the value input, in this case DIM +1)
VelocitaVento=	N (1)	4	Wind speed in m/s (may be input manually by placing "#" before the value input, in this case DIM +1)
UmiditaRelativa=	N	3	Relative humidity in % (may be input manually by placing "#" before the value input, in this case DIM +1)
Note=	S (i)	320	OBLIGATORY if LivSonoroN1P1 is not entered and EsitoLivelloSonoro is filled in manually, in this case at least the following message must be shown: "SOUND METER TEST NOT CARRIED OUT ON THE BASIS OF A SUBJECT EVALUATION BY THE TECHNICAL MANAGER".
NumVersioneProtocollo=	N	3	MCTCNet protocol version (e.g.: 200). If file is produced by PCStazione the value corresponds to the MCTCNet version of the sound meter used.
DataVersioneProtocollo=	D	8	OBLIGATORY. Version issue date
TipoCollegamento=	S	...	OBLIGATORY. Indicates configured MCTCNet connection type, from among: "DIR" "RETE" "RS SENZA ESITO"
CircolareApplicata=	S	...	OBLIGATORY. Indicates identification of latest circular to which the installed software version refers. (E.g.: 64/404/2005).

ChecksumRS=	S	92	OBLIGATORY if TipoCollegamento = "RS SENZA ESITO" and NumVersioneProtocollo=200. Otherwise it must not be completed. Checksum produced by the gas analyser
IDChiaveRS=	C (i)	5	OBLIGATORY if TipoCollegamento = "RS SENZA ESITO" and NumVersioneProtocollo=210. Otherwise must not be completed. Identification released at moment when key used by sound meter is registered
DataRegChiaveRS=	D (i)	8	OBLIGATORY if TipoCollegamento = "RS SENZA ESITO" and NumVersioneProtocollo=210. Otherwise must not be completed. Registration date of key used by sound meter.
IDChiaveContagiriRS=	C (i)	5	OBLIGATORY only if LivSonoroN1P1 is completed and NumVersioneProtocolloContagiri = 210. Otherwise must not be completed. Identification released at moment when key used by sound meter is registered
DataRegChiaveContagiriRS=	D (i)	8	OBLIGATORY only if LivSonoroN1P1 is completed and NumVersioneProtocolloContagiri = 210. Otherwise must not be completed. Registration date of key used by sound meter.
ModuloChiaveRS=	C	172	OBLIGATORY if TipoCollegamento = "RS SENZA ESITO" and NumVersioneProtocollo=210. Otherwise it must not be completed. Gas analyser public key module
EsponenteChiaveRS=	C	4	OBLIGATORY if TipoCollegamento = "RS SENZA ESITO" and NumVersioneProtocollo=210. Otherwise it must not be completed. Gas analyser public key exponent
ChecksumContagiriRS=	S	92	OBLIGATORY only if TipoCollegamentoContagiri = "ESTERNO" and NumVersioneProtocolloContagiri = 200. Otherwise it must not be completed. Checksum SHA-1 produced by external rev counter.
ModuloChiaveContagiriRS=	C	172	OBLIGATORY only if TipoCollegamentoContagiri = "ESTERNO" and NumVersioneProtocolloContagiri = 210. Otherwise it must not be completed. External rev counter public key module.
EsponenteChiaveContagiriRS=	C	4	OBLIGATORY only if TipoCollegamentoContagiri = "ESTERNO" and NumVersioneProtocolloContagiri = 210. Otherwise it must not be completed. External rev counter public key exponent.
CodErrore=	S (*)	....	This field may contain: "Code" or "Code and Description", identifying a specific fault or error in device operation. If this "Entry" is completed, the measurement should be considered invalid
DataMisura=	D	8	Noise test date
InizioMisura=	H	6	Noise test start time
FineMisura=	H	6	Noise test end time
Operatore=	S	....	Identification of the Technician in charge who carried out the test

3.3.3.9 Section ⇒ Headlight test

Section name = [ProvaFari]

ENTRY	TIPO	DIM	DESCRIPTION
Marca=	S	...	Headlight Beam Tester make
Tipo=	S	...	Headlight Beam Tester model
NumOmologa=	S	...	Headlight Beam Tester Type approval number
NumSerie=	S	...	Headlight Beam Tester serial number
NumVersioneSoftware=	S	...	Software version number
DataScadenza=	D	8	Headlight Beam Tester periodic check due date
Targa=	S	10	Licence plate number. The number of characters making up a licence plate shall be at least 4.
Note=	S (*)	320	NOT OBLIGATORY.
NumVersioneProtocollo=	N	3	MCTCNet protocol version (e.g.: 200). If file is produced by PCStazione the value corresponds to the MCTCNet version of the headlight test.
DataVersioneProtocollo=	D	8	OBLIGATORY. Version issue date
TipoCollegamento=	S	...	OBLIGATORY. Indicates configured MCTCNet connection type, from among: “DIR” “RETE” “RS SENZA ESITO”
LimiteMinLuxAnab=	N (i)	6	OBLIGATORY if TipoVeicolo<>”MOTOVEICOLO”, otherwise must not be completed. Minimum level of low beam headlight illumination.
LimiteMaxLuxAnab=	N (i)	6	OBLIGATORY if TipoVeicolo<>”MOTOVEICOLO”, otherwise must not be completed. Maximum level of low beam headlight illumination.
LimiteMinLuxAbb=	N (i)	6	If CategoriaInternazionale = “L1e”, “L2e”, “L6e” and NumeroFari=1 and TipoFaroUnicoSx= “ANABBAGLIANTE”, must not be completed. If CategoriaInternazionale = “L1e” or “L2e” or “L6e” and NumeroFari=2 and TipoFaroUnicoSx= “ANABBAGLIANTE” and TipoFaroDx= “ANABBAGLIANTE”, must not be completed. Must be completed in all other cases. Minimum level of high beam headlight illumination.
LimiteMaxLuxAbb=	N (i)	6	If CategoriaInternazionale = “L1e”, “L2e” or “L6e”, must not be completed. Must be completed in all other cases. Maximum high beam headlight lighting limit.

CircolareApplicata=	S	...	OBLIGATORY. Indicates identification of latest circular to which the installed software version refers. (E.g.: 64/404/2005).
IDChiaveRS=	C (i)	5	OBLIGATORY if TipoCollegamento = "RS SENZA ESITO" and NumVersioneProtocollo=210. Otherwise must not be completed. Identification released at moment when key used by headlight test is registered
DataRegChiaveRS=	D (i)	8	OBLIGATORY if TipoCollegamento = "RS SENZA ESITO" and NumVersioneProtocollo=210. Otherwise must not be completed. Registration date of key used by headlight test.
ChecksumRS=	S	92	OBLIGATORY if TipoCollegamento = "RS SENZA ESITO" and NumVersioneProtocollo=200. Otherwise it must not be completed. Checksum produced headlight test.
ModuloChiaveRS=	C	172	OBLIGATORY if TipoCollegamento = "RS SENZA ESITO" and NumVersioneProtocollo=210. Otherwise it must not be completed. Headlight test public key module.
EsponenteChiaveRS=	C	4	OBLIGATORY if TipoCollegamento = "RS SENZA ESITO" and NumVersioneProtocollo=210. Otherwise it must not be completed. Headlight test public exponent.
CodErrore=	S (*)	....	This field may contain: "Code" or "Code and Description", identifying a specific fault or error in device operation. If this "Entry" is completed, the measurement should be considered invalid
DataMisura=	D	8	Headlight beam test date
InizioMisura=	H	6	Test start time
FineMisura=	H	6	Test end time
Operatore=	S	....	Identification of the Technical Manager responsible for the test

3.3.3.9.1 Section ⇒ Car headlight test

Section name = [ProvaFariAuto]

This section need be present only in cases where TipoVeicolo="LEGGERO" or "PESANTE".

AltezzaAnab=	N	3	Height from the ground of low beam headlights (cm.)
TipoAnab=	C	1	Type of low beam headlight, where: "A" = asymmetric "S" = symmetrical
VertAnabDx=	E	1	Right low beam vertical height (can be input manually placing "#" before the value input, e.g. "#R").
VertAnabSx=	E	1	Left low beam vertical dimension (can be input manually placing "#" before the value input, e.g. "#R")
VertAbbDx=	E	1	Right high beam vertical dimension (can be input manually placing "#" before the value input, e.g. "#R")
VertAbbSx=	E	1	Left high beam vertical dimension (can be input manually placing "#" before the value input, e.g. "#R")
OrizzAnabDx=	E	1	Right low beam horizontal deviation (can be input manually placing "#" before the value input, e.g. "#R")
OrizzAnabSx=	E	1	Left low beam horizontal deviation (can be input manually placing "#" before the value input, e.g. "#R")
OrizzAbbDx=	E	1	Right high beam horizontal deviation (can be input manually placing "#" before the value input, e.g. "#R")
OrizzAbbSx=	E	1	Left high beam horizontal deviation (can be input manually placing "#" before the value input, e.g. "#R")
IllumLuxAnabDx=	N	6	Right low beam brightness in Lux
IllumLuxAnabSx=	N	6	Left low beam brightness in Lux
IllumLuxAbbDx=	N	6	Right high beam brightness in Lux
IllumLuxAbbSx=	N	6	Left high beam brightness in Lux
EsitoIllumLuxAnabDx=	E	1	Result of right low beam headlight brightness in Lux
EsitoIllumLuxAnabSx=	E	1	Result of left low beam headlight brightness in Lux
EsitoIllumLuxAbbDx=	E	1	Result of right high beam headlight brightness in Lux
EsitoIllumLuxAbbSx=	E	1	Result of left high beam headlight brightness in Lux

3.3.3.9.2 Motor cycle headlight test

Section name = [ProvaFariMoto]

This section need be present only in cases where TipoVeicolo="MOTOVEICOLO".

The wording "unico" appearing in some entries indicates that the headlight may be the only one present if NumeroFari=1 or the Left is considered if NumeroFari=2.

AltezzaAnab=	N	3	Height from the ground of low beam headlights (cm.)
TipoAnab=	C	1	Type of low beam headlight, where: "A" = asymmetric "S" = symmetrical
VertAnabDx=	E	1	Assumes value of N if TipoFaroDx is other than the following values: "ANABBAGLIANTE" "MISTO" otherwise cannot be set to N. Right low beam vertical height (can be input manually placing "#" before the value input, e.g. "#R").
VertAnabUnicoSx=	E	1	Assumes value of N if TipoFaroUnicoSx="ABBAGLIANTE". otherwise cannot be set to N. Left low beam vertical dimension (can be input manually placing "#" before the value input, e.g. "#R")
VertAbbDx=	E	1	Assumes value of N if TipoFaroDx is other than the following values: "ABBAGLIANTE" "MISTO" otherwise cannot be set to N. Right high beam vertical dimension (can be input manually placing "#" before the value input, e.g. "#R")
VertAbbUnicoSx=	E	1	Assumes value of N if TipoFaroUnicoSx="ANABBAGLIANTE". otherwise cannot be set to N. Left high beam vertical dimension (can be input manually placing "#" before the value input, e.g. "#R")
OrizzAnabDx=	E	1	Assumes value of N if TipoFaroDx is other than the following values: "ANABBAGLIANTE" "MISTO" otherwise cannot be set to N. Right low beam horizontal deviation (can be input manually placing "#" before the value input, e.g. "#R")
OrizzAnabUnicoSx=	E	1	Assumes value of N if TipoFaroUnicoSx="ABBAGLIANTE". otherwise cannot be set to N. Left low beam horizontal deviation (can be input manually placing "#" before the value input, e.g. "#R")

OrizzAbbDx=	E	1	Assumes value of N if TipoFaroDx is other than the following values: “ABBAGLIANTE” “MISTO” otherwise cannot be set to N. Right high beam horizontal deviation (can be input manually placing "#" before the value input, e.g. “#R”)
OrizzAbbUnicoSx=	E	1	Assumes value of N if TipoFaroUnicoSx= “ANABBAGLIANTE”. otherwise cannot be set to N. Left high beam horizontal deviation (can be input manually placing "#" before the value input, e.g. “#R”)
IllumLuxAnabDx=	N (i)	6	OBLIGATORY only if NumeroFari=“2” and TipoFaroDx<> “ABBAGLIANTE”, otherwise must not be completed. Right low beam brightness in Lux.
IllumLuxAnabUnicoSx=	N (i)	6	OBLIGATORY only if TipoFaroUnicoSx<> “ABBAGLIANTE”, otherwise not completed. Left low beam brightness in Lux.
IllumLuxAbbDx=	N (i)	6	OBLIGATORY only if NumeroFari=“2” and TipoFaroDx<> “ANABBAGLIANTE”, otherwise not completed. Right high beam brightness in Lux
IllumLuxAbbUnicoSx=	N (i)	6	OBLIGATORY only if TipoFaroUnicoSx<> “ANABBAGLIANTE”, otherwise not completed. Left high beam brightness in Lux
EsitoIllumLuxAnabDx=	E	1	Assumes value of N if LimiteMinLuxAnab is not completed or if TipoFaroDx is other than the following values: “ANABBAGLIANTE” “MISTO” otherwise cannot be set to N. Result of right low beam headlight brightness in Lux
EsitoIllumLuxAnabUnicoSx=	E	1	Assumes value of N if LimiteMinLuxAnab and LimiteMaxLuxAnab are not completed or if TipoFaroSx= “ABBAGLIANTE”. otherwise cannot be set to N. Result of left low beam headlight brightness in Lux
EsitoIllumLuxAbbDx=	E	1	Assumes value of N if TipoFaroDx is other than the following values: “ABBAGLIANTE” “MISTO” otherwise cannot be set to N. Result of right high beam headlight brightness in Lux
EsitoIllumLuxAbbUnicoSx=	E	1	Assumes value of N if TipoFaroUnicoSx= “ANABBAGLIANTE”. otherwise cannot be set to N. Result of left high beam headlight brightness in Lux

3.3.3.10 Section⇒License plate photo

Section name [FotoTarga]

Marca=	S	...	OBLIGATORY. Indicates acquisition system manufacturer
Modello=	S	...	OBLIGATORY. Indicates the name/model defined by the manufacturer.
Approvazione=	S	...	OBLIGATORY. Indicates the approval number achieved.
DataApprovazione=	D	8	OBLIGATORY. Indicates the date on which approval was obtained.
NumVersioneSoftware=	S	....	RT system software version number
CostruttoreObiettivo=	S	....	OBLIGATORY. Trademark identifying Manufacturer or marking assigned by manufacturer.
TipoObiettivo=	S	....	OBLIGATORY. Name or model or type or characteristic of lens marked on device.
TipoMacchinaOttica=	S	....	OBLIGATORY. Name or model or type assigned by manufacturer if already assembled or by optical machine manufacturer assembler.
NumSerieSistemaRT=	S	....	OBLIGATORY. Serial number allocated by the certification applicant.
GenerazioneFileIMM=	L	1	OBLIGATORY Indicates whether the RT system has also generated the associated IMM file
NumVersioneProtocollo=	N	3	OBLIGATORY. MCTCNet protocol version (e.g.: 200 = 2.00)
DataVersioneProtocollo=	D	8	OBLIGATORY. Version issue date
TipoCollegamento=	S	...	OBLIGATORY. Indicates configured MCTCNet connection type. “DIR” “RETE”
CircolareApplicata=	S	...	OBLIGATORY. Indicates identification of latest circular to which the installed software version refers. E.g.: 64/404/2005
DimensioneOriginale=	N	5	OBLIGATORY. Indicates image size in bytes.
1=	S	100	OBLIGATORY. (data in base64)
2=	S	100	OBLIGATORY. (data in base64)
3=	S	100	OBLIGATORY. (data in base64)
n=	S	100	OBLIGATORY. (data in base64)

ForzaFrenanteSingolaSx=	N	5	OBLIGATORY. Indicates individual or left braking force value, acquired from CLK file
ForzaFrenanteDx=	N (i)	5	OBLIGATORY if CategoriaInternazionale <>("L1e" or "L3e" or "L4e") or if CategoriaInternazionale = "L2e" or "L5e" and AsseRuotaSingola is equal to 1, otherwise must not be completed. Indicates right wheel braking force value, acquired from CLK file
TargaNominale=	S (i)	10	OBLIGATORY if the Targa entry of file AC2 is completed, otherwise need not be entered.
TargaRiconosciuta=	S (i)	10	OBLIGATORY if the Targa entry of file AC2 is completed, otherwise need not be entered. (*)
DataScatto=	D	8	OBLIGATORY. Indicates the date on which the photo was taken.
OraScatto=	H	6	OBLIGATORY. Indicates the time at which the photo was taken.
EsitoRiconoscimento=	E	1	OBLIGATORY. Must assume value N if the TargaNominale entry is not completed. Indicates license plate recognition result.

(*) Minimum length entry equal to 1 only if the entry was not fully recognised (in this case entry must be equal to %). In all other cases, minimum length is 4 characters.

3.3.3.11 Section⇒EOBD test

Section name = [Analisi_EOBD]

ENTRY	TIPO	DIM	DESCRIPTION
MarcaScanTool=	S	....	Scan Tool brand
TipoScanTool=	S	....	Scan Tool type
NumOmologaScanTool=	S	....	Scan Tool device type approval number
NumSerieScanTool=	S	....	Scan Tool serial number
NumVersSoftwareScanTool=	S	....	Scan Tool software version number
DataScadenzaScanTool=	D	8	Scan tool periodic check due date
Targa=	S	10	Licence plate number. The number of characters making up a licence plate shall be at least 4.
NormaOBDSupportata=	S	...	Defines ISO guideline applicable to vehicle type approval. Response string to PID \$1C service \$01
LetturaAutomaticaTemperatura=	L	1	\$01 – PID \$05 service presence
LetturaAutomaticaRPM=	L	1	\$01 – PID \$0C service presence
LetturaAutomaticaSondeLambda=	L (i)	1	\$01 – PID \$13 0 \$1D service presence (obligatory if lambda sensor present, otherwise must not be completed)
NumBancate=	N (i)	1	Number of cylinder blocks (obligatory if lambda sensor present, otherwise must not be completed). If completed, values may be: 1, 2, 3, 4.
PressAtmosferica=	N (1)	5	Atmospheric pressure (kpa) (may be input manually by placing “#” before the value input, in this case DIM +1).
TempAmbiente=	S	3	Environmental temperature in °C. Only values between -99 and 999 are permitted. (may be input manually by placing “#” before the value input, in this case DIM +1)
UmiditaRelativa=	N	3	Relative humidity in % (may be input manually by placing “#” before the value input, in this case DIM +1)
ControlloVisMILON=	E	1	Result of visual check on MIL warning light with engine off - MIL “ON”
ControlloVisMILOFF=	E	1	Result of visual check on MIL warning light with engine running - MIL “OFF”
TipoSondaLambda=	S (i)	...	Lambda sensor type (obligatory for spark ignition vehicles, otherwise must not be completed) Values may be as follows: - “J” for Jump type - “V” for broad voltage range - “I” for broad current range - “L” for broad lambda range - “NOT MEASURABLE”
SogliaEscursioneTensioneMin=	N (3) (i)	5	Minimum voltage range value in Volts for lambda sensor Jump test (obligatory if TipoSondaLambda is set to “J”, otherwise must not be completed)
SogliaLambdaMin=	N (3) (i)	5	Lambda value for lambda sensor test at idle rpm (obligatory if TipoSondaLambda is set to “L”, otherwise must not be completed)

SogliaLambdaMax=	N (3) (i)	5	Lambda value for lambda sensor test at maximum rpm (obligatory if TipoSondaLambda is set to "L", otherwise must not be completed)
SogliaTensioneMin=	N (3) (i)	5	Voltage value in Volts for lambda sensor test at idle rpm (obligatory if TipoSondaLambda is set to "V", otherwise must not be completed)
SogliaTensioneMax=	N (3) (i)	5	Voltage value in Volts for lambda sensor test at maximum rpm (obligatory if TipoSondaLambda is set to "V", otherwise must not be completed)
SogliaCorrenteMin=	N (3) (i)	7	Current value in mA for lambda sensor test at idle rpm (obligatory if TipoSondaLambda is set to "I", otherwise must not be completed)
SogliaCorrenteMax=	N (3) (i)	7	Current value in mA for lambda sensor test at maximum rpm (obligatory if TipoSondaLambda is set to "I", otherwise must not be completed)
ControlloComunicazCentralina=	E	1	Result of communication function with control unit
ControlloStatoSpiaMIL=	E	1	Result of MIL warning light state check
ReadinessTestSupportati=	S	...	12 bit binary value from bit 3 of B to bit 0 of C (e.g.: "001111101111")
ReadinessTestNonCompletati=	S	...	12 bit binary value from bit 7 of B to bit 0 of D (e.g.: "000010000000")
CodiciErroreMIL_1=	S (*)	...	NOT OBLIGATORY. Error code no 1 present with MIL warning light on. Followed by associated information message. E.g. "P0059 Heating of lambda sensor 1 bank 2".
CodiciErroreMIL_2=	S	...	Error code no 2 present with MIL warning light on. Followed by associated information message. Entry present only if necessary and if CodiciErroreMIL_1 is completed.
CodiciErroreMIL_3=	S	...	Error code no 3 present with MIL warning light on. Followed by associated information message. Entry present only if necessary and if CodiciErroreMIL_2 is completed.
CodiciErroreMIL_n=	S	...	Error code n present with MIL warning light on followed by associated information message (n max = 10). Entry present only if necessary and if CodiciErroreMIL_n-1 is completed.
Note=	S (*)	320	NOT OBLIGATORY. Field reserved for operator's notes, particularly to explain why measurements have been entered manually.
NumVersioneProtocollo=	N	3	MCTCNet protocol version (e.g.: 200 = 2.00).
DataVersioneProtocollo=	D	8	Version issue date
TipoCollegamento=	S	...	Indicates configured MCTCNet connection type, from among: "DIR" "RETE"
CircolareApplicata=	S	...	Indicates identification of latest circular to which the installed software version refers. (E.g.: 64/404/2005).

CodErrore=	S (*)	....	This field may contain: "Code" or "Code and Description", identifying a specific fault or error in device operation. If this "Entry" is completed, the measurement should be considered invalid
DataMisura=	D	8	EOBD test date
InizioMisura=	H	6	Test start time
FineMisura=	H	6	Test end time
Operatore=	S	....	Test operator identification

3.3.3.11.1 Analisi_Eobd_Cat_n section

Section name = [Analisi_EOBD_Cat_1]

EscursioneTensione=	N (3) (i)	5	Voltage range in Volts measured in lambda sensor test (obligatory if TipoSondaLambda is set to "J", otherwise must not be completed)
ValoreLambda=	N (3) (i)	5	Lambda value measured in lambda sensor test (obligatory if TipoSondaLambda is set to "L", otherwise must not be completed)
ValoreTensione=	N (3) (i)	5	Voltage value in Volts measured in lambda sensor test (obligatory if TipoSondaLambda is set to "V", otherwise must not be completed)
ValoreCorrente=	N (3) (i)	7	Current value in mA measured in lambda sensor test (obligatory if TipoSondaLambda is set to "I", otherwise must not be completed)
EsitoSondaLambda=	E (i)	1	Result of lambda sensor test n (obligatory if TipoSondaLambda is other than "NON RILEVABILE", otherwise must not be completed)

One or more sections [Analisi_EOBD_Cat_n] need be present only for vehicles equipped with lambda sensor for spark ignition engines.

For vehicles with lambda sensor, one [Analisi_EOBD_Cat_n] section must be present for each "NumBancate=" entry in the [Analisi_EOBD] section.

Permitted values are n = 1,2,3,4.

3.3.3.12 Section⇒Tyre check

New file AAnnnnnn.gom containing technical data on tyres used by the vehicle undergoing testing is defined below.

Because the GOM file is created by PCStazione in the same way as the DEC file, physical connection of a measuring instrument to MCTCNet is not currently provided.

The GOM file is always OBLIGATORY and must be signed using the same method adopted for the other files and described in point 3.2, using the PCStazione private key. Note that the nominal data of the device used to measure the tread may not be known because this is a device commonly used by car repair workshops and not subject to homologation. It was nevertheless decided to make the

relevant entries because more advanced instruments are available for which this data is not known. If any Entries are empty, put the wording “NON DISPONIBILE” in the overall report.

If available, give the make, model and serial number of the device used to take the tread measurement.

The overall report must also always give:

Tread limit thickness; Measurement date; Test start time; Test end time; Notes; Minimum tread measurement and indication of wheel on which it was identified; Overall outcome of the check.

Section name = [**Pneumatici**]

ENTRY	TIPO	DIM	DESCRIPTION
MarcaStrumento=	S (*)	....	Make of device used to measure tread thickness
ModelloStrumento=	S (*)	....	Model of device used to measure tread thickness
NumeroSerieStrumento=	S (*)	....	Serial number of device used to measure tread thickness
Targa=	S	10	Licence plate number. The number of characters making up a licence plate shall be at least 4.
NumVersioneProtocollo=	N	3	MCTCNet protocol version (e.g.: 200 = 2.00).
DataVersioneProtocollo=	D	8	Version issue date
LimiteSpessoreBattistrada=	N (1)	3	Indicates minimum limit of tread thickness (expressed in millimetres) for the vehicle under examination (reference to logbook).
UnitaMisuraPneumatico=	S	....	indicates unit of measure shown in the logbook and may be only one of the following: “POLLICI” “MILLIMETRI”
EsitoRiepilogativo=	E	1	Overall result of the test.
DataMisura=	D	8	Date test performed.
InizioMisura=	H	6	Time test started.
FineMisura=	H	6	Time test completed.
Operatore=	S	....	Identification of the Technical Manager responsible for the test
Note=	S (*)	320	Notes relating to the test carried out.

Section name = [Dettagli_Pneumatici_Asse_n]

This section will be repeated for each axle of the vehicle undergoing testing, where n is the number of the axle to which the section refers.

Entries showing the wording “Singola” are also used for single wheel axles. “_E” and “_I” are used to distinguish between Interior and Exterior tyres for four-wheeled axles. For two-wheeled axles entries containing the wording “_E” must always be used.

MarcaPneumSingoloSx_E=	S (* )	....	Make of tyre, unique for the axle or left exterior tyre in use.
MarcaPneumDx_E=	S (* )	....	Make of right exterior tyre in use
MarcaPneumSx_I=	S (* )	....	Make of left interior tyre in use.
MarcaPneumDx_I=	S (* )	....	Make of right interior tyre in use.
ModelloPneumSingoloSx_E=	S	....	Model of tyre, unique for the axle or left exterior tyre in use.
ModelloPneumDx_E=	S (i )	....	OBLIGATORY if CategoriaInternazionale<>“L1e” or “L3e” or “L4e”. Furthermore, for “L2e” and “L5e” AsseRuotaSingola must not correspond to the axle relating to the section, otherwise need not be entered. Model of right exterior tyre in use
ModelloPneumSx_I=	S (* )	....	Model of left interior tyre in use.
ModelloPneumDx_I=	S (* )	....	Model of right interior tyre in use.
IndiciPneumSingoloSx_E=	S	....	If UnitaMisuraPneumatico=“MILLIMETRI” indicate tyre width, nominal aspect ratio, rim fit diameter, load index and speed index, as shown on the tyre. (Example: 225/45/R18 91V) If UnitaMisuraPneumatico=“POLLICI” enter only the measurement in inches written on the tyre (Example: 4.80). Identification code for axle or for left exterior tyre.
IndiciPneumDx_E=	S (i )	....	OBLIGATORY if CategoriaInternazionale<>“L1e” or “L3e” or “L4e”. Furthermore, for “L2e” and “L5e” AsseRuotaSingola must not correspond to the axle relating to the section, otherwise need not be entered. Also, if UnitaMisuraPneumatico=“MILLIMETRI” indicate tyre width, nominal aspect ratio, rim fit diameter, load index and speed index, as shown on the tyre (Example: 225/45/R18 91V). If UnitaMisuraPneumatico=“POLLICI” enter only the measurement in inches written on the tyre (Example: 4.80). Identification code of right exterior tyre, in use

IndiciPneumSx_I=	S (* )	....	If UnitaMisuraPneumatico="MILLIMETRI" indicate tyre width, nominal aspect ratio, rim fit diameter, load index and speed index, as shown on the tyre (Example: 225/45/R18 91V). If UnitaMisuraPneumatico="POLLICI" enter only the measurement in inches written on the tyre (Example: 4.80). Identification code of left interior tyre in use.
IndiciPneumDx_I=	S (* )	....	If UnitaMisuraPneumatico="MILLIMETRI" indicate tyre width, nominal aspect ratio, rim fit diameter, load index and speed index, as shown on the tyre (Example: 225/45/R18 91V). If UnitaMisuraPneumatico="POLLICI" enter only the measurement in inches written on the tyre (Example: 4.80). Identification code of right interior tyre in use.
EsitoCongruenzaPneumatici=	E	1	Indicates whether the size of the tyres being checked is included amongst those shown on the vehicle logbook and if the tyres fitted on the axle are the same, including in design.
MisuraBattistradaSingoloSx_E=	N (1)	3	Indicates tread thickness, expressed in millimetres, unique for the axle or left exterior tyre in use.
EsitoBattistradaSingoloSx_E=	E	1	Indicates whether the tread thickness is compliant with the limit imposed for the type of vehicle being tested
MisuraBattistradaDx_E=	N (1) (i)	3	OBLIGATORY if CategoriaInternazionale<>"L1e" or "L3e" or "L4e". Furthermore, for "L2e" and "L5e" AsseRuotaSingola must not correspond to the axle relating to the section, otherwise need not be entered. Indicates tread thickness, expressed in millimetres, right exterior tyre, in use.
EsitoBattistradaDx_E=	E (i)	1	OBLIGATORY if CategoriaInternazionale<>"L1e" or "L3e" or "L4e". Furthermore, for "L2e" and "L5e" AsseRuotaSingola must not correspond to the axle relating to the section, otherwise need not be entered. Indicates whether the tread thickness is compliant with the limit imposed for the type of vehicle being tested
MisuraBattistradaSx_I=	N (1) (*)	3	Indicates tread thickness, expressed in millimetres, right interior tyre, in use.
EsitoBattistradaSx_I=	E (*)	1	Indicates whether the tread thickness is compliant with the limit imposed for the type of vehicle being tested
MisuraBattistradaDx_I=	N (1) (*)	3	Indicates tread thickness, expressed in millimetres, right interior tyre, in use.
EsitoBattistradaDx_I=	E (*)	1	Indicates whether the tread thickness is compliant with the limit imposed for the type of vehicle being tested

3.3.3.13 List of Visual Check items

The term Visual Checks refers to checks or items established by Ministerial Decrees that reveal the regular or irregular state of vehicle parts that are or are not subject to automatic checks, e.g. Service brake efficiency, entry "EfficienzaFrenoServizio_112="). In other words, they are a full list of the parts that define vehicle operating state and operating regularity.

Reference is made to the paragraph defined by the Ministerial list in the visual check entry definition (e.g.: StatoMeccanicoFrenoServizio_111 = paragraph 1.1.1).

Entries must always be present (as a name), including entries for Visual Checks.

3.3.3.13.1 Section ⇒ Braking devices

Section name = [Vis_DispositiviFrenatura]

ENTRY	TIPO	DIM	DESCRIPTION
StatoMeccanicoFrenoServizio_111=	E (i)	1	OBLIGATORY only if EsitoRevisione is completed. Service Brake mechanical condition
EquilibraturaFrenoServizio_113=	E (i)	1	OBLIGATORY only if EsitoRevisione is completed. Service brake balancing
PompaVuotoCompressoreFrenoServizio_114=	E (i) (p)	....	OBLIGATORY only if EsitoRevisione is completed. Checking of vacuum pump and service brake compressor.
IndicatorePressione_115=	E (i) (p)	....	OBLIGATORY only if EsitoRevisione is completed. Checking of pressure gauge operation
GiuntiMobiliAccoppiamento_116=	E (i)		OBLIGATORY only if EsitoRevisione is completed. Checking of error and electrical mobile joints.
StatoMeccanicoFrenoStaz_121=	E (i)	1	OBLIGATORY only if EsitoRevisione is completed. Mechanical condition of parking Brake
StatoMeccanicoFrenoRimSemirimorchio_141=	E (i)	1	OBLIGATORY only if EsitoRevisione is completed. Mechanical condition of automatic braking for trailer or semi-trailer brake

3.3.3.13.2 Section ⇒ Steering

Section name = [Vis_Sterzo]

ENTRY	TIPO	DIM	DESCRIPTION
StatoMeccanicoSterzo_21=	E (i)	1	OBLIGATORY only if EsitoRevisione is completed. Mechanical condition of Steering
GiocoSterzo_22=	E (i)	1	OBLIGATORY only if EsitoRevisione is completed. Steering play
FissaggioSistemaSterzo_23=	E (i)	1	OBLIGATORY only if EsitoRevisione is completed. Steering system fastening

3.3.3.13.3 Section ⇒ Visibility

Section name = [Vis_Visibilita]

ENTRY	TIPO	DIM	DESCRIPTION
CampoVisibilita_31=	E (i)	1	OBLIGATORY only if EsitoRevisione is completed. Field of visibility
Vetri_32=	E (i)	1	OBLIGATORY only if EsitoRevisione is completed. Windows
Retrovisori_33=	E (i)	1	OBLIGATORY only if EsitoRevisione is completed. Door mirrors
Tergicristallo_34=	E (i)	1	OBLIGATORY only if EsitoRevisione is completed. Windscreen wiper
Lavavetro_35=	E (i)	1	OBLIGATORY only if EsitoRevisione is completed. Screen wiper

3.3.3.13.4 Section ⇒ Electrical system

The electrical equipment section is divided into two subsections:

- Low and high beam headlight state and operation
- State, operation, colour and efficacy of other devices

Section name = [Vis_ImpiantoElettrico]

ENTRY	TIPO	DIM	DESCRIPTION
StatoFunzionamentoProiettoriAbbAnab_411=	E (i)	1	OBLIGATORY only if EsitoRevisione is completed. Low and high beam headlight state and operation
CommutazioneAbbAnab_413=	E (i)	1	OBLIGATORY only if EsitoRevisione is completed. Switching between low and high beam headlights
LuciPosizione_421=	E (i)	1	OBLIGATORY only if EsitoRevisione is completed. Side lights
LuciArresto_422=	E (i)	1	OBLIGATORY only if EsitoRevisione is completed. Brake lights
IndicatoriLuminosiDirezioe_423=	E (i)	1	OBLIGATORY only if EsitoRevisione is completed. Direction indicator lights
ProiettoriRetromarcia_424=	E (i)	1	OBLIGATORY only if EsitoRevisione is completed. Reversing lights
ProiettoriFendinebbia_425=	E (i)	1	OBLIGATORY only if EsitoRevisione is completed. Foglights
DispositivoIlluminazioneTarga_426=	E (i)	1	OBLIGATORY only if EsitoRevisione is completed. License plate lighting device
Catarifrangenti_427=	E (i)	1	OBLIGATORY only if EsitoRevisione is completed. Reflectors
LuciSegnalazionePericolo_428=	E (i)	1	OBLIGATORY only if EsitoRevisione is completed. Hazard warning lights

IlluminazioneInterna_45=	E (i)	1	OBLIGATORY only if EsitoRevisione is completed. Vehicle interior light operating check
Ventilazione_43=	E (i)	1	OBLIGATORY only if EsitoRevisione is completed. Ventilation system operating check
Riscaldamento_44=	E (i)	1	OBLIGATORY only if EsitoRevisione is completed. Heating system operating check
Spie_49=	E (i)	1	OBLIGATORY only if EsitoRevisione is completed. Checking absence of system fault signals (braking system, ABS, EBS, Airbag, etc.)
DispositivoSupplementareSegnalazione_429=	E (i)	1	OBLIGATORY only if EsitoRevisione is completed. Check on additional warning light presence and operation
CollegamentoMotriceRimorchio_430=	E (i)	1	OBLIGATORY only if EsitoRevisione is completed. Checking of electrical connections between the tractor unit and trailer.
SistemaAntiappannante_431=	E (i)	1	OBLIGATORY only if EsitoRevisione is completed. Checking operation of the demisting and deicing system.
FissaggioBatteria_432=	E (i)	1	OBLIGATORY only if EsitoRevisione is completed. Battery fastening

3.3.3.13.5 Section ⇒ Wheel Axles Tyres and Suspension

Section name = [Vis_AssiRuotePneumaticiSospensioni]

ENTRY	TIPO	DIM	DESCRIPTION
Assi_51=	E (i)	1	OBLIGATORY only if EsitoRevisione is completed. Axles
RuotePneumatici_52=	E (i)	1	OBLIGATORY only if EsitoRevisione is completed. Wheels and tyres
Sospensioni_53=	E (i)	1	OBLIGATORY only if EsitoRevisione is completed. Suspension
CuscinettiRuota_54=	E (i)	1	OBLIGATORY only if EsitoRevisione is completed. Checking of wheel bearings

3.3.3.13.6 Section ⇒ Chassis and Parts Fastened to Chassis

Section name = [Vis_TelaioElementiFissatiTelaio]

ENTRY	TIPO	DIM	DESCRIPTION
StatoGeneraleTelaioElementiFissatiTelaio_611=	E (i)	1	OBLIGATORY only if EsitoRevisione is completed. General condition of Chassis and parts attached to the chassis
TubiScaricoSilenziatori_612=	E (i)	1	OBLIGATORY only if EsitoRevisione is completed. Exhaust pipes and silencers
SerbatoiTubiCarburante_613=	E (i)	1	OBLIGATORY only if EsitoRevisione is completed. Fuel tanks and pipes
SupportoRuotaScorta_614=	E (i)	1	OBLIGATORY only if EsitoRevisione is completed. Spare wheel mount
SicurezzaDispositivoAccoppiamento_615=	E (i)	1	OBLIGATORY only if EsitoRevisione is completed. Coupling device safety catch
Gradini_618=	E (i)	1	OBLIGATORY only if EsitoRevisione is completed. Checking of electrical and/or mechanical status of steps.
RampeSollevamento_619=	E (i)	1	OBLIGATORY only if EsitoRevisione is completed. Checking operation of lift system.

FissaggioSedieRotelle_620=	E (i)	1	OBLIGATORY only if EsitoRevisione is completed. Checking fastenings for wheelchairs.
StatoStrutturaleCarrozzeria_621=	E (i)	1	OBLIGATORY only if EsitoRevisione is completed. Body structural condition
PorteSerrature_622=	E (i)	1	OBLIGATORY only if EsitoRevisione is completed. Doors and locks
UscitaSicurezza_63	E (i)	1	OBLIGATORY only if EsitoRevisione is completed. Safety exit
DivisorioInamovibile_616=	E (i)	1	OBLIGATORY only if EsitoRevisione is completed. Check on presence, condition and non-removability of divider provided for the vehicle being tested (e.g. partition between driver's cab and main ambulance compartment, or partition for vehicles registered as trucks)
Finestre_623=	E (i)	1	OBLIGATORY only if EsitoRevisione is completed. Check presence and condition of window/s.
AncoraggiBarella_617=	E (i)	1	OBLIGATORY only if EsitoRevisione is completed. Check presence, condition and fastening of stretcher.

3.3.3.13.7 Section ⇒ Other equipment

Section name = [Vis_AltriEquipaggiamenti]

ENTRY	TIPO	DIM	DESCRIPTION
DispositivoPlurifunzionaleSoccorso_74=	E (i)	1	OBLIGATORY only if EsitoRevisione is completed. Multifunctional emergency device
TriangoloSegnalazioneVeicoloFermo_75=	E (i)	1	OBLIGATORY only if EsitoRevisione is completed. Emergency vehicle breakdown triangle
SicurezzaMontaggioCintureSicurezza_761=	E (i)	1	OBLIGATORY only if EsitoRevisione is completed. Seat belt installation safety catch
StatoCintureSicurezza_762=	E (i)	1	OBLIGATORY only if EsitoRevisione is completed. Seat belt state
FunzionamentoCintureSicurezza_763=	E (i)	1	OBLIGATORY only if EsitoRevisione is completed. Seat belt operation
CassettaProntoSoccorso_764=	E (i)	1	OBLIGATORY only if EsitoRevisione is completed. Checking of presence and condition of first aid kit
Cunei_765=	E (i) (p)	1	OBLIGATORY only if EsitoRevisione is completed. Checking presence and status of wheeled chocks.
Tachimetro_766=	E (i)	1	OBLIGATORY only if EsitoRevisione is completed. Checking of tachometer operation
Tachigrafo_767=	E (i) (p)	1	OBLIGATORY only if EsitoRevisione is completed. Checking of speedometer operation
LimitatoreVelocita_768=	E (i)	1	OBLIGATORY only if EsitoRevisione is completed. Checking operation of speed limiter.
FissaggioSedili_71=	E (i)	1	OBLIGATORY only if EsitoRevisione is completed. Check on presence, condition and fastening of seats provided for the vehicle being tested
Estintori_72=	E (i)	1	OBLIGATORY only if EsitoRevisione is completed. Check presence and expiry date of fire extinguishers provided with the vehicle

3.3.3.13.8 Section ⇒ Harmful effects

Section name = [Vis_EffettiNocivi]

ENTRY	TIPO	DIM	DESCRIPTION
EliminazioneDisturbiRadio_83=	E (i)	1	OBLIGATORY only if EsitoRevisione is completed. Elimination of radio interference

3.3.3.13.9 Section ⇒ Vehicle identification

Section name = [Vis_IdentificazioneVeicolo]

ENTRY	TIPO	DIM	DESCRIPTION
Targa_91=	E (i)	1	OBLIGATORY only if EsitoRevisione is completed. Registration plate
Telaio_92=	E (i)	1	OBLIGATORY only if EsitoRevisione is completed. VIN No
DataControlli=	D (i)	8	OBLIGATORY only if EsitoRevisione is completed. Visual check completion date
OraInizioControlli=	H	6	Test stage start time
OraFineControlli=	H (i)	6	OBLIGATORY only if EsitoRevisione is completed. Test stage end time
Operatore=	S	....	Code of the operator who took the booking

The OraInizioControlli Entry indicates the time when the Technical Manager booked in the vehicle (creating the AAnnnnnn.acc, file and deleting the AAnnnnnn.pre file), while the OraFineControlli Entry indicates the time when the Technical Manager assigns the overall result via the PCStazione.

3.3.3.14 Section ⇒ Overall result of instrumental checks

Overall result indicates the final result established by test technicians, according to their evaluation criteria.

Section name = [EsitoComplessivo]

ENTRY	TIPO	DIM	DESCRIPTION
MarcaStazione=	S		OBLIGATORY only if EsitoRevisione is completed. Otherwise it must not be completed. Indicates the software manufacturer.
ModelloStazione=	S		OBLIGATORY only if EsitoRevisione is completed.

			Otherwise it must not be completed. Indicates the name/model defined by the software manufacturer.
NumeroMatricolaStazione=	S	...	OBLIGATORY only if EsitoRevisione is completed. Otherwise it must not be completed. Indicates software serial (matriculation/licence) number.
ApprovazioneStazione=	S		OBLIGATORY only if EsitoRevisione is completed. Otherwise it must not be completed. Indicates the approval number achieved.
DataApprovazioneStazione=	D	8	OBLIGATORY only if EsitoRevisione is completed. Otherwise it must not be completed. Indicates the date on which approval was obtained.
NumVersioneStazione=	S		OBLIGATORY only if EsitoRevisione is completed. Otherwise it must not be completed. Indicates the PCStazione software version.
NumVersioneMCTCNet=	N	3	OBLIGATORY only if EsitoRevisione is completed. Otherwise it must not be completed. Latest MCTCNet protocol version used (e.g.: 200 = 2.00).
DataVersioneMCTCNet=	D	8	OBLIGATORY only if EsitoRevisione is completed. Otherwise it must not be completed. Issue date of latest MCTCNet version used.
NumeroPostazioneStazione=	N	2	OBLIGATORY only if EsitoRevisione is completed. Otherwise it must not be completed. Indicates the workstation number allocated at the activation stage.
CircolareApplicata=	S		OBLIGATORY only if EsitoRevisione is completed. Otherwise it must not be completed. Indicates identification of latest circular to which the installed software version refers. (E.g.: 64/404/2005)
EsitoRevisione=	S	..	Overall Test result, which may be: “SOSPESO“ “REGOLARE“ “RIPETERE“ Must be completed only when the technical manager has determined the overall test result. Completion of this entry determines the end of the technical vehicle check, also assigning a value to OraFineControlli.
DataEffettiva=	D	8	OBLIGATORY only if EsitoRevisione is completed. Otherwise it must not be completed. Effective test date
Note=	S (*)	320	The value 320 corresponds to the maximum string length “note” entry where the operator may make specific notes on the test.

Note that two PCStazione cannot be configured with the same workstation number. The workstation number identifying PCStazione must also start from 1, and be sequential.

3.3.4 Automatic acquisition of tested vehicle images

3.3.4.1 Introduction

The document describes a method for including automatic acquisition of an image in electronic format, for each vehicle undergoing testing, within the MCTCNet system.

Acquisition describes transfer of the image, in digital form, from an optical/digital device to the processing unit. Although this acquisition may take place with any transmission protocols and methods that the manufacturer wishes to adopt, one constant factor is the constraint that the optical machine and processing system must be positioned within the same working environment (thus ruling out any processing of the file remotely or via the Internet).

Processing describes a set of procedures that, provided the image file is in a standard format, makes it possible to:

- Identify the licence plate by means of appropriate software and compare it with the tested plate.
- Store the image in the MCTCNet circuit so that it cannot subsequently be tampered with by third parties.

Storing describes the backing up of the image file that has been acquired and processed in a standard format, to join the files stored in relation to the tests conducted on the vehicle in question.

The system structure requires a system synchronised with the brake test bench, but it is not bound to this or to the PCStazione.

Following the favourable outcome of checks conducted with a license plate simulator, an approval will be issued with an attached technical datasheet with the following coding:

AP00000rt/U/Net: Approval with reference to a universal license plate recognition system to be used for motor vehicles (with recognition of front and rear license plate) and 2 3 4 wheel motor vehicles.

AP00000rt/AM/Net: Approval with reference to a universal license plate recognition system to be used for motor vehicles (with recognition of rear license plate only) and 2 3 4 wheel motor vehicles.

AP00000rt/AU/Net: Approval with reference to a universal license plate recognition system to be used for motor vehicles (with recognition of both front and rear license plate).

AP00000rt/AP/Net: Approval with reference to a license plate recognition system to be used for motor vehicles (with recognition of rear license plate only).

AP00000rt/M/Net: Approval with reference to a license plate recognition system to be used only for 2 3 and 4 wheel motor vehicles.

3.3.4.2 Image acquisition.

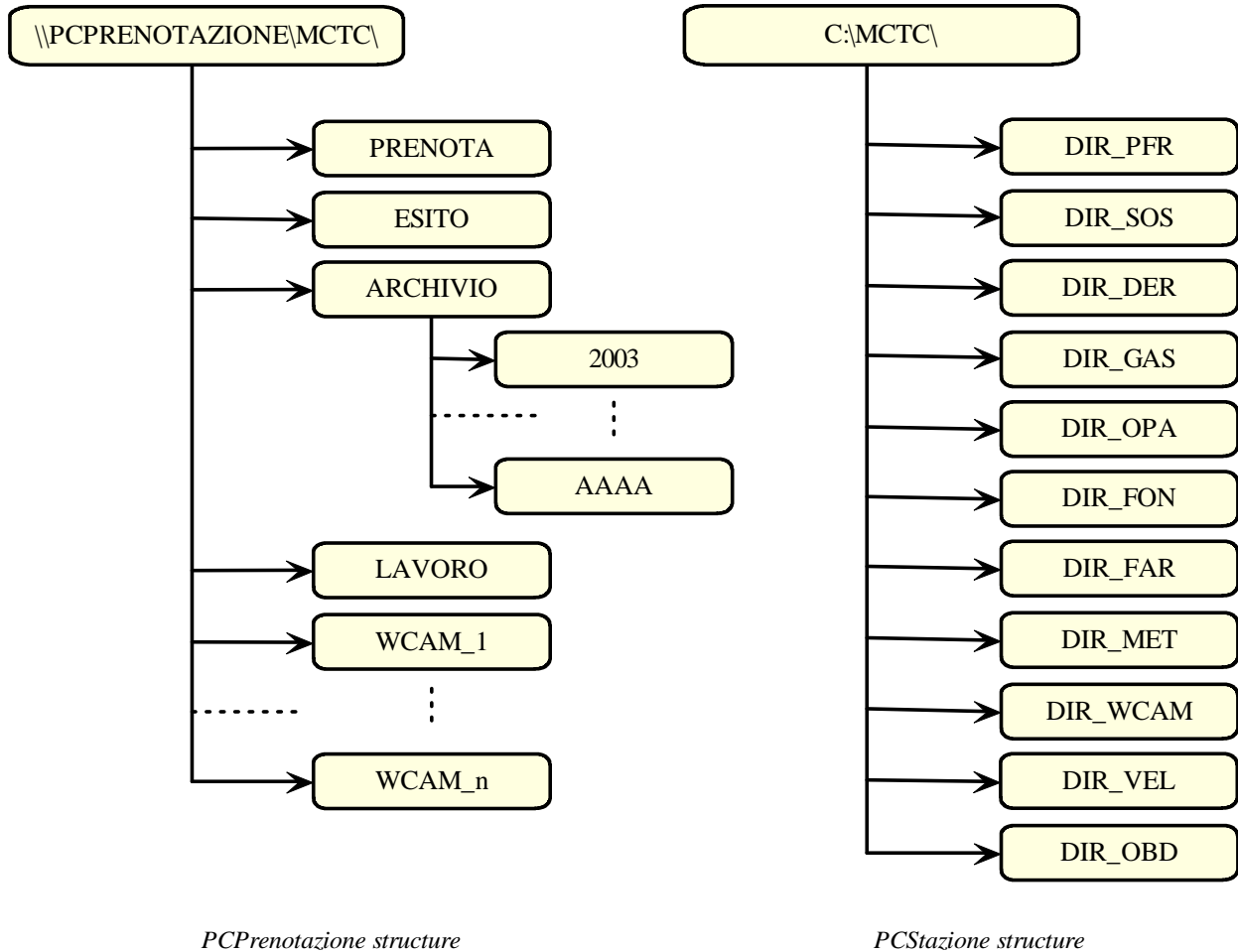
In order to allow system interchangeability, the flow diagrams and specifications to be complied with for image acquisition are described below. Three software packages are involved: software RT , software Banco Prova Freni and software PCStazione.

3.3.4.3 Activities performed by RT software

The RT software may be configured in two modes: DIR and RETE. In the first case, the flow of data will only be handled by the PCStazione, using exchange folder C:\MCTC\DIR_WCAM.

In the second case, the exchange folder \\PCPrenotazione\MCTC\WCAM_n will be used, where n indicates the brake line to which the RT software is associated.

The difference lies only in the directory used for the file exchange. The software should not involve the use of other directories, other than those defined (WCAM_n, which is found on PCPrenotazione and DIR_WCAM present on the PCStazione).



The WebCam software is responsible for creating the folders necessary for operation, both on the PCStazione and on the PCPrenotazione at the configuration stage.

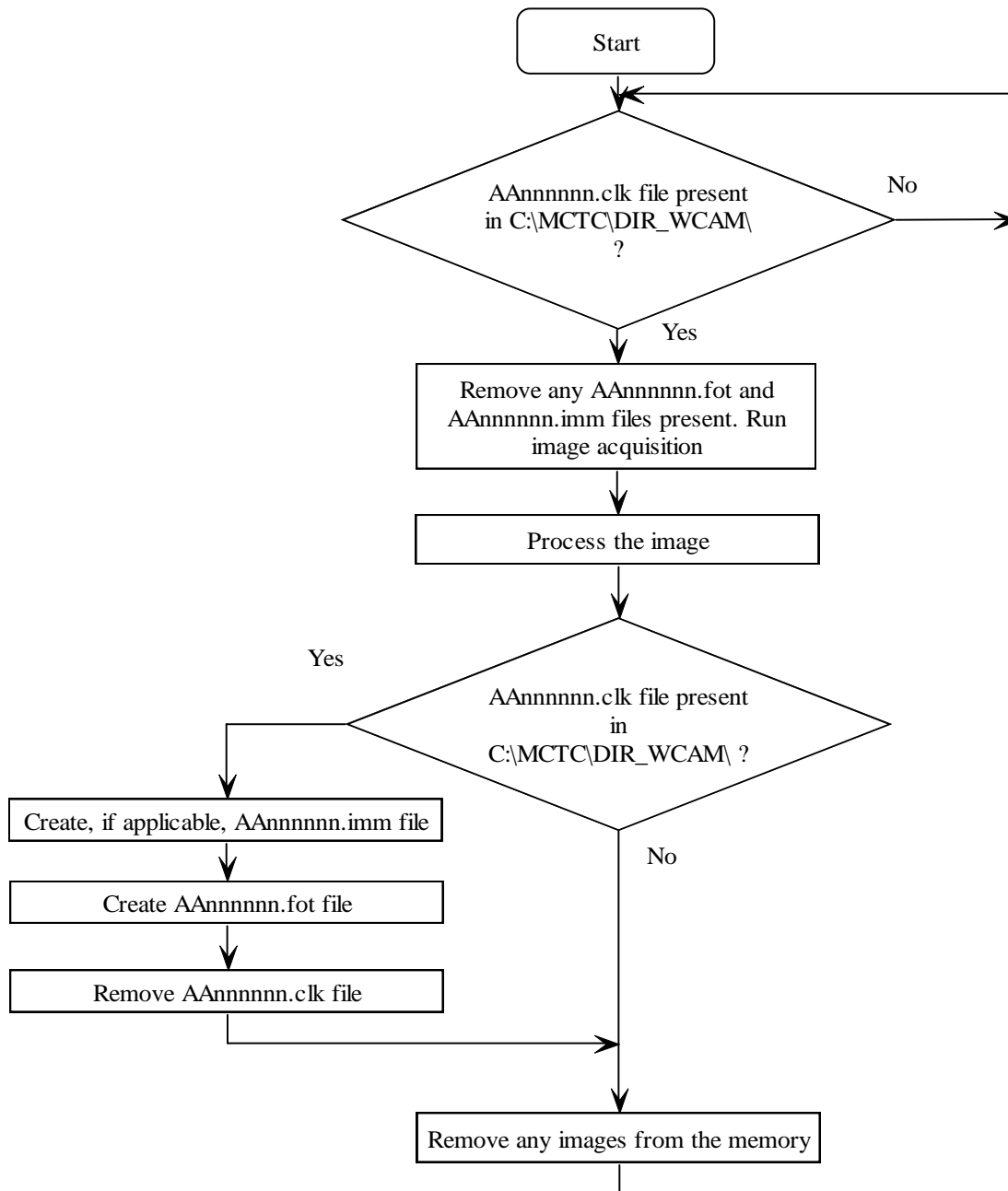


Diagram DIR Mode 3.3.4.3 A

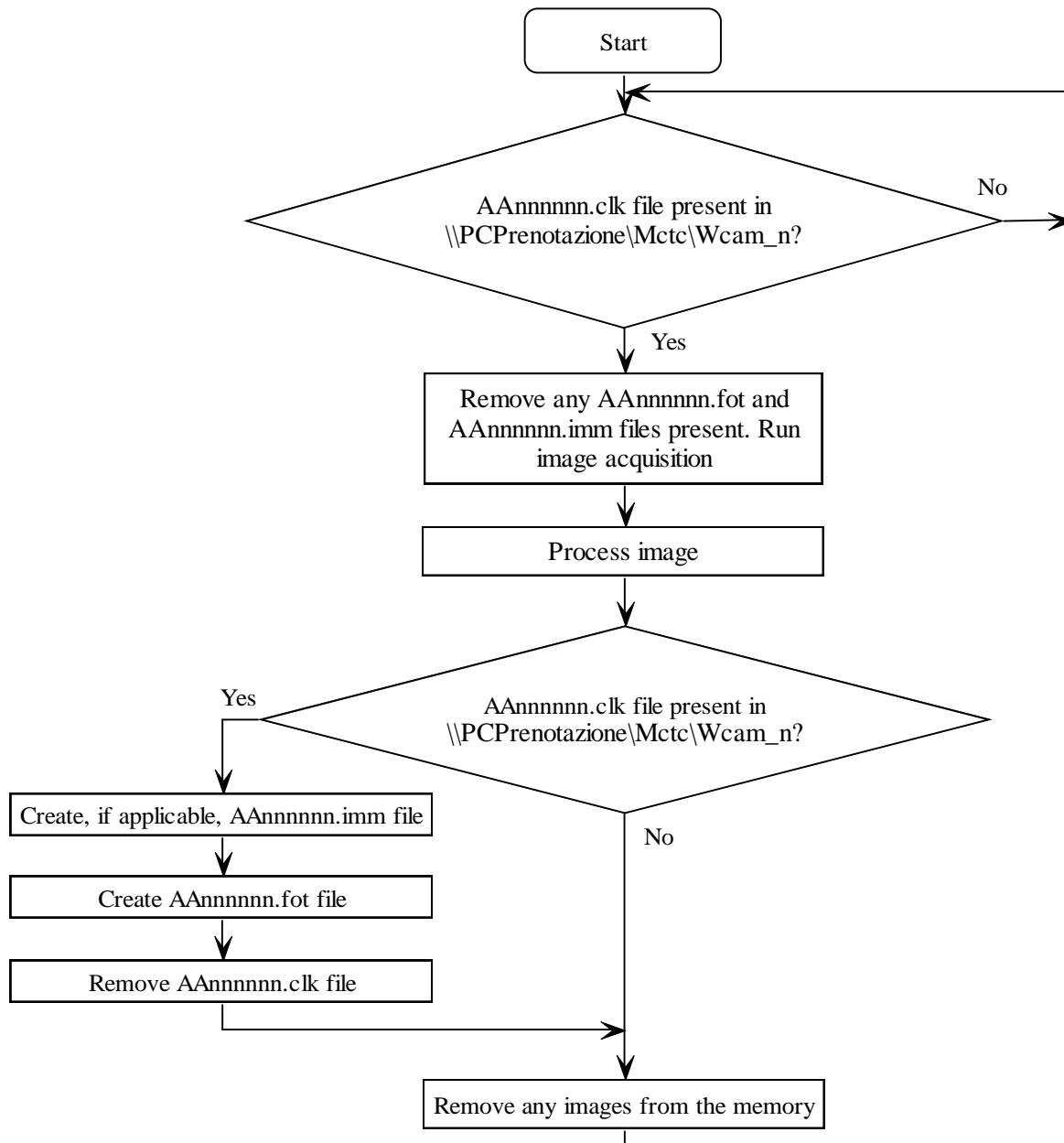


Diagram RETE mode 3.3.4.3 B

The frequency with which the WebCam must confirm the presence of the CLK is set at 4 seconds at most, thus reducing the image acquisition execution times.

The DIR method is applied in cases where test centres are organised in a ‘simple’ configuration, i.e. the brake software and the WebCam software reside on only one PC. This means low commitment by the computer, which will not have to access the Internet so frequently that this would affect the normal operation of other installed applications.

In both cases, the method that the system must use to establish congruence between the licence plate contained in the ACC or AC2 file and that extrapolated from the acquired image is not defined. This must nevertheless guarantee the following requirements:

The type of vehicle photograph used by the licence plate recognition system must frame the entire rear or front of the vehicle from side to side (maximum width for light vehicles 2.55 m, for motor vehicles 1.60 m).

This specification is required in order to represent a significant part of the vehicle as well as a portion of the control station.

To implement these requirements, special demarcation lines must be applied to the floor of the control station. The purpose of these is to delimit the area that the camera lens must always frame and represent as described below.

Appropriate demarcation lines are placed equidistant from the centre line of the brake test bench. These should be spaced at least 1.60 m apart for brake test benches approved only for 2-wheeled motor vehicles and mopeds and at least 2.55 m apart for all other brake test bench types. The distances are calculated from the outer edges of the demarcation lines.

The photographic image, which will be used for automatic license plate recognition must be such as to display at least part of a demarcation line, part of the brake tester and the entire rear of the vehicle, from side to side.

Reaffirming the need for the photographic image to contain the above elements for the image to be valid, solely in the event that the vehicle type is likely to obscure part of the brake tester as in the case of a motorhome or caravan with significant overhang where the photograph is taken at right angles to the plate, and only in such cases, the photograph of part of the brake tester can be replaced, within the same frame, by wording showing the authorisation number of the test centre and line serial number. This wording shall be irremovable and positioned in such a way as to be clearly visible. It is emphasised that the proposed option can only be used in cases where the type of vehicle would prevent acquisition of the tester image; in all other cases, the camera system adopted must allow compliance with the essential requirements. Upon inspection of the workshop by government officials, the location of any wording will be mentioned.

Only when installing the brake tester on a podium is possible to use two poles (e.g., accident prevention model) positioned above the demarcation lines, in line with the vertical plane of the plate. These posts will replace the demarcation lines to ensure the image is fit for purpose. The above considerations also apply in this case.

Even in the licence plate recognition system produces regular results, if these requirements are not met, the image should be considered inappropriate and the brake test must be repeated positioning the licence plate recognition system hardware more effectively.

The demarcation lines should be parallel to the normal direction of travel under test and must be long enough to ensure they are present in the photographic image .

The point of origin of the lines will identify a point half way along the brake tester (whether it is a roller or plate tester).

Demarcation lines placed at the tester entrance side will clearly be sufficient for licence plate recognition systems approved for acquisition of the rear license plate, while licence plate recognition systems for the acquisition of both the front and rear license plates also need demarcation lines on the tester exit side.

The demarcation lines shall be designed to meet the following minimum requirements:

- √ Their colours must stand out easily against the surface to which they are applied.
- √ Their length must be ≥ 50 mm.

The image must be colour (not greyscale) in order to allow the body colour to be identified if necessary.

The front or rear numberplates must be clearly visible and legible (as required by the Highway Code) so that they may be identified using the appropriate dedicated software.

It must not be possible for the function certifying consistency between the real license plate and the extrapolated plate to be manipulated by the operator and in particular the operator must not be given the opportunity to force a positive recognition outcome.

Due to the need to keep the size of the REV file as small as possible and in view of the large area taken up by the licence plate in the image, the image resolution is set at 640*480, which is sufficient to allow automatic licence plate recognition.

To avoid over-use of the transmission band when sending the REV and SAV files to the computer centre, the size of FOT files generated by the RT system must not exceed 70 kB (70000 bytes).

If the image used for license plate recognition leads to creation of a FOT file bigger than 70 kB, it will be necessary to: 1) increase the compression factor of the JPG file so that the size of the FOT file is within the specified limits and 2) also create the corresponding IMM file (AAnnnnnn.IMM), which remain on the local system and contain Base64 coding of the image actually processed by the RT system.

In this case it is understood that the compressed image in the FOT file should not differ from the original image used to recognise the license plate to the human eye once both the images are displayed in windows of the same size (640 per 480 pixel). In this regard, in order to allow government officials to carry out checking activities on photographs generated during the test, the RT system manufacturer must make available an application that can be installed separately without licence time constraints that is able to set two windows of the same size alongside one another (640 per 480 pixels). The first must display the image recreated from the generic REV, SAV or FOT file while the other window must display the entire image stored in the corresponding IMM file with the necessary resizing.

To deal with cases where the application is run on computers with video and/or monitor cards with insufficient resolution to display both images side by side with the required dimensions in pixels, the application must also make it possible to view the image stored in the FOT, REV or SAV file and the image stored in the corresponding IMM file alternately.

The RT system must also be equipped with a function that allows license plate recognition from any IMM file generated by the system and present in the archive

If the photo that has been taken and used for license plate recognition is already in JPG format and its conversion to Base64 does not lead to the creation of a FOT file bigger than 70 kB, it will naturally not be necessary to create the IMM file.

In this case, the RT system must be equipped with a function that allows license plate recognition from any file appropriately crated from a FOT, REV or SAV file once all entries not necessary for coding the image in Base64 have been removed.

The IMM will respect the following MCTCNet convention:

Section name **[FotoTarga]**

DimensioneOriginale=	N	7	OBLIGATORY. Indicates image size in bytes.
1=	S	100	OBLIGATORY. (data in base64)
2=	S	100	OBLIGATORY. (data in base64)
3=	S	100	OBLIGATORY. (data in base64)
n=	S	100	OBLIGATORY. (data in base64)

The coded data must be formatted to ensure that the value of each entry is exactly 100 characters, except the last entry, which will contain the remaining effectively available characters. Starting from the entry named 1, one entry must be present for each progressive entry number until the image has been fully stored.

The IMM file must be signed as specified in paragraph 3.2 and formally validated by PCStazione and PCPrenotazione in the same way as for the other files.

The licence plate recognition system creates an IMM file together with a FOT file when necessary and contains the original image used by the system for the purposes of license plate recognition. The file is signed (Checksum entry) to guarantee that it cannot be altered and to allow the license plate recognition system to acquire only files produced by the system during the stage of inspection by the responsible officials. Note that because the IMM and FOT files are created at the same time by the same system, the identification data beneath the respective signatures (key registration code, key registration date, protocol ID, type approval number) must be the same.

If required on the basis of the above configurations, PCStazione must move the IMM close together with the FOT files into the PCPrenotazione Esito [Results] folder.

To supplement the information in paragraph 3.2.4 the IMM file must clearly never be included in the SAV file due to its excessive size but will be moved by PCPrenotazione, at the time the SAV file is created, into a dedicated folder named Immagini [images], in turn contained in the Archivio [archive] folder. At the start of each new year, a folder for the year ending will be created in the archive folder and all the REV and SAV and the Images folder will be moved into this.

It is obligatory for an IMM file to be present for each REV file containing a FOT file if license plate recognition took place by processing a file other than that contained in the FOT file, otherwise only the FOT file need be present. If the test specified in paragraph 4.1 of the standard is interrupted, it could be the case that a SAV file is present but not an IMM file if the test was interrupted before license plate recognition.

In view of the fundamental role played by IMM files for any subsequent checks carried out by government officials, such files, if present, must be backed up each day as described in paragraph 1.3.4 point 5 and paragraph 4.1.3.

To avoid wasting too much space in the data archiving devices commonly available in the computers provided at test centres and to avoid having to make use of more advanced, high-performing backup systems at a later stage, it is obligatory for the IMM files must be kept immediately available in the ARCHIVE folder for at least 3 calendar years. At the end of this time period, the IMM files can be removed from the ARCHIVE folder and archived together with the relevant REV or SAV files present on the appropriate optical devices (e.g. DVDs), which must still remain available for any subsequent checks by government officials. Note that after removing any IMM files in accordance with the above conditions, the relevant REV or SAV files must also remain stored in the original ARCHIVE file as well as being archived in the optical devices chosen for this purpose.

When the FOT file is written down, all unrecognised characters must be replaced by the character % so that any unrecognised character/s may be clearly identified.

The outcome of automatic licence plate recognition is REGULAR if the following conditions are met:

- √ The number of licence plate characters in the “TargaRiconosciuta=” entry must be equal to the number of characters making up the nominal licence plate.
- √ At least all the characters minus one are recognised.

In the extreme case where the system cannot identify any character in the photographed image (licence plate missing or licence plate obscured) the “TargaRiconosciuta=” entry will contain a single character % (e.g.: TargaRiconosciuta=%) because it is unable to establish how many characters a licence plate is made up of because it has not identified any licence plate.

Any incongruence must always generate an AAnnnnnn.FOT file.

For vehicles with the registration date prior to 01/01/1964, an AAnnnnnn.FOT must always be expected and its format must be correct even though licence plate recognition need not be performed. The “TargaRiconosciuta=” entry to the above file will contain the licence plate acquired from the AAnnnnnn.CLK file and the outcome of recognition will always be “REGOLARE”.

The photograph must be saved in JPEG format inside the FOT file with Base64 coding. This coding makes it possible to represent the primary data in a format that is compatible with all text editors. The size of the coded file is approximately 1/3 greater than the original in binary format. It is also

necessary to specify the size of the original file in bytes to confirm and allow correct decoding in Base64. The coded data must be formatted to ensure that each row contains exactly 100 characters, except the last row, which will contain the remaining characters. Each row must be inserted into a new entry in the same section and the name of the entry must be the progressive number of the row, starting from one.

In the specific case that the vehicle bears a licence plate of the type RomaXXXXXX it is necessary to adopt certain measures because the format used during the booking stage must be the same used by the data processing centre, i.e. RMXXXXXX. In this case, once the WebCam software has recognised that the licence plate contains the characters “Roma”, it must treat them as “R” (if recognised) and “%” (because the characters “oma” are not recognised by the system). The licence plate “RomaXXXXXX” will therefore be recognised as R%XXXXXX. In these cases only, the number of characters that may be different from the nominal licence plate is equal to 2, including the %, which stands for the characters “oma”. As an example, the licence plate Roma123456, which following acquisition will be recognised as R%12%456, will be allocated a REGULAR result.

3.3.4.4 Activities carried out by the brake test software (DIR and RETE)

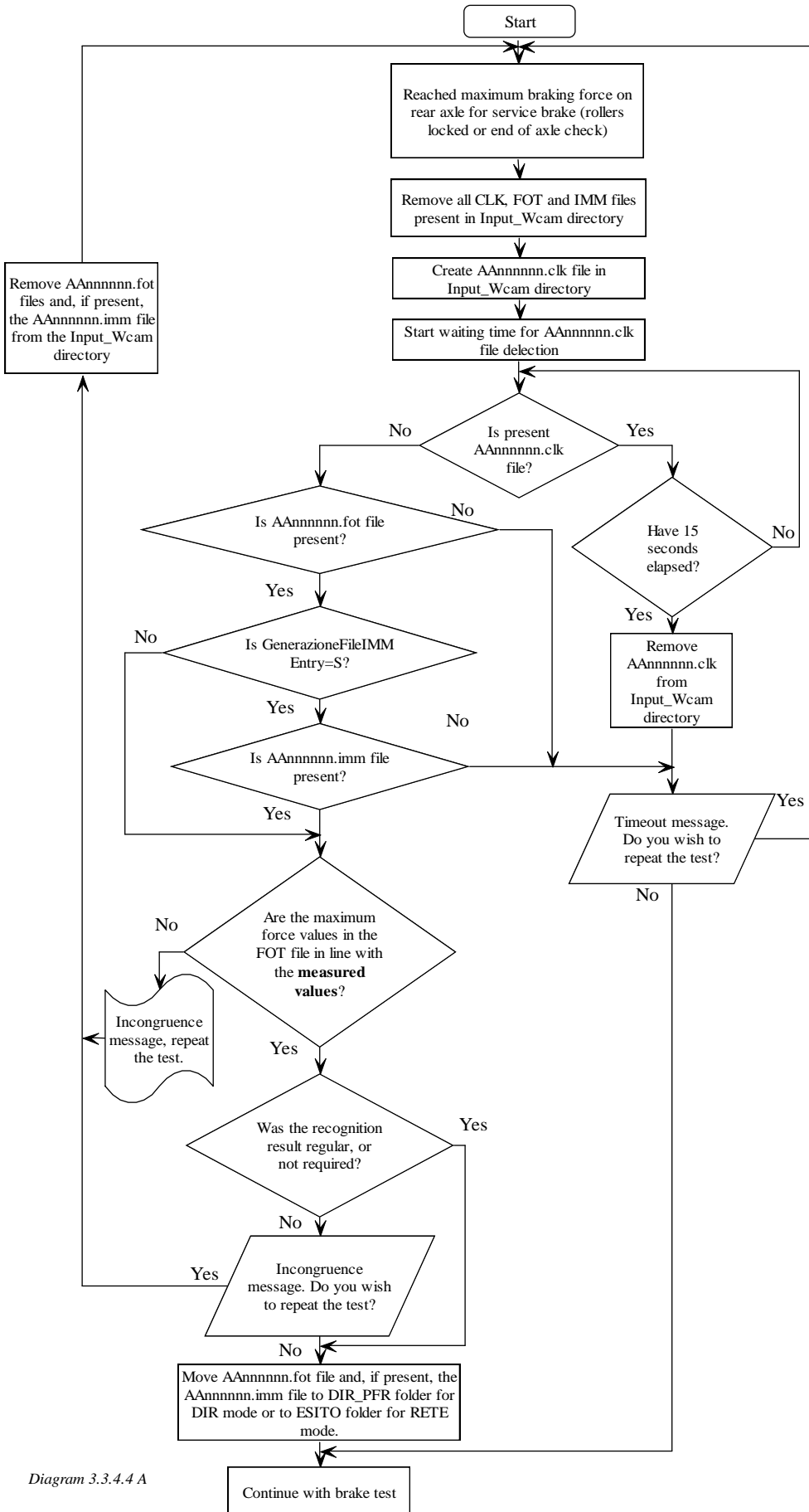


Diagram 3.3.4.4 A

When a test is suspended, all data measured to that point must be deleted and, if the operator intends to repeat the test, it must be repeated from the beginning. The brake software configuration must allow for the option of setting the data exchange directory (known as input_Wcam in flow diagram) with the WebCam software. It must be possible to set a network (RETE) pathway even if the software is type approved only for DIR mode. This option guarantees greater flexibility and allows a test centre to use a single image acquisition system even though it may be equipped with two brake test benches.

The brake test bench software is responsible for generating the AAnnnnnn.CLK file in the set exchange directory. The file must be structured as follows:

Section [FotoTarga] file AAnnnnnn.CLK

ENTRY	TIPO	DIM	DESCRIPTION
ForzaFrenanteSingolaSx=	N	5	OBLIGATORY. Indicates maximum single or left wheel braking force value, for the tested axle (rear)
ForzaFrenanteDx=	N (i)	5	OBLIGATORY if CategoriaInternazionale <>("L1e" or "L3e" or "L4e") or if CategoriaInternazionale is equal to ("L2e" or "L5e") and AsseRuotaSingola is equal to 1 Otherwise it must not be completed. Indicates maximum right braking force value, for the tested axle (rear)
AsseRuotaSingola=	S (i) (m)	....	OBLIGATORY only if CategoriaInternazionale="L2e" or "L5e" and may assume only one of the following values: "1" "2" Otherwise it must not be completed. Indicates axle affected by only one wheel.
TargaNominale=	S (i)	10	If the entry CategoriaInternazionale="L1e" or "L2e" or "L6e" and the entry CodiceCIC is not entered, then the TargaNominale need not be entered, in all other cases entry is OBLIGATORY.
DataPrimaImm=	C	8	Date of first registration of the vehicle. In cases where the day and/or month are not entered in the log book, must be set to "00" (e.g. 00031994 for unknown day, or 00001994 for unknown day and month). Dates with a known day and unknown month are not accepted (e.g. 02001997)
CategoriaInternazionale=	S	...	OBLIGATORY. Specifies the vehicle category, and may be only one of those listed in the file MCTC.INI in the CategorieInternazionali Section.
CodiceCIC=	S (i)	10	Obligatory if the entry CategoriaInternazionale="L1e" or "L2e" or "L6e", and if the TargaNominale entry consists of 6 characters, otherwise need not be entered. Moped identification code.

The presence of the AAnnnnnn.CLK file in the input_Wcam exchange folder tells the WebCam software to begin the image acquisition procedure.

Maximum measured force entries for the tested axle must be entered in the AAnnnnnn.FOT file to guarantee that the image produced is really associated with the tested vehicle.

3.3.4.5 Connection of licence plate recognition system

License plate recognition systems must also meet the requirements laid down for other devices. For license plate recognition systems certified in DIR mode, the connection between hardware and software that is actually set up (cable, wireless, etc.) is the choice of each individual manufacturer, which will assume full responsibility for data transmission security. In particular, possible use of a LAN network as a means of data transfer does not exonerate the manufacturer from this obligation and the same applies to normal devices type approved in DIR mode. For license plate recognition systems certified in RETE mode (PCApparecchiatura), a LAN network can be used only to exchange CLK and FOT files and not to communicate between RT system HW and RT system management software .

License plate recognition system software can be installed on PCStazione or on a dedicated computer (when it becomes a PCApparecchiatura for the RT system). It is not therefore possible to install RT software on PCApparecchiatura dedicated to another device (e.g. brake tester). The RT system may be accredited as suitable for both DIR and RETE modes.

In DIR mode, the software must make the following configurations available:

- local file exchange on the PCStazione where the brake tester DIR module and RT system software are installed;
- network file exchange on PCPrenotazione if brake tester on PCApparecchiatura;
- network file exchange on PCPrenotazione if brake testing activated (DIR) other than that on which the RT system software is installed.

When in RETE mode, the software can only exchange CLK and FOT files in folders shared over the network by PCPrenotazione.

When the brake tester is configured in DIR mode, it is understood that AC2 and PFR will continue to be exchanged in the DIR_PFR folder, while the the CLK and FOT files will be exchanged:

- in the DIR_WCAM folder for an RT system installed on the same PCStazione;
- in the WCAM_n folder for RT systems installed on another PCStazione or on PCApparecchiatura.

With two more more brake testers, it is permitted to use only one RT system HW. It is also allowed to install several HWs usable by a single RT software package.

3.3.4.5.1 Configuration of RT system installed on dedicated computer (PCApparecchiatura)

In this case, the RT system software can only use the shared folders on PCPrenotazione, whatever the brake tester connection mode.

3.3.4.5.2 Configuration of RT system installed on PCStazione

If the brake tester is configured RETE, the RT system must also be configured in such a way as to use the folders shared by PCPrenotazione. If the brake tester is configured DIR, the data exchange folders on PCStazione may be used or data exchange may be configured on PCPrenotazione as

described in the previous paragraph. In the latter case, for example, it is possible to install two brake testers configured DIR on a single PCStazione, which use two different RT systems.

3.3.4.6 Activities carried out by the PCStazione software

The PCStazione software is responsible for managing the file produced by the acquisition system in accordance with the following rules:

The PCStazione must copy the AAnnnnnn.FOT file into the Esito (Results) folder, if the file is saved in the DIR_PFR folder.

The PCStazione shall not allow determination of the overall outcome of the roadworthiness test if the EsitoRiconoscimento entry, contained in the FOT file, is set to "I", in other words the vehicle license plate has not been recognised by the RT system.

The PCStazione must allow the image produced by the Licence Plate Recognition software to be displayed.

3.3.4.7 Webcam software approval

The functionalities of the above software must be identified as suitable by the Administration and it may be used in conjunction with the MCTCNet circuit only following regular issue of a “certificato di idoneità software”.

At the time of approval, the manufacturer must set up a simulation system that allows the responsible officials to confirm that the instrument operates correctly. This system must allow the official in charge to compose licence plates different from the types issued after 1963, the characteristics of which are listed below (for rear licence plates):

Categories M1, M2 and N1

- √ 1963-1976 white characters on a black ground, arranged over two lines
- √ 1976-1985 orange and white characters on a black ground, arranged over one or two lines
- √ 1985-1994 black characters on a white ground, arranged over one or two lines
- √ 1994-1999 black characters on a white ground, arranged over one or two lines (double-line plates begin with Z).
- √ Since 1999, black characters on a white ground, blue stripes and province code (double-line plates begin with Z).

Categories L3e, L4e, L5e, L7e

- √ 1963-1985 blue characters on a white ground, arranged over two lines
- √ 1985-1999 black characters on a white ground, arranged over two lines
- √ Since 1999 black characters on a white ground, arranged over two lines. Blue stripes and province code.

Categories L1e, L2e

- √ Since 2007 if newly registered or holder of Codice Identificativo Ciclomotore (CIC) [moped identification code]

For each licence plate model, at least 3 acquisitions must be carried out at the minimum brightness at which the manufacturer claims that its system will operate correctly.

For each licence plate model, at least 3 acquisitions must be carried out at the minimum brightness at which the manufacturer claims that its system will operate correctly.

The brightness (expressed in lux) must be measured by positioning the measuring instrument sensor in the same position as the acquisition optics and directed toward the licence plate used for approval.

For a suitability certificate to be issued, all the licence plates subjected to testing must be recognised with an outcome of REGOLARE.

For approval purposes, these licence plates must be recognised both using the AAnnnnnn.CLK file which is synchronised with the brake test bench and by means of a procedure that is able to take a photograph even without the above file. In this case, once the licence plate has been recognised, it must be shown in an editable text box on the screen (in read-only mode) and the officials in charge are responsible for confirming that it effectively corresponds with the photographed licence plate (it must not be possible to save any files from this procedure). For the purposes of allowing future checks by the officials in charge, this procedure must form an integral part of the software subject to approval and must be easily accessible without entering codes or passwords. The manufacturer is obliged to attach the above procedure to the instrument.

Companies requesting RT system certification must submit the following documents in addition to the administrative documentation referred to in circular 88/95, as amended (as already required for PCPrenotazione and PCStazione devices and software):

- technical report;
- list of essential components, with their respective specifications, drawings, etc.;
- draft of the technical datasheet that will accompany the function accreditation certificate, which will be completed and validated during the certification;

- service manual for correct installation;
- photos of the outside of the licence plate recognition system and, if assembled by the certification applicant, also of the internal component parts;
- licence plate recognition system software on an optical storage device;
- software operation, maintenance and general information handbook supplied to the user;
- draft identification plate including at least the following fields:
 - Certification applicant;
 - Name of licence plate recognition system;
 - Approval No;
 - Serial number of licence plate recognition system hardware (assigned by the manufacturer or, if assembled, by the certification applicant).

The application must specify in the technical report whether the RT system is universal or another type as specified in paragraph 1.1.4 below. It must also make evident, by attaching photographic reproductions, that all types of license plates in use have been tested from Presidential Decree No 393 of 15 June and subsequent amendments to the current version, for all vehicles subject to Article 80 of the Highway Code.

The technical report must also show the following information (which will also form an integral part of the technical datasheet):

- photographs of licence plate recognition system HW and accessories supplied;
- marking of lens manufacturer and marking of lens name or model or type or characteristics;
- optical machine name or model or type or characteristics, if already assembled, or name assigned by the optical machine case Assembler;
- name of the license plate recognition system allocated by the certification applicant;
- minimum and maximum license plate recognition system installation distance (*);
- minimum and maximum license plate recognition system installation height (**);
- lower and upper installation angle on the vertical plane for each position in which the license plate recognition system HW can be installed (***);
- installation angles on a horizontal plane for each position in which the license plate recognition system HW can be installed (****);
- minimum and maximum lighting (*****) (expressed in lux).

(*) *originating at the point at which the longitudinal axis of the brake meter crosses the transverse axis coinciding with the axis of symmetry of the rollers or plates.*

(**) *with reference to the plane of the plate or the edge of the roller frame.*

(***) *with reference to the horizontal plane of the optics.*

(****) *with reference to the vertical plane of the optics.*

(*****) *as a departure from the technical annex to the 2009 circular, the light intensity (expressed in lux) will be measured by positioning the measurement instrument sensor against the plates used during approval.*

In order to trace the hardware that took the photo used for the recognition, note that the entry NumSerieSistemaRT in the [FotoTarga] section must be completed with a string made up of 2 parts, the first relating to the serial or licence number of the Licence Plate Recognition System SW and the second relating to the serial number of the HW part. The two parts must be separated by the character “-“. The MCTCNet connection diagram in annex A of the specification must use a representative symbol for each RT system software installation, regardless of the number of hardware components connected to the software. The descriptive diagram, on the other hand, must contain the serial or licence number of the installed software and the serial numbers of all connected cameras.

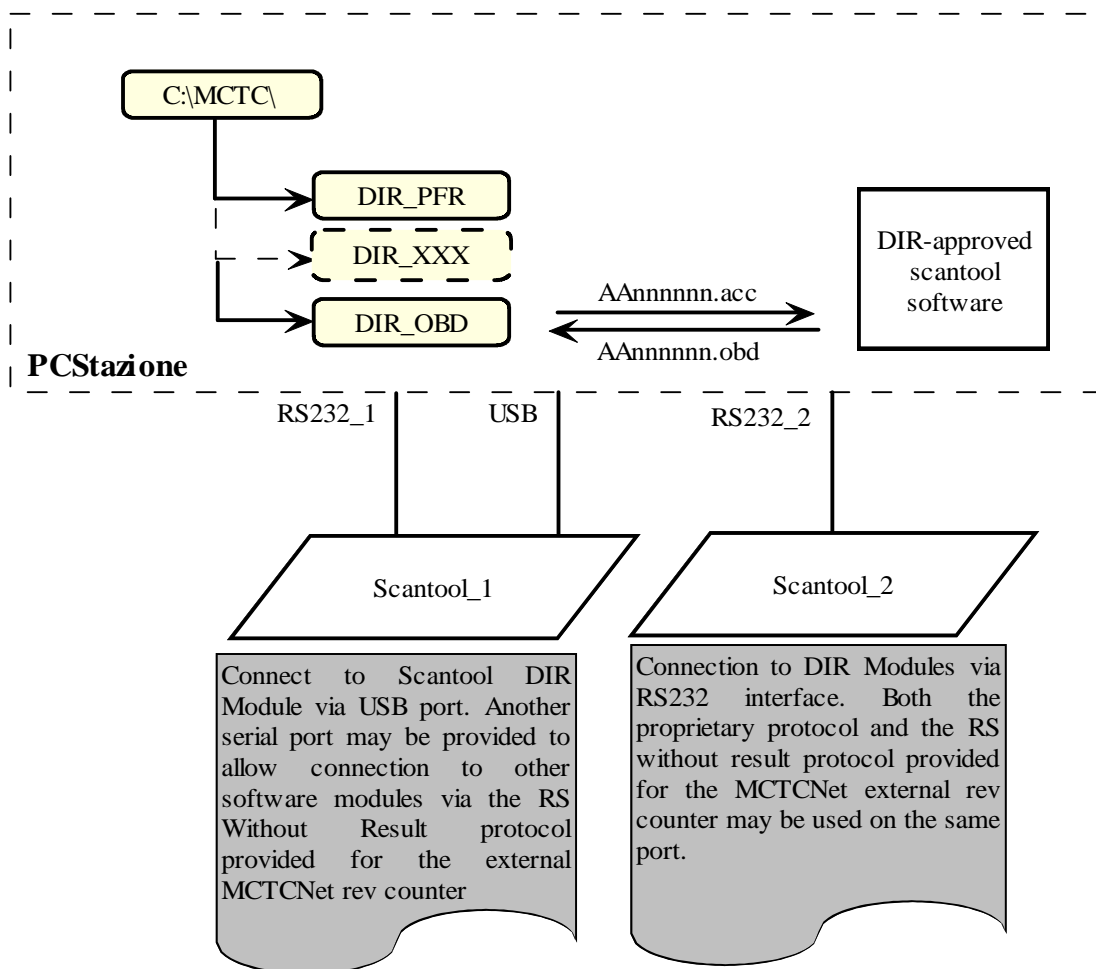
3.3.5 Scantool test

All references to the EOBD test in this specification should be considered obligatory only if they are introduced as an obligatory test to be performed for the purposes of the roadworthiness test.

Introduction of the scantool must satisfy fundamental MCTCNet requirements, i.e. interchangeability of equipment and computer security of completed tests. For this purpose, a new DIR_OBD data exchange folder has been defined that resides in the PCStazione MCTC folder. The type approvals required for the scantool are exclusively in DIR and RETE mode and require writing of results file AAnnnnnn.OBD in accordance with the MCTCNet standard.

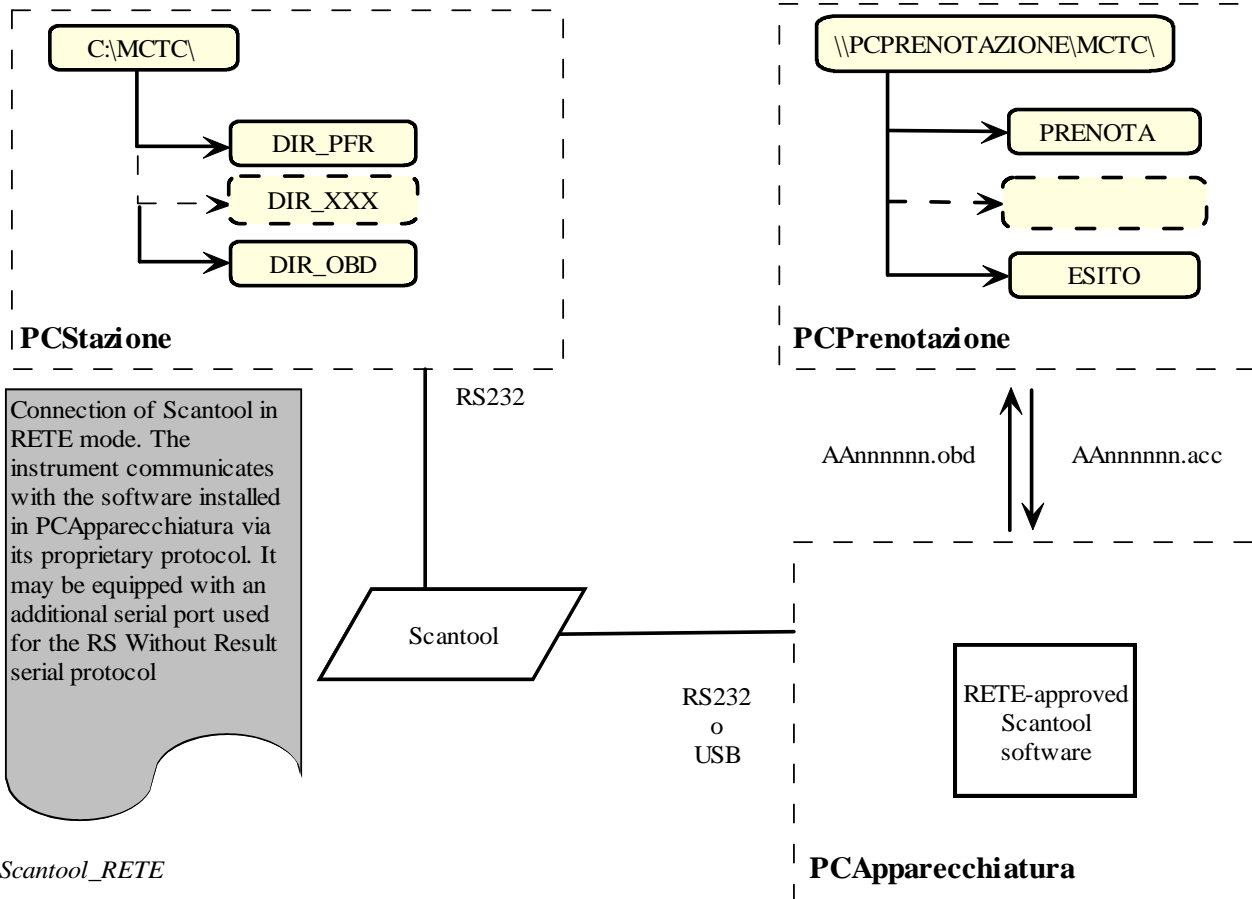
Under the terms of this specification, data relating to RPM and engine oil temperature may be acquired through the OBD interface. In order to ensure effective interchangeability of devices, the Scantool is required to be compatible with the RS Senza Esito serial protocol used with the normal MCTCNet2 approved external rev counters. The instrument may be equipped with one or more serial ports, at the manufacturer's discretion. Where the instrument is equipped with only one serial port, it is able to automatically recognise commands received and use the proprietary protocol as a scantool or of the standard RS Senza Esito protocol designed for the rev counters. The measuring instrument may not transmit RPM and temperature data by means of a proprietary protocol under any circumstances. This function is allowed only by means of the RS Senza Esito protocol defined for the external rev counter.

Some examples of Scantool instrument connection methods are shown below, both for DIR and RETE approved systems.



Scantool_DIR

MCTCNet 2



3.4 Measurement data input manually

In the event that it is necessary, for specific measurement data, to input manually required data, due to the type of data (e.g. environmental data) or difficulty (potential) in acquiring the data automatically (e.g. engine rpm), this must be highlighted in the relevant Entry by the symbol "#".

Because the size of entries, indicated in the tables, does not take into account this character, if it is used the size should be considered increased by 1.

The abovementioned character must always precede the data, even in printouts.

For example, the following entry:

TempAmbiente=	S	3	Environmental temperature in °C. Only values between -99 and 999 are permitted. (may be input manually by placing “#” before the value input, in this case DIM +1)
---------------	---	---	--

may assume the values:

- In the case of automatic data measurement

TempAmbiente=#18crlf

- In the case of manual input

TempAmbiente=#18crlf

(e.g. indication in the field “Notes”, Notes=#environmental temperature entered manually)

If manual entry takes place in devices connected by means of RS protocol, in this case too, the value entered manually must be preceded by the symbol “#” so that this may be easily interpreted by the PCStazione and input into the appropriate “Entry”.

For example the following field:

Tipo	Type of low beam headlight	Possible states: "A" = asymmetric "S" = symmetrical (can be input manually by placing "#" before the value input, e.g. “#A”)
------	----------------------------	---

- In the case of automatic data measurement

A

- In the case of manual input

#A

N.B.

This data acquisition option should be considered entirely the responsibility of the operator who manually input the data. It should consequently be used only when, for clearly objective reasons, it becomes necessary to work in this way.

When referring to an Entry that can be input manually (putting the symbol “#” before the value input), this describes specific measurement data; it is not however necessary to enter the symbol “#” when the data must necessarily be entered manually (for example with visual checks).

The technical manager must provide a reason for each manually entered data item, with the exception of those relating to environmental data. The software will enter this in the Note= entry for the relevant test results file. All notes will be shown in the overall report.

3.5 Shared Data

Data shared by the PCPrenotazione and PCStazione software are deposited in files in “INI” format in the **MCTC** folder created in the server computer.

3.5.1 Sections and Entries for the MCTC.INI file

This file contains sections with synchronization data for software versions and folder and sub-folder paths shared by the “Client” Personal Computers on the “Server” Computer. In order to simplify management of future revisions of the MCTCNet protocol, constants used for setting up devices are listed below. The aim is not to make it obligatory to update devices that perform tests that are unaffected by these constants (e.g. power supply to headlight alignment device).

These must be added in a specific section of the MCTC.INI file contained in the c:\mctc\ directory on PCPrenotazione in accordance with the format described below.

With every programme start-up, the PCStazione must copy the MCTC.INI file resident in the c:\mctc\ folder on PCPrenotazione, and put it in the c:\mctc\ folder on the PCStazione. All the PCPrenotazione, PCStazione and RETE-approved software must use the constants contained in the:\mctc\MCTC.INI file resident on PCPrenotazione.

All the DIR modules must use the constants contained in the c:\mctc\MCTC.INI file resident in the PCStazione.

The file contains the following sections:

- Protocol identification
- Shared folders
- Fuel systems
- International categories
- Description of vehicle for categories M and N
- Description of vehicle for categories O
- Description of vehicle for categories L
- Sound level meter directives
- Diesel emission directives
- Light vehicle petrol emission directives
- Moped petrol emission directives
- Motorcycle petrol emission directives
- Acoustic directives
- Motor vehicle acoustic emission directives
- Motor vehicle horn directives
- Test type

3.5.1.1 Section ⇒ IdentificazioneProtocollo

This section gives the version of the MCTCNet communication protocol in use. During the period of transition from one version to the next, the older protocol version number and associated date must be indicated. During the phasing in period of version 2.00, the section will show Versione=100 and Data=02111999 until all the software and all the test centre devices have been updated to the new version.

Section name = [IdentificazioneProtocollo]

ENTRY	TIPO	DIM	DESCRIPTION
Version=	N	3	“MCTCNet” protocol version number
Data=	D	8	Version issue date

3.5.1.2 Section ⇒ Shared folders

Section name = [CartelleCondivise]

ENTRY	TIPO	DIM	DESCRIPTION
DirPrenotazione=	S		Folder for storing files “AAnnnnnn.PRE” relating to cars booked in for testing (es. \\PcServer\MCTC\PRENOTA)
DirRevisione=	S		Folder for storing files “AAnnnnnn.XXX” with results of individual roadworthiness tests (eg. \\PcServer\MCTC\ESITO)
DirArchivio=	S		Folder for storing the AAnnnnnn.REV files with the test results (eg. \\PcServer\MCTC\ARCHIVIO).
DirLavoro=	S		Folder used for processing of software installed on personal computers present in the control station (eg. \\PcServer\MCTC\LAVORO)

3.5.1.3 Section ⇒ Fuel systems

Section name = [Alimentazioni]

NumeroCostanti=	N	2	Indicates the number of constants listed.
C1=	S	...	“BENZINA”
C2=	S	...	“DIESEL”
C3=	S	...	“METANO”
C4=	S	...	“GPL”
C5=	S	...	“ELETTRICO”
C6=	S	...	“MISCELA”
C7=	S	...	“NESSUNA”

3.5.1.4 Section ⇒ International Categories

Section name = [CategorieInternazionali]

NumeroCostanti=	N	2	Indicates the number of constants listed.
C1=	S	...	“M1”
C2=	S	...	“M1G”
C3=	S	...	“M2”
C4=	S	...	“M3”
C5=	S	...	“N1”
C6=	S	...	“N1G”
C7=	S	...	“N2”
C8=	S	...	“N3”
C9=	S	...	“O1”
C10=	S	...	“O2”
C11=	S	...	“O3”
C12=	S	...	“O4”
C13=	S	...	“L1e”
C14=	S	...	“L2e”
C15=	S	...	“L3e”
C16=	S	...	“L4e”
C17=	S	...	“L5e”
C18=	S	...	“L6e”
C19=	S	...	“L7e”

For the purposes of revising the contents of this specification, the same conditions and settings as in categories “M1” and “N1” will be applied to categories “M1G” and “N1G” respectively.

3.5.1.5 Section ⇒ Description of vehicle for categories M and N

List of vehicle classifications associated with international categories M1-M2-M3-N1-N2-N3

Section name = [DescrizioneVeicolo_MN]

NumeroCostanti=	N	2	Indicates the number of constants listed.
C1=	S	...	“AUTOVETTURA”
C2=	S	...	“AUTOBUS”
C3=	S	...	“PROMISCUO”
C4=	S	...	“AUTOCARRO”
C5=	S	...	“TRATTORE STRADALE”
C6=	S	...	“TRASPORTO SPECIFICO”
C7=	S	...	“USO SPECIALE”
C8=	S	...	“AUTOTRENO”
C9=	S	...	“AUTOARTICOLATO”
C10=	S	...	“AUTOSNODATO”
C11=	S	...	“AUTOCARAVAN”
C12=	S	...	“MEZZO DOPERA”

3.5.1.6 Section ⇒ Description of vehicle for O categories

List of vehicle classifications associated with international categories O1-O2-O3-O4

Section name = [DescrizioneVeicolo_O]

NumeroCostanti=	N	2	Indicates the number of constants listed.
C1=	S	...	“TRASPORTO DI PERSONE”
C2=	S	...	“TRASPORTO DI COSE”
C3=	S	...	“TRASPORTO SPECIFICO”
C4=	S	...	“USO SPECIALE”
C5=	S	...	“CARAVAN”
C6=	S	...	“TRASPORTO ATTREZZATURE”

3.5.1.7 Section ⇒ Description of vehicle for categories L

List of vehicle classifications associated with international categories L1e-L2e-L3e-L4e-L5e-L6e-L7e

Section name = [DescrizioneVeicolo_L]

NumeroCostanti=	N	2	Indicates the number of constants listed.
C1=	S	...	“CICLOMOTORE DUE RUOTE”
C2=	S	...	“CICLOMOTORE TRE RUOTE”
C3=	S	...	“MOTOCICLO DUE RUOTE”
C4=	S	...	“MOTOCARROZZETTA TRE RUOTE”
C5=	S	...	“PROMISCUO TRE RUOTE”
C6=	S	...	“MOTOCARRO TRE RUOTE”
C7=	S	...	“MOTOTRATTORE TRE RUOTE”
C8=	S	...	“TRASPORTO SPECIFICO TRE RUOTE”
C9=	S	...	“USO SPECIALE TRE RUOTE”
C10=	S	...	“QUADRICICLO”
C11=	S	...	“QUADRICICLO LEGGERO”

3.5.1.8 Section ⇒ Diesel emission directives

Section name = [DirettiveEmissioniGasDiesel]

NumeroCostanti=	N	2	Indicates the number of constants listed.
C1=	S	...	“DPR323/71” Indicates that the vehicle is type approved in accordance with Presidential Decree 323/71 and subsequent decrees up to and excluding 72/306/EEC.
C2=	S	...	“72/306/EEC” Indicates that the vehicle is type approved in accordance with 72/306/EEC and subsequent directives up to and excluding 98/69/EC.
C3=	S	...	“98/69/EC” Indicates that the vehicle is type approved in accordance with 98/69/EC and subsequent directives, i.e. vehicles compliant with row B of 98/69/EC or rows B1, B2, C of directive 1999/96/EC.
C4=	S	...	“NESSUNA” Indicates that type approval has been issued in the absence of a relevant directive.

3.5.1.9 Section ⇒ Light vehicle petrol emission directives

Section name = [DirettiveEmissioniGasBenzinaAuto]

NumeroCostanti=	N	2	Indicates the number of constants listed.
C1=	S	...	“RT1902” Indicates that the vehicle is type approved as of act OM 9439 of 4 August 1971 or type-recognised as of act RT 1902 of 2 August 1971 up to and excluding 91/441/EEC.
C2=	S	...	“91/441/EEC” Indicates that the vehicle is type approved under Directive 91/441/EEC and subsequent directive up to and excluding 98/69/EC, i.e. vehicles equipped with catalytic converters.
C3=	S	...	“98/69/EC” Indicates that the vehicle is type approved under Directive 98/69/EC and subsequent directives, i.e. vehicles whose limit values are indicated in row A or row B of the Directive.
C4=	S	...	“NESSUNA” Indicates that type approval was issued in the absence of a reference directive, i.e. vehicles for which the gas analysis test requires the best tuning.

3.5.1.10 Section ⇒ Moped petrol emission directives

Section name = [DirettiveEmissioniGasCiclomotori]

NumeroCostanti=	N	2	Indicates the number of constants listed.
C1=	S	...	“NESSUNA”
C2=	S	...	“97/24/EC”
C3=	S	...	“97/24/EC/PhaseII”
C4=	S	...	“97/24/EC/PhaseIII”

3.5.1.11 Section ⇒ Motorcycle petrol emission directives

Section name = [DirettiveEmissioniGasMotocicli]

NumeroCostanti=	N	2	Indicates the number of constants listed.
C1=	S	...	“NESSUNA”
C2=	S	...	“97/24/EC”
C3=	S	...	“2002/51/EC/PhaseA”
C4=	S	...	“2002/51/EC/PhaseB”

3.5.1.12 Section ⇒ Acoustic directives

Section name = [DirettiveAcusticheAuto]

NumeroCostanti=	N	2	Indicates the number of constants listed.
C1=	S	...	“TU393/59”
C2=	S	...	“70/157/EEC” Denotes regulation 9 ECE/UNO and all regulations which came into force subsequently, and the entry into force of “81/334/EEC”.
C3=	S	...	“81/334/EEC” Denotes all the regulations which entered into force from the above and subsequent directives.

3.5.1.13 Section ⇒ Motorcycle acoustic emission directives

Section name = [DirettiveEmissioniAcusticheMotoveicoli]

NumeroCostanti=	N	2	Indicates the number of constants listed.
C1=	S	...	“TU393/59”
C2=	S	...	“97/24/EC”

3.5.1.14 Section ⇒ Motor vehicle horn directives

Section name = [DirettiveAvvisatoreAcusticoMotoveicoli]

NumeroCostanti=	N	2	Indicates the number of constants listed.
C1=	S	...	“TU393/59”
C2=	S	...	“93/30/EC”

3.5.1.15 Section ⇒ Test type

Section name = [TipoRevisione]

NumeroCostanti=	N	2	Indicates the number of constants listed.
C1=	S	...	“PERIODICHE”
C2=	S	...	“ANNUALI”
C3=	S	...	“STRAORDINARIE”

3.5.2 Environmental values

No official document regulates the connection of barometric stations available on the market to the PCStazione and neither are such stations subject to ministerial approval (ref circ. 6902/604 of 04 August 2000).

It is nevertheless considered reasonable to create a new MCTCNet subfolder named DIR_MET and allocated to the PCStazione in the directory c:\MCTC\.

If at least one weather station is present that allows automatic data acquisition, the PCStazione software connected to it will be responsible for creating and updating a file meteo.met file in the C:\MCTC\DIR_MET\ directory and, if configured, in the \\PCPrenotazione\MCTC\ directory every 5 (five minutes). If necessary, other PCStazione software may synchronise with the file present in the \\PCPrenotazione\MCTC\ directory.

This method guarantees that all devices can use the same environmental values.

If the Meteo.met file is updated automatically by a barometric station, it must not contain the symbol “#”, otherwise if the data are entered by the technical manager, they must be preceded by the symbol “#”.

Devices may include their own weather stations from which data may be recorded but they must nevertheless always allow for the possibility of acquiring such data also from the meteo.met file.

Note that test centres are still obliged to make use of barometric stations able to record temperature, humidity, pressure and wind speed but not to connect them to the PCStazione or other devices because the choice of this solution is still made at the discretion of the user.

If input is carried out manually, the operator must be required to enter updated values at least once each hour. In order to avoid the need for external modules for maintenance of this data, when an interfaceable weather station is not present, the PCStazione is obliged to zero the contents of entries relating to environmental values and request a new input by the operator (while maintaining the format required by MCTCNet).

The format of the section and associated entries are set out below:

3.5.2.1 Section [ValoriAmbientali] File meteo.met

PressAtmosferica=	N (1) (*)	5	NOT OBLIGATORY. Atmospheric pressure in kpa (may be input manually by placing “#” before the value input, in this case DIM +1)
TempAmbiente=	S (*)	3	NOT OBLIGATORY. Environmental temperature in °C. Only values between -99 and 999 are permitted. (may be input manually by placing “#” before the value input, in this case DIM +1)
VelocitaVento=	N (1) (*)	4	NOT OBLIGATORY. Wind speed in m/s (may be input manually by placing “#” before the value input, in this case DIM +1)
UmiditaRelativa=	N (*)	3	NOT OBLIGATORY. Relative humidity in % (may be input manually by placing “#” before the value input, in this case DIM +1)
DataMisura=	D (*)	8	NOT OBLIGATORY. Date of last reading
InizioMisura=	H (*)	6	NOT OBLIGATORY. Measurement start time
FineMisura=	H (*)	6	NOT OBLIGATORY. Measurement end time

3.6 Confidential data

If the PCStazione needs to use a working subfolder, this is identified by the name: **LAVORO**.

The contents of the subfolder must be considered **exclusively for the use of the PCStazione/PCApparecchiatura software** and therefore: **not modified, processed and used** by other software in the network.

3.7 Test centre application and device software updates

Software update also includes firmware update.

It is important to distinguish between two types of update: functional and legal. The former includes all updates made available to resolve problems or improve collateral product functions. The latter covers all updates made necessary by regulatory updates (e.g. introduction of new limits etc).

All manufacturers are obliged to provide updates of their software products to their customers. This obligation concerns regulatory updates that do not affect product metrology. It is an obligation for the updates to be distributed via the Internet using standard protocols (http and ftp); in addition, but not as an alternative, it is possible to use a distribution system based on other Telematic communication channels, even without the use of standard protocols (network with proprietary protocols). Additionally, but not as an alternative, a distribution system involving physical media may also be provided.

The *update* must be carried out in order to respect all canons of usability to ensure that it may be used without difficulty by end users; it must therefore be simple to 'use', 'transport' and 'preserve'. It must also allow mechanisms that ensure configurations remain fully intact in the event of malfunctions (e.g. Backup).

The end-user must be notified of any risks or malfunctions that may arise in the event of *update* (above all in the event of *firmware* updates) but these notifications must not be used for the purpose of discouraging and alienating the end user from the possibility of carrying out the update independently; instead they must simply be designed to make the end-user aware of how the update process works.

In the event of a *regulatory update*, manufacturers are obliged to implement a system for notifying when updates have taken place that allows the proper regulatory procedures to be implemented (e.g. update of metrology books). This notification system may be automatic or manual, online (e.g. e-mail) or by hardcopy (e.g. fax). Manufacturers are obliged to inform end users of the way the notification system operates and the process to be followed. Note also that regulatory update of software cannot be considered valid for the purposes of complying with all regulatory procedures that certify it (e.g. update of metrology books).

The obligation, by manufacturers, to make available online updates of their software products does not necessarily oblige customers to use this technology. They must always have the option of calling in a qualified technician to update the device in question.

4. “PCPrenotazione ↔ PCStazione” data exchange

The exchange of information (data) between personal computers installed in the office and personal computers installed in the vehicle control station (SCA Stazione di Controllo Autoveicoli) is managed by means of a “Rete” connection (§ 2.1.1), using files containing data on an individual road worthiness test.

The convention used to represent data contained in exchange files reflects the specifications of “INI” files (see § 3).

Synchronicity of information exchange is regulated by compiling individual files, in shared folders on “PCPrenotazione Server”, in accordance with the test stage in progress.

The following figure shows the layout of the **MCTC** folder with its associated sub-folders (the name “PcServer” indicated in the diagram is simply provided as an example). The AAAA indicates the last year concluded and not the current year. It cannot contain folders prior to 2003 and it cannot contain folders later than the last year concluded. The first folder must be 2003 and all folders for each year must be present, even if they are empty.

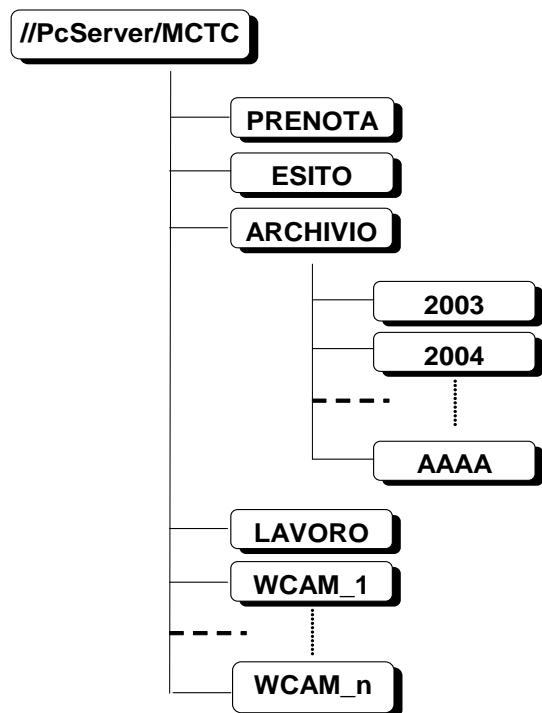


Figure B – Layout of shared folders and sub-folders in the PC named as the network Server

When the state of each activated test changes from “prenotazione” to “revisione in corso”, an “**AA**nnnnnn” type file name is assigned where:

- “**AA**” identifies the year in which the test is performed
- “**nnnnnn**” identifies a progressive number assigned to the test.

For example “**09000001**” identifies test number one of the year 2009.

A 3 character extension “**.xxx**” associated with the above filename identifies the test status and type of data for the vehicle being tested. The file extension is assigned by PCPrenotazione or by PCStazione.

The different types of extension applied are as follows:

- “**PRE**” ⇒ booking data (when at least one device compatible with version 1.0 of the MCTCNet protocol is present)

- “**PR2**” ⇒ booking data (when at least one device compatible with version 2.0 of the MCTCNet protocol is present)
- “**ACC**” ⇒ booking data confirmed during the reception stage; for testing purposes, the “Controlli Visuali” sections will also be contained (when at least one device compatible with version 1.0 of the MCTCNet protocol is present)
- “**AC2**” ⇒ booking data confirmed during the reception stage; for testing purposes, the “Controlli Visuali” sections will also be contained (when at least one device compatible with version 2.0 of the MCTCNet protocol is present)
- “**PFR**” ⇒ measurements provided by the brake tester
- “**SOS**” ⇒ measurements provided by the suspension tester
- “**DER**” ⇒ measurements provided by the drift tester
- “**GAS**” ⇒ measurements provided by the gas analyser
- “**VEL**” ⇒ measurements provided by the speed tester
- “**OPA**” ⇒ measurements provided by the opacimeter
- “**FON**” ⇒ measurements provided by the sound level meter
- “**FAR**” ⇒ measurements provided by the headlight beam tester
- “**FOT**” ⇒ result of the WebCam test
- “**CLK**” ⇒ file for exchanging data between brake test bench and WebCam software
- “**OBD**” ⇒ measurements provided by the Scantool for the EOBD test
- “**REV**” ⇒ data relating to a completed test
- “**SAV**” ⇒ data relating to a test state

La logical sequence for the synchronous exchange of information between “Ufficio↔ SCA” by means of “AAAnnnnn.xxx” files may be summarised with the following passi:

- 1) “PCPrenotazione m” completes the booking data sections and deposits booking file/s AAAnnnnnn.PRE (when at least one device compatible with version 1.0 of the MCTCNet protocol is present) and PR2 (always) in the PRENOTA folder. In addition to the aspects defined for the content of individual PRE and PR2 files, the PCStazione must establish the consistency between both files, in other words they must not contain different information. This check is excluded when the PRE file format is AA9nnnnn.

In line with the new operational flows developed by the Data Processing Centre referred to in circular 29832 of 2 April 2010, it is now considered necessary to enable creation of a PR2 file and, for the interim period alone, of a PRE file only if PCPrenotazione accepted a vehicle booked by the data-processing centre by means of the special web-service (documentation attached to the said circular and subsequent amendments). Because it is not possible to establish operational flows with the data-processing centre during PCPrenotazione software certification, the companies that produce PCPrenotazione shall be responsible for complying with these provisions in versions issued to roadworthiness test centres. It shall be understood that the latter requirement shall also be reflected in the reports on the certification.

- 2) The first PCStazione in any testing line, typically the PC used during the vehicle booking-in stage, unless otherwise specified by the booking file, is the PC responsible for taking the AAAnnnnnn.PRE and AAnnnnnn.PR2 files (when the necessary conditions for their creation described under the previous point are present) contained in the PRENOTA folder and depositing them in the ESITO folder under the names of AAAnnnnnn.ACC and/or AAAnnnnnn.AC2 respectively in order to make them available to the other PCApparecchiatura involved in the test stage;

- 3) With reference to PCs associated with devices connected directly to the RETE (e.g. RilevGAS) or to a PC (e.g. PCStazione), which in turn act as test controllers through their connected measuring devices (by means of RS or DIR links), the PCs making up the SCA part of the centre (including the PC indicated under point 2), complete the sections relevant to them and deposit the associated **AAAnnnnnn.XXX** file in the RESULT folder.

At this stage, in addition to completing the file for the measurement in question, the contents of the **AAAnnnnnn.ACC** (**AAAnnnnnn.AC2**) file must also be checked if this has not already been done as indicated under point 2; to establish the accuracy of the data, it contains a reference to the type of measurement being performed. This is necessary when different testing stages are taking place in the SCA (multistation lines) which may be managed by different software designs (e.g. software for gas and opacity testing PC), where each operator is concerned with their own part of the test sequence as well as the reception stage when the booking data are checked. For example, the operator of station 1, used for gas testing, receives the vehicle (checking: license plate, VIN No etc.) and records data on the type of fuel system, while the operator of station 2, used for brake testing, checks data on the type of braking system. The above combinations and various tests are specific to the configuration in terms of stations installed, software installed and the working methods used by the operator or operators who work in the test centre.

- 4) The PCStazione can allow determination of an overall result only if all the tests required for the category and the characteristics of the tested vehicle are present. Reference will be made to the following table, to be considered during the transitional period and also applicable to PCPrenotazione for validating outcome files relating to a test:

File type	Conditions
PFR	<p>If the PFR version of the MCTCVer.ini file is 200: OBLIGATORY if CategoriaInternazionale <> (“L1e” or “L5e” or “L6e” or “L7e” or if CategoriaInternazionale is equal to “L2e” or “L5e” or “L6e” or “L7e” and the DEC file is not present.</p> <p>If the PFR version of the MCTCVer.ini file is 100 or 150: OBLIGATORY if TipoVeicolo <> MOTOVEICOLO</p>
PES	<p>If the PFR version of the MCTCVer.ini file is 100 or 150: OBLIGATORY if TipoVeicolo <> MOTOVEICOLO and if the PFR is in version 100.</p>
GAS	<p>If the GAS version of the MCTCVer.ini file is 200: OBLIGATORY if Alimentazione_1= “BENZINA” or “METANO” or “GPL” or “MISCELA”.</p> <p>If the GAS version of the MCTCVer.ini file is 100 or 150: OBLIGATORY if Alimentazione_1= “BENZINA” or “METANO” or “GPL” or “MISCELA” and if TipoVeicolo = “LEGGERO”.</p>
OPA	<p>If the OPA version of the MCTCVer.ini file is 200: OBLIGATORY if Alimentazione_1= “DIESEL”.</p> <p>If the OPA version of the MCTCVer.ini file is 100 or 150: OBLIGATORY if Alimentazione_1= “DIESEL” and if TipoVeicolo = “LEGGERO”.</p>
FAR	<p>If the FAR version of the MCTCVer.ini file is 200: OBLIGATORY</p> <p>If the FAR version of the MCTCVer.ini file is 100 or 150:</p>

	OBLIGATORY if TipoVeicolo = "LEGGERO"
FON	If the FON version of the MCTCVer.ini file is 200: OBLIGATORY If the FON version of the MCTCVer.ini file is 100 or 150: OBLIGATORY if TipoVeicolo = "LEGGERO"
SOS	NOT OBLIGATORY
DER	NOT OBLIGATORY
OBD	NOT OBLIGATORY
FOT	If the PFR version of the MCTCVer.ini file is 200: OBLIGATORY If the PFR version of the MCTCVer.ini file is 150: OBLIGATORIO if the PFR file is in version 200 or if the DEC file is present If the PFR version of the MCTCVer.ini file is 100: Must not be entered in FOT file.
IMM	OBLIGATORY if the FOT file is present and the entry GenerazioneFileIMM=S
GOM	OBLIGATORY if AC2 file present
DEC	If the PFR version of the MCTCVer.ini file is 200: OBLIGATORY if CategoriaInternazionale = "L2e" or "L5e" or "L6e" or "L7e" and if the PFR file is not present, otherwise must not be present. If the PFR version of the MCTCVer.ini file is 100 or 150: May be present only if CategoriaInternazionale = "L2e" or "L5e" or "L6e" or "L7e" and the PFR file is not present.
VEL	If the GAS version of the MCTCVer.ini file is 200: OBLIGATORY if CategoriaInternazionale = "L1e" or "L2e" or "L6e" If the GAS version of the MCTCVer.ini file is 150: OBLIGATORY if CategoriaInternazionale = "L1e" or "L2e" or "L6e", vehicle is spark ignition and GAS file is version 2.00 or if CategoriaInternazionale = "L1e" or "L2e" or "L6e", vehicle is diesel and OPA file is version 2.00

- 5) Once the overall result of the test has been established via the PCStazione, the "PCPrenotazione m", will check the presence of all the results files required to complete the test stage (as shown in the previous table). The "PcPrenotazione m" generates the SAV file and starts the procedure for connection to the EDP CENTRE. One certificate has been received to apply to the logbook, it converts the SAV file to REV, entering the anti-forgery code received from the EDP CENTRE. Files relating to motor vehicles identifiable from the numbering AA9nnnnn.XXX must not be entered in the REV/SAV file.

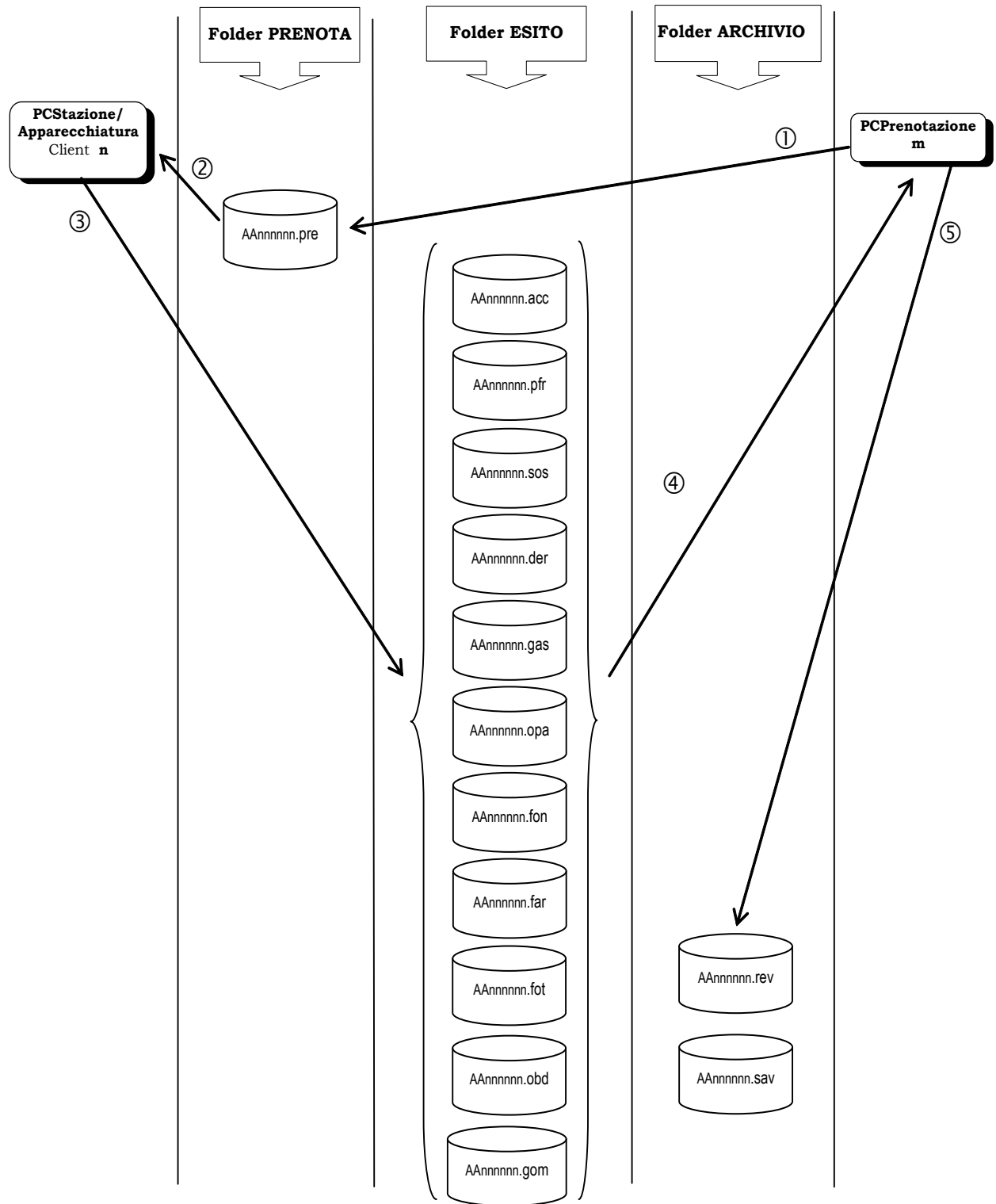


Figure A- Diagram showing “Office- SCA” synchronicity with AAnnnnnn.XXX files

4.1 Archiving of tests carried out and connection to EDP centre

All the sequential AAnnnnnn.* files must be present in the MCTC\Archivio without any gaps or missing files. A new SAV extension has been introduced for this purpose, which will join the REV extension. This means that an AAnnnnnn.SAV file indicating the test state or an AAnnnnnn.REV file indicating a completed test **must** correspond to each AAnnnnnn.PRE file generated by the PCPrenotazione. Having a file that contains details of the test status in the MCTC\Archivio folder allows full traceability of the test. In order to guarantee an effective history of operations carried out in the test centre, it is a requirement that the PCPrenotazione should not envisage in any way deleting a booking for which at least the AAnnnnnn.PRE file has been created.

4.1.1 Test state

A MCTCNet state is defined for each state that may be assumed by the test:

- Booked
- Received or work in progress
- Completed, awaiting transmission to EDP centre
- Completed, cannot be sent to the EDP centre due to expired terms
- Completed with transmission to the EDP centre:
- Cancelled
- Formal errors

4.1.1.1 Booked

This state indicates a test that has been booked but has not yet been delivered to the lines. In the MCTCNet, it can be identified by the presence of the relevant PRE or PR2 file in the MCTC\Prenota folder. The term PRE State will be used throughout the rest of the document to indicate this state.

4.1.1.2 Received or work in progress

This state indicates a test that is in progress on the lines. In the MCTCNet, it can be identified by the presence of the relevant ACC or AC2 file in the MCTC\Esito folder with the *EsitoRevisione* entry not completed. The term ACC State will be used throughout the rest of the document to indicate this state.

4.1.1.3 Completed, awaiting transmission to EDP centre

This state indicates a test that has been completed with the execution of all tests and the allocation of a valid result on the PCStazione, but for which connection to the EDP centre has not yet been activated: the Anti-forgery code is therefore not yet known because it has not yet been received by the EDP centre. In MCTCNet it can be identified by the presence of the file AAnnnnnn.SAV in the MCTC\Archivio folder. It will contain a checksum or an anti-forgery code to prevent modifications. **REC status** terminology will be used throughout the rest of the document to indicate this state.

The SAV file identifying the REC state will be formed by linking all files from the individual tests included in the roadworthiness test (with the separators <rev:test tipo="XXX"></rev:test>) followed in order by the following sections:

[DatiPCPrenotazione]

MarcaPrenotazione=	S	...	OBLIGATORY. Indicates the software manufacturer.
ModelloPrenotazione=	S	...	OBLIGATORY. Indicates the name/model defined by the software manufacturer.
NumeroMatricolaPrenotazione=	S	...	OBLIGATORY. Indicates software serial (matriculation/licence) number.
ApprovazionePrenotazione=	S	...	OBLIGATORY. Indicates the approval number achieved.
DataApprovazionePrenotazione=	D	8	OBLIGATORY. Indicates the date on which approval was obtained.
NumVersionePrenotazione=	S	...	OBLIGATORY. Indicates the PCStazione software version.
NumVersioneMCTCNet=	N	3	OBLIGATORY. Latest MCTCNet protocol version used (e.g.: 200 = 2.00)
DataVersioneMCTCNet=	D	8	OBLIGATORY. Issue date of latest MCTCNet version used.
NumeroPostazionePrenotazione =	N	2	OBLIGATORY. Indicates the workstation number allocated at the activation stage.
CircolareApplicata=	S	...	OBLIGATORY. Indicates identification of latest circular to which the installed software version refers. E.g.: 64/404/2005)

[DatiCentroRevisione]

Denominazione =	S	...	Roadworthiness test centre name
Provincia=	C	2	Code for the relevant province
CodiceImpresa=	C	3	Company code allocated by the M.C.T.C.
NumeroConcessione=	N	5	Franchise number allocated by the M.C.T.C.
AnnoConcessione=	C	4	The year in which the franchise was granted.
Data :	D	8	Creation date of SAV file associated with REC state

The following entry defined as described in [3.2.2](#) is added to the end of this section:

Checksum=	S	235	OBLIGATORY. Checksum of SAV file associated with REC state
-----------	---	-----	---

4.1.1.4 Completed, cannot be sent to the EDP centre due to expired terms

This state indicates a test that has been completed with all tests performed and the assignment of a valid result on the PCStazione. For this reason it has not been sent to the EDP centre and the anti-forgery code has not been entered. In this state, it is not possible to send files to the EDP centre and it is not possible to enter a valid anti-forgery code due to expiry of the terms. In MCTCNet it can be

identified by the presence of the file AAnnnnnn.SAV in the MCTC\Archivio folder. It will contain a checksum or an anti-forgery code to prevent modifications. The terminology RES State will be used throughout the rest of the document to indicate this state.

A SAV file representing an RES will be made up of the SAV file representing the REC state, to which the following section will be added:

[RevisioneScaduta]

Motivazione =	S	320	Reason for creating a SAV file associated with REC state supplied on the PCPrenotazione by the operator
Data =	D	8	Creation date of SAV file associated with RES state

The following entry is added to the end of this section. It is defined as described in [3.2.2](#):

Checksum=	S	235	OBLIGATORY. Checksum of SAV file associated with RES state
-----------	---	-----	---

4.1.1.5 Completed with transmission to the EDP centre:

This state indicates a completed test, with all the tests carried out and a valid result is signed on PCPrenotazione, which has been sent to the EDP centre. In MCTCNet it can be identified by the presence of the file AAnnnnnn.REV file in the MCTC\Archivio folder. It will contain a further error-detecting code, similar to the code used on individual instruments, for the purpose of preventing modifications. A test can reach this status only once it has passed through the *REC state*. More specifically, the SAV file must be converted to a REV file by adding the anti-forgery code issued by the EDP centre and an additional checksum or anti-forgery code. The term REV State will be used throughout the rest of the document to indicate this state.

A REV file will be made up of the SAV file representing the REV state, to which the following section will be added:

[CodiceAntifalsificazione]

Codice =	C	11	Anti-forgery code supplied during the stage of connection to the EDP centre D.T.T.
Data :	D	8	Connection date

The following entry is added to the end of this section. It is defined as described in [3.2.2](#):

Checksum=	S	235	OBLIGATORY. REV file Checksum
-----------	---	-----	----------------------------------

4.1.1.6 Cancelled

This state indicates a test that has not been completed. In MCTCNet it can be identified by the presence of the file AAnnnnnn.SAV in the MCTC\Archivio folder. It will contain a checksum or an anti-forgery code to prevent modifications. The Motivazione entry must also be completed. The

term **SAV State** will be used throughout the rest of the document to indicate this state. The PCPrenotazione may attribute SAV states to a test at any time, allowing the operator to complete the vehicle testing stage and provide reasons.

The SAV file representing the SAV state will be formed by linking all files from the individual tests included in the roadworthiness test (with the separators <rev:test tipo="XXX"></rev:test>) followed in order by the following sections:

[DatiPCPrenotazione]

MarcaPrenotazione=	S	...	OBLIGATORY. Indicates the software manufacturer.
ModelloPrenotazione=	S	...	OBLIGATORY. Indicates the name/model defined by the software manufacturer.
NumeroMatricolaPrenotazione=	S	...	OBLIGATORY. Indicates software serial (matriculation/licence) number.
ApprovazionePrenotazione=	S	...	OBLIGATORY. Indicates the approval number achieved.
DataApprovazionePrenotazione=	D	8	OBLIGATORY. Indicates the date on which approval was obtained.
NumVersionePrenotazione=	S	...	OBLIGATORY. Indicates the PCStazione software version.
NumVersioneMCTCNet=	N	3	OBLIGATORY. Latest MCTCNet protocol version used (e.g.: 200 = 2.00)
DataVersioneMCTCNet=	D	8	OBLIGATORY. Issue date of latest MCTCNet version used.
NumeroPostazionePrenotazione =	N	2	OBLIGATORY. Indicates the workstation number allocated at the activation stage.
CircolareApplicata=	S	...	OBLIGATORY. Indicates identification of latest circular to which the installed software version refers. E.g.: 64/404/2005

[DatiCentroRevisione]

Denominazione =	S	...	Roadworthiness test centre name
Provincia=	C	2	Code for the relevant province
CodiceImpresa=	C	3	Company code allocated by the M.C.T.C.
NumeroConcessione=	N	5	Franchise number allocated by the M.C.T.C.
AnnoConcessione=	C	4	The year in which the franchise was granted.
Data :	D	8	Creation date of SAV file associated with SAV state

[RevisioneAnnullata]

Motivazione =	S	320	Reason for creating a SAV file supplied on the
---------------	---	-----	--

			PCPrenotazione by the operator
--	--	--	--------------------------------

The following entry defined as described in [3.2.2](#) is added to the end of this section:

Checksum=	S	235	OBLIGATORY. Checksum of SAV file associated with SAV state
-----------	---	-----	---

4.1.1.7 Formal errors

This status is used to indicate a test for which an overall result has been allocated but that contains errors. In MCTCNet it can be identified by the presence of the file AAnnnnnn.SAV in the MCTC\Archivio folder. It will contain a checksum or an anti-forgery code to prevent modifications. The term ERR State will be used throughout the rest of the document to indicate this state.

With this association, a lack of progression of the AAnnnnnn files in the MCTC\Archivio folder always indicates anomalous MCTCNet management behaviour.

The SAV file representing the ERR state will be formed by linking all files in the ESITO and PRENOTA folders for the roadworthiness test (with the separators <rev:test tipo="XXX"></rev:test>) followed in order by the following sections:

[DatiPCPrenotazione]

MarcaPrenotazione=	S	...	OBLIGATORY. Indicates the software manufacturer.
ModelloPrenotazione=	S	...	OBLIGATORY. Indicates the name/model defined by the software manufacturer.
NumeroMatricolaPrenotazione=	S	...	OBLIGATORY. Indicates software serial (matriculation/licence) number.
ApprovazionePrenotazione=	S	...	OBLIGATORY. Indicates the approval number achieved.
DataApprovazionePrenotazione=	D	8	OBLIGATORY. Indicates the date on which approval was obtained.
NumVersionePrenotazione=	S	...	OBLIGATORY. Indicates the PCStazione software version.
NumVersioneMCTCNet=	N	3	OBLIGATORY. Latest MCTCNet protocol version used (e.g.: 200 = 2.00)
DataVersioneMCTCNet=	D	8	OBLIGATORY. Issue date of latest MCTCNet version used.
NumeroPostazionePrenotazione =	N	2	OBLIGATORY. Indicates the workstation number allocated at the activation stage.
CircolareApplicata=	S	...	OBLIGATORY. Indicates identification of latest circular to which the installed software version refers. E.g.: 64/404/2005

[DatiCentroRevisione]

Denominazione =	S	...	Roadworthiness test centre name
Provincia=	C	2	Code for the relevant province
CodiceImpresa=	C	3	Company code allocated by the M.C.T.C.
NumeroConcessione=	N	5	Franchise number allocated by the M.C.T.C.

MCTCNet 2

AnnoConcessione=	C	4	The year in which the franchise was granted.
Data =	D	8	Creation date of SAV file associated with ERR state

[RevisioneErrore]

Motivazione =	S	320	Reason for creating a SAV file associated with ERR status supplied automatically by the PCPrenotazione software
---------------	---	-----	---

The following entry defined as described in [3.2.2](#) is added to the end of this section:

Checksum=	S	235	OBLIGATORY. Checksum of SAV file associated with ERR state
-----------	---	-----	---

4.1.2 Data security

In addition to the traceability of roadworthiness tests and the progression of AAnnnnnn.* files it is also necessary to ensure that the data containing the files are not tampered with and ensure that each file is the result of an automatic change in state, without any type of external intervention. For this purpose, an additional checksum or anti-forgery code is introduced into the REV and SAV files that is generated in a similar way to the code introduced into each individual test file.

4.1.3 Backup

The daily backup procedure must consider all types of files present in the MCTC\Archivio folder: REV, SAV

In order to keep down the number of files present in the ARCHIVIO folder, the SAV and REV for a completed year must be filed in an appropriate folder named with the year of reference (e.g.: "2007"). Note that the REV and SAV files for the current year must be kept in the ARCHIVIO folder.

4.2 “MCTCNet” protocol update methods and flows

This paragraph describes a method of updating the MCTCNet system that does not require the simultaneous updating of all the devices. It refers, in particular, to the updating of version 1.00 (currently in use) to version 2.00 (the subject of this specification).

Version 1.00 of the protocol covers the following points:

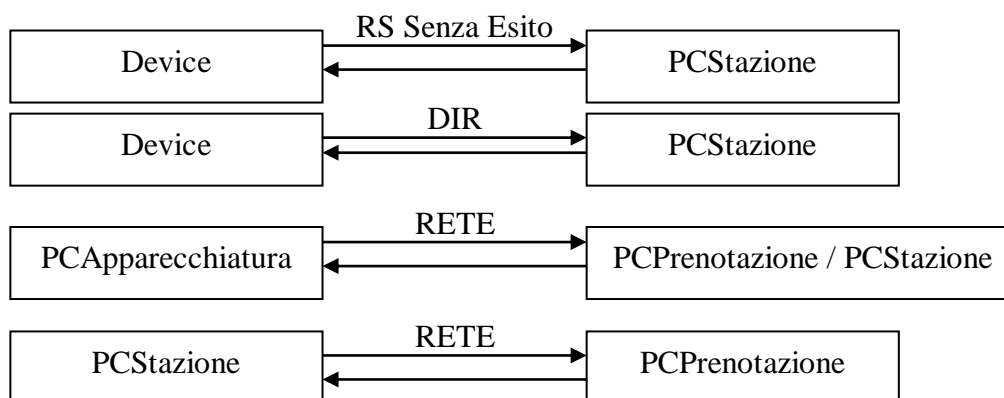
- the protocol version and date apply to the entire system and are in the **MCTC.INI** file;
- the values read from this file are entered in the booking and reception files and are used by the PCStazione PCs when they communicate with the “RS” devices;
- changing the MCTC.INI file version brings about the global update of all the MCTCNet devices present in the service centre;
- the devices communicate using "INI" files: the accuracy of these files is confirmed by a close check on entries and sections in accordance with the “OMON” program.

The current constraints may therefore be summarised as follows:

- It is not possible to alter the version contained in the MCTC.INI, because all the devices would be forced to use the new MCTCNet version simultaneously;
- It is not possible to introduce indications of additional versions in any type of “INI” file (apart from MCTC.INI, also the PRE booking files, the ACC reception files and the individual FON, PFR test files etc.) because it is not possible to add new fields to existing “INI” files.

4.2.1 MCTCNet system connection set-up

In an MCTCNet system, communication between the various systems takes place in a one-to-one manner, according to the following setup:



For each of the cases mentioned, we must therefore find a way to get round the constraints described in the above paragraph in order to maintain internal consistency. Another problem is the fact that several devices at the same time may be present simultaneously in the same centre. These may even be made by different manufacturers, with a considerable number of possible combinations.

4.2.2 New update methodology

The new methodology for updating devices in testing centres involves updating the PCPrenotazione software and then the PCStazione software so that they are compatible with both the updated and non-updated peripheral devices.

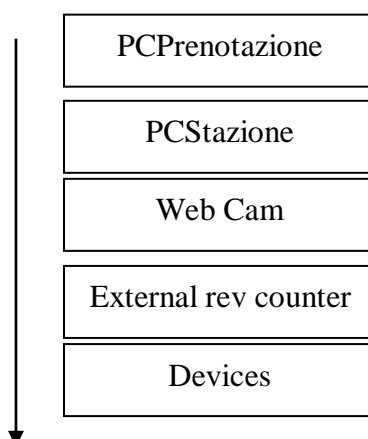
The following modifications are necessary in relation to MCTCNet version 1.00:

- creation of a new INI file in the same MCTC.INI folder, with the version of each type of device present in the centre;
- the creation of two booking files and two reception files, one for the existing protocol version and one for the new version;
- the entry of the protocol version and date of the generating device in the results file for versions later than 1.00.

This methodology involves the following constraints:

- the PCPrenotazione and PCStazione PCs must be updated first in order to support the latest available protocol version. In order to ensure the correct file flow and their validation, with particular reference to the AAnnnnnn.DEC file, the PCPrenotazione must be updated before the PCStazione.
- The WebCam device must necessarily be installed and configured before updating the brake test bench to version 2.00.
- The rev counter device must be updated to version 2.00 before the devices that make use of it.
- As mentioned previously, motorbike devices do not have a version 1.00 of the MCTCNet protocol, except for the serial communication for the speed test (the latest version of which is defined in circular 2258/404 of 29 September 2003). The protocol contained in the above circular nevertheless contains certain discrepancies in relation to this specification, particularly with regard to the use of different question and answer TIPOS. In order to standardise the convention used for serial communications, the speed test bench must be updated to version 2.00 at the same time as the motorbike exhaust gas analyser is updated. This need emerges solely due to the introduction of the motorbike devices to MCTCNet, while for future updates, the serial commands will be used to identify the speed test version in use.

to simplify system management, only two versions of the protocol are allowed simultaneously: the current one (version 1.00) and the next one (version 2.00). Due to this, version 1.00 will no longer be usable during subsequent updates to version 2.00.



MCTCNet line update time sequence.

4.2.3 Use of MCTCVER.INI file

The new file, to be placed in the same MCTC.INI folder, should be named MCTCVer.INI and should contain the MCTCNet protocol version of each device category (except PCPrenotazione and PCStazione and those not specifically required by this document) present in the centre. All software modules that are connected by means of the RETE protocol must then refer to this file to find out the protocol versions to be adopted.

The new file will therefore contain one section for each device category (the section name is the device type code: OPA, GAS, PFR, FAR, FON, etc). Each of these sections will contain two entries with the version and date of the MCTCNet version supported.

ENTRY	TIPO	DIM	DESCRIPTION
Version=	N	3	MCTCNet protocol version (e.g.: 100=1.00; 200=2.00)
Data=	D	8	Version issue date

If devices of the same type with version 1.00 and with version 2.00 are used simultaneously in the centre, a special version number is introduced: 1.50. This number does not refer to an existing protocol version. It is used only to notify software operating on the line of the presence of devices of the same type with different versions. Particular attention should be paid to devices used to test motor vehicles for which a communication protocol has not been defined. They must be treated in the same way as devices that are already approved for MCTCNet. If one instrument used for the vehicles (e.g.: brake test bench) has not yet been updated while the same type of device approved for motorbikes has already been updated to MCTCNet 2.00, version 1.50 must be entered. Similarly, if an instrument used for cars is updated to version 2.00 while the same type of device used for motor vehicles is not yet in the MCTCNet environment, the value 1.50 will be entered

Refer to the following rules when setting the version number and date of a device category:

- If all devices in a category are running version 1.00 and do not yet use MCTCNet (devices currently used for motor vehicles), add Versione=100 and the official date of version 1.00 to the file.
- If all devices in a category are running version 2.00, add Versione=200 and the official date of version 2.00 to the file.
- “If some devices in a category are running version 1.00 or do not yet use MCTCNet (devices currently used for motor vehicles) and others in the same category are running version 2.00, in the section for equipment type, add Versione=150 in the entry Version= and the value and the value 11082009 nella entry Data=”.

4.2.3.1 Content of MCTCVER.INI file

The MCTCVer.INI file must be created by PCPrenotazione during update to version 200. The file must contain the following Sections and Entries: [OPA], [PFR], [GAS], [FON], [FAR], [OBD], [FOT]. The tachometer and speed test devices are excluded because these are not affected by the MCTCNet files and are recognised by the instruments that use them by means of serial identification commands.

The operator responsible for updating an individual device is also responsible for updating the associated version contained in the MCTCVer.INI file.

Writing of the MCTCVer.INI file by PCPrenotazione during update to version 2.00

[OPA]
Version=100

Data=02111999

[GAS]

Version=100

Data=02111999

[PFR]

Version=100

Data=02111999

[FON]

Version=100

Data=02111999

[FAR]

Version=100

Data=02111999

[OBD]

Version=100

Data=02111999

[FOT]

Version=100

Data=02111999

Example of the MCTCVer.INI file following partial update:

[OPA]

Version=100

Data= 02111999

[GAS]

Version=200

Data=11082009

[PFR]

Version=150

Data=11082009

[FON]

Version=100

Data= 02111999

[FAR]

Version=100

Data= 02111999

[OBD]

Version=100

Data= 02111999

[FOT]

Version=200

Data= 11082009

In this specific case, one or more opacimeters are present only with version 1.00, one or more gas analysers only with version 2.00, several brake test benches of which at least one running version 1.00 and at least one running version 2.00, one or more sound meters only with version 1.00, one or more headlight aligners only with version 1.00, no scantool installed and the Licence Plate Recognition system in version 2.00.

4.2.4 Use of multiple booking files

When PCPrenotazione reads the MCTCVer.INI file, it will be aware which protocol versions must be supported. During the interim period, file PR2 must be created and as long as devices are present that are not updated to the new protocol version (revealed by the presence of values 100 or 150 in the OPA, GAS, PFR, FON, FAR sections in the MCTCVer.ini file), also the PRE file. At the end of the interim period, in other words when the maximum term allowed for updating the devices is reached, the PCP must generate only the PR2 file. The PRE file PRE is implicitly not required for MOTOR VEHICLES because MCTCNet 100 did not support this type of vehicles and only the PR2 file will therefore be generated. In the MCTCNet version 100 environment, however, manufacturers have adopted their own data exchange criteria with motorcycle devices, which are similar to the MCTCNet protocol and use these same folders PRENOTA, ESITO and DIR_XXX.

To allow the maintenance of proprietary protocols for motor vehicles, it is permissible for software modules not to apply the checks laid down in the MCTCNet2 specification if the format of the PRE and ACC file is as follows: AA9nnnnn.xxx. Note that this exemption applies only to the interim period and only to devices that are not yet in line with the new protocol (revealed by the presence of the values 100 or 150 in the OPA, GAS, PFR, FON, FAR sections of the MCTCVer.ini file). The proprietary files must also be entered in the AAAnnnnn.sav file so that they can be forwarded to the EDP CENTRE for any necessary consistency checks.

Please note that in the case of equipment approved for testing vehicles that has not been updated to the MCTCNet2 or is not connected through a proprietary protocol whose management is regulated by the technical specification, as amended, the Technical Manager shall enter the recorded result of the single test carried out on the vehicle in the notes to the ACC file in PCStazione. This provision is naturally applied only during the transitional period, i.e. when it is still possible to use equipment reserved only for motor vehicle categories that are not connected via the government-approved computerised standard.

4.2.5 Use of multiple reception files

The first PCStazione that carries out reception will be responsible for creating the reception file or files, one for each existing booking file.

- One ACC file is generated from the PRE file
- One AC2 file is generated from the PR2 file

The PCStazione must simply limit itself to generating one ACC file for each PRE file, and one AC2 file for each PR2.

The PCStazione must enter any changes to the booking data in each reception file (both ACC and AC2).

4.2.6 Further notes on multiple booking and reception files

If the above conditions are present and it is therefore necessary to produce multiple reception and booking files, it will be necessary to guarantee data congruence between different versions of the same type of file (the PRE file must be congruent only with its associated PR2 file, the ACC file must be congruent only with the relative PC2 file). For example, a PRE file cannot be associated with a vehicle with a numberplate different to that declared in the PR2 file. If some types of data are changed, data congruence must be guaranteed for all data that are declared simultaneously in both versions of the same file type, assuming as a general rule that data relating to one version cannot contradict the data relating to another. For example, Fuel system data has been amended in the changeover from the previous version to the current version: because it is not therefore possible to specify complete equality of Alimentazione_1 (and Alimentazione_2) entries in both versions of the file, it will be necessary to guarantee that the set of data that can be extrapolated from a PR2 file identifies a vehicle with the same fuel system characteristics described in the associated PRE file. For example, in the case of a car with an Alimentazione_1 entry of PETROL CAT in the PRE file, the associated PR2 file must specify a “LEGGERO” vehicle with its Alimentazione_1 entry set to PETROL and its DirettivaEmissioniBenzinaAuto greater than or equal to 91/441/EEC (directive identifying a vehicle with catalytic converter).

4.2.7 Entering protocol version in results files

Individual test results are saved in the various results files (OPA, GAS, PFR, FAR, FON, etc.) sent to the network by the devices that have completed each test (or by the PCStazione for DIR or RS devices). In order to establish the version of the device that generated each result file with certainty, it is necessary to add the protocol version and date of each file as of version 2.00.

In files with more than one section, the two new entries must be entered in the section containing the device software version (see point 3.2). If the PCStazione generates the results files (when connected to RS devices), the version and date entered must be those of the connected devices. PCPrenotazione then assembles the various results files to generate the REV file. Sections with version 1.00 and other sections with version 2.00 may therefore co-exist in this file and are distinguished from one another due to these new entries.

Note: the new entries are NOT entered into version 1.00 files in order not to interfere with the strict validation of entries and sections in accordance with the OMON program. When a results file is analysed (or a results section in a REV file) the version of the result is 1.00 if no protocol version is present.

4.2.8 Information flows after the required changes

At this point we will examine the information flows that involve the various test centre components and how these may be affected by updating the software by means of the methods proposed here.

4.2.8.1 PCStazione and PCPrenotazione flow

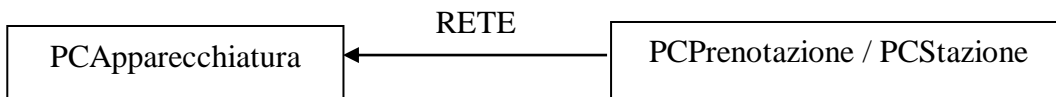


The information flow indicated in the diagram refers to the PRE and/or PR2 files that are generated by PCPrenotazione. The PCStazione may accept both old and new generated booking files without interrupting the data flow.

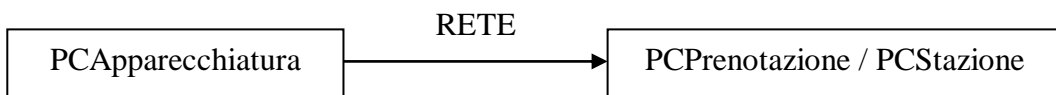


The information flow indicated in the diagram refers to both results files generated by PCStazione according to the devices connected to it and also to the ACC and/or AC2 files that arise out of the vehicle reception operation. PCPrenotazione may accept both old and new generation data.

4.2.8.2 Flow for PCApparecchiatura connected to PCPrenotazione in “RETE” mode

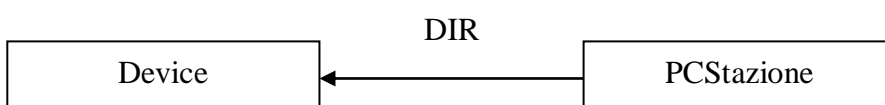


This information flow involves the ACC and/or AC2 files generated during the reception stage by a PCStazione. Update of the PCStazione does not prevent the device from operating correctly because the appropriate versions are present (ACC and/or AC2).



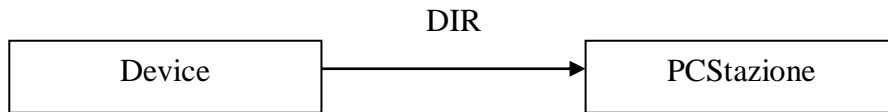
This information flow involves the result file (PFR, FAR, etc.) that contains the test result. The device update involves the correct operation of PCStazione and PCPrenotazione, which must be compatible with both MCTCNet versions. The result file version is obtained from the file due to the two new NumVersioneProtocollo and DataVersioneProtocollo entries (if these are absent, the version is 1.00).

4.2.8.3 Flow for device connected to PCStazione in “DIR” mode



This information flow involves the ACC and/or AC2 files generated during the reception stage by a PCStazione and copied into the folder DIR_XXX (DIR_FAR, DIR_GAS, etc). Updating the

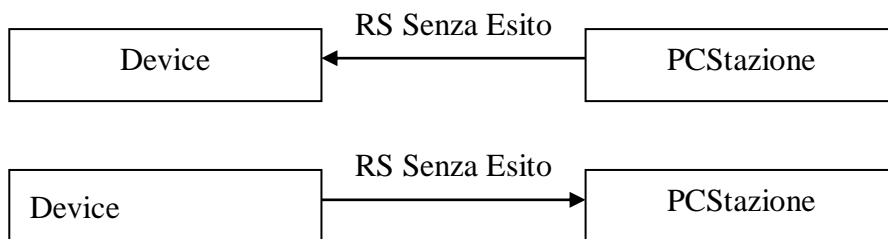
PCStazione does not prevent the device from operating correctly because the PCStazione copies both the reception files ACC AND AC2 (if only one reception file is present, only this is copied).



This information flow involves the result file (PFR, FAR, etc.) produced as a result of the test. Updating the device involves the PCStazione, which checks this file. The result file version is obtained from the file due to the two new NumVersioneProtocollo and DataVersioneProtocollo entries (if these are absent, the version is 1.00).

Important: the DIR cancels the reception file (ACC or AC2) corresponding to its own version from the DIR_XXX folder. The PCStazione is responsible for deleting the other file (if present). This must be done after the device has submitted its results file.

4.2.8.4 Flow for device connected to PCStazione in “RS Senza Esito” mode



In this case, the PCStazione guarantees compatibility with both versions by asking the device for the protocol version identification (by means of the ID command) at the beginning of each test. The device responds to this command with its protocol version. PCStazione must continue the test only if the version shown by the device is the same read in the MCTCVER.INI file. If version 1.50 is specified in this file, both version 1.00 and version 2.00 are allowed. The result file generated by PCStazione must correspond to the device version.

Note: there are no problems of compatibility between the two versions because the PCStazione does not show its own protocol version number in the ID command but must merely adapt to the version number transmitted by the device.

4.2.9 Resolution of ambiguities over modified entries

Changeover from one version of MCTCNet to the next version generates ambiguities between the ACC and AC2 files and between the PRE and PR2 files. The PCPrenotazione and PCStazione must check that the contents of both file types are consistent with one another. During the interim period it will therefore be necessary to adopt certain conversion criteria to guarantee the interchangeability of software and equipment. In particular, PCPrenotazione must adopt the following table for writing of PRE and PR2 files and it must also therefore be adopted by PCStazione for formal consistency checks between both files. It must also be used by PCStazione for writing ACC and AC2 files and consequently by PCPrenotazione for formal consistency checks on both files.

Starting on the assumption that the AC2 extends the information content of the ACC file, making the information content more specific, removing only information that is superfluous or has become obsolete for the purpose of the test, the check criteria will be satisfied in all cases by taking the PR2

or AC2 file as a starting point. The PRE and ACC files must therefore be the ones that satisfy the check criteria.

For all entries not covered by these tables and present in both versions PRE/PR2 or ACC/AC2, the consistency of the various values must be checked, taking into account the different size; for example, if the value of the CognomeDenominazione entry in file AC2 is 32 characters while the value for the ACC file is a maximum of 25 characters due to limits imposed by MCTCNet1, the test outcome will be positive if the first 25 characters of the value of the PR2 or AC2 entry (minus any final spaces) correspond to the value of the entry in the PRE or ACC file.

“The consistency between the entry “Note=” contained in the ACC file and the same entry contained in the AC2 file must be checked only when the technical manager has determined the overall result of the test, therefore only if the entry “EsitoRevisione=” has been completed. When PCStazione 2.00 determines the overall outcome, it must complete the entry “Note=” in the ACC file with the same value as the entry “Note=” in the AC2 file.”

Check criteria between PRE-PR2 and ACC-AC2 file during interim period		
AC2 file entries	Possible values assumed	Positive check conditions A formal error must be generated in the event of inconsistency <i>(Entries refer to PRE and ACC files unless otherwise specified)</i>
TipoVeicolo	“LEGGERO”	TipoVeicolo = “LEGGERO”
	“PESANTE”	TipoVeicolo = “PESANTE”
	“MOTOVEICOLO”	PRE and ACC files may be present in format AA9nnnnn but will not be formally checked. If the PCStazione detects the PRE file in the format Aannnnnn, it must generate a formal error
CategoriaInternazionale	“L1e”, “L2e”, “L3”, “L4”, “L5”, “L6”, “L7”	PRE and ACC files may be present in format AA9nnnnn but will not be formally checked. If the PCStazione detects the PRE file in the format Aannnnnn, it must generate a formal error
	“M1”	DescrizioneVeicolo must assume one of the following values: “AUTOVETTURA” “PROMISCUO” “AUTOCARAVAN” “TRASPORTO SPECIFICO” “USO SPECIALE” AND TipoVeicolo = “LEGGERO”
	“M2”	DescrizioneVeicolo must assume one of the following values: “AUTOBUS”
	“M3”	DescrizioneVeicolo must assume one of the following values: “AUTOBUS” AND TipoVeicolo = ”PESANTE”
	“N1”	DescrizioneVeicolo must assume one of the following values: “AUTOCARRO” “TRATTORE STRADALE” “TRATTORE PER SEMIRIMORCHIO” “TRASPORTO SPECIFICO” “USO SPECIALE” AND TipoVeicolo = “LEGGERO”
	“N2”	DescrizioneVeicolo must assume one of the following values: “AUTOCARRO” “TRATTORE STRADALE” “TRATTORE PER SEMIRIMORCHIO” “TRASPORTO SPECIFICO” “USO SPECIALE” AND TipoVeicolo = ”PESANTE”
	“N3”	DescrizioneVeicolo must assume one of the following values: “AUTOCARRO”

		<p>“TRATTORE STRADALE” “TRATTORE PER SEMIRIMORCHIO” “TRASPORTO SPECIFICO” “USO SPECIALE” AND TipoVeicolo = ”PESANTE”</p>
	“O1”, “O2”	<p>DescrizioneVeicolo must assume one of the following values: “RIMORCHIO” “SEMIRIMORCHIO” AND TipoVeicolo = “LEGGERO”</p>
	“O3”, “O4”	<p>DescrizioneVeicolo must assume one of the following values: “RIMORCHIO” “SEMIRIMORCHIO” AND TipoVeicolo = ”PESANTE”</p>
DataPrimaImm	Type D format with exception for day and month, which may assume value “00”	Value of AnnoPrimaImm must be equal to year of DataPrimaImm for file PR2 or AC2.
Alimentazione_1	“BENZINA”	<p>If DirettivaEmissioniGasBenzinaAuto of AC2 file is “RT1902” or “NESSUNA” and registration year is prior to 01/10/1986, then Alimentazione_1=“BENZINA<86”.</p> <p>If DirettivaEmissioniGasBenzinaAuto of AC2 file is “RT1902” and registration year is 01/10/1986 or later but earlier than 01/07/2002 then Alimentazione_1=“BENZINA NO CAT”</p> <p>If DirettivaEmissioniGasBenzinaAuto of AC2 file is “91/441/CEE” or “98/69/CE” then Alimentazione_1=“BENZINA CAT”</p>
	“DIESEL”	<p>If Turbo=“S” in file AC2, then Alimentazione_1=“DIESEL TURBO COMPRESSO”.</p> <p>If Turbo=“N” in file AC2 and CorrettorePressione=“N”, then Alimentazione_1=“DIESEL ASPIRATO SENZA CORRETTORE” or otherwise “DIESEL ASPIRATO CON CORRETTORE”</p>
	Other types available for the Entry	Value must correspond
AzionamentoFrenoStazionamento	“ELETTRICO”	FrenoStazionamento may assume the value “MANO” and also “PEDALE”
	Other types available for the Entry	Value must correspond (N.B. possible “NON PRESENTE” value in file AC2 is irrelevant because is possible only in certain motor vehicle categories)
PosAssiStaz	“L” (9)	The flag number with value “S” must coincide with the value of Entry NumAssiStazionamento
NomeEntry (applies to all Entries relating to visual defects)	“I”	If the entry is present with the same name then NomeEntry=“I”
	“R”	If the entry is present with the same name then NomeEntry=“R”
	“N”	If the entry is present with the same name then NomeEntry=“R”

4.2.10 Miscellaneous notes

- For reasons of simplicity, only two versions may coexist on the system at the same time: the current one and the next one. An MCTCNet update necessarily involves all device types. For example, before changing over to a future 3.00 version, it will be necessary to upgrade all the devices in the centre to version 2.00.
- The decelerometer instrument is not mentioned in the MCTCVER.INI file because no MCTCNet approval is provided for the instrument. No transitional period is therefore provided for the AAnnnnnn.DEC file and it will be operational from the moment that the PCStazione and PCPrenotazione are updated.
- All versions later than 1.00 contain two new fields in the files and results sections that clearly identify the version. If these two fields are missing, this indicates that the results are version 1.00.
- Strict analysis of the entries and sections is not affected: it is, however, necessary to have different validation algorithms for each version supported. Current implementations of version 1.00 will continue to operate without problems during the transition to version 2.00.

4.2.11 Test operating flow at the completion stage

When the necessary conditions are met, PCPrenotazione is obliged to convert a test to **REC State** at the moment of completion. The test is considered to be completed when the operator stores a valid outcome by means of the PCStazione and in the MCTC\Esito folder, all the files for all the tests obligatory for completion of the test are present and in the valid format.

If PCPrenotazione detects one or more formatting errors, MCTCNet must convert the test to ERR State.

Conversion of the test to REC State requires the immediate creation of a SAV file in accordance with the above rules and the consequent deletion of all files relating to the test from the MCTC\Esito folder. When a connection to the EDP centre is available, the PCPrenotazione must send the EDP centre a SAV file relating to the **REC state** of the testing question in order to obtain a valid anti-forgery code. Because **REC state** necessarily identifies a file relating to a completed test with a valid format, once the EDP centre receives the file, it is able to issue an anti-forgery code for the complete test. This code must be used by PCPrenotazione to complete the test, creating the required REV file containing the anti-forgery code received through the link to the EDP centre, and deleting the SAV file used previously. PCPrenotazione is obliged to allow the operator to make the connection to the EDP centre from the creation date of the SAV file on the **REC state**. Note that the connection may always be carried out manually by the technical manager and for this reason all the PCPrenotazione PCs must allow manual import of the anti-forgery code, which will start the procedure for changing the state (from REC to REV) with consequent creation of a REV file and deletion of the SAV file.

If the operator has not taken steps to connect to the EDP centre once the maximum period allowed by the EDP centre has elapsed, the PCPrenotazione is obliged to change the state to RES State with a consequent obligatory request for reasons to the operator, followed by immediate modification of the SAV file with the addition of data for the change of state.

It is an obligatory requirement for it to be impossible for any PCPrenotazione or PCStazione software to delete any PRE or ACC file apart from for the actions listed in this document.

Note that from the time a SAV file is generated, it must no longer be possible to reset the associated test in the line. If, for example, the SAV was generated by a formatting error or a PCPrenotazione data change, a new progressive number must be applied to the vehicle test.

4.3 Notes on the performance of tests during the roadworthiness test.

1. All PCStazione PCs must be able to determine a result automatically for tests carried out with RS Without Result devices because it must be possible to enter limits for the vehicle being tested. The possibility of the software allowing manual modification of the result determined by the test is therefore ruled out.
2. The PCStazione must not allow determination of the overall result when one or more instruments show a periodic test expiry date beyond permitted limits.
3. It must be possible for tests included as part of the visual checks to be carried out at any time, from the time of booking file reception to determination of the overall result.
4. All Entries, if completed, must be acquired automatically by the devices that use them.
5. Note that DIR and RETE software modules and PCStazione software is not allowed to emulate tests required for the purposes of roadworthiness testing, even in debugging mode. Any system designed for testing purposes must be a proprietary product of the manufacturer or software house and must not be an integral part of type approved software modules, and neither must it be disclosed.
6. “To run the application of a device connected in DIR mode, the PCStazione setup must only allow one executable to be entered. Several identical devices may therefore be connected to one PCStazione, but only one executable must be allowed for each of these. The manufacturers of DIR modules must ensure it is not necessary to supply additional parameters to be set in the PCStazione software in order to run the software.”
7. “except in cases where the operator voluntarily cancels test execution and only if the connected devices have already been identified (correct reception of the ID command for all devices necessary for the vehicle being tested), whenever the test is interrupted for any reason, the software must write the results file (the file must be formally correct). all values measured up to the interruption must be entered in the file and if they are sufficient to set a partial results, the corresponding result must be correctly completed (for example, if the left low beam headlight test is completed and the interruption occurs during the left high beam test). The remaining values that it is obligatory to record must be entered with value “0” (written in the format required by the specifications for that specific entry) and all the associated results, excluding those that must be set to “N”, must be set to “I”, irrespective of the comparison with the related limit. Where the test interruption does not depend on a CodErrore received from the device, the PCStazione will automatically complete the above entry with the reason that led to the interruption (e.g.: “Irregular overload status” or “received NAK” or “reached timeout”, etc).”
8. All applications type approved for performance of an instrumental test, must indicate the number of days remaining before the next obligatory periodic test. Once one year has elapsed from the last check, the applications must not allow a test to be carried out if the instrument is initialised by an ACC file or if the test is started in the manner specified in this specification.

9. The MCTCNet approved external rev counter must not allow for the possibility of altering or blocking the measured value. The measurement obtained must be continuously shown on the display (if present) and transmitted via the MCTCNet protocol.
10. Note that circular 88/95 indicates that exhaust gas must be measured for 30 seconds both when idling and during fast idle. On this basis, note that software modules are not permitted to allow the test to be interrupted before the end of the 30-second period, even in debugging mode, if an official roadworthiness test is being performed.
11. For the whole 30-second period allowed for exhaust gas analysis, the measured CO₂ value must constantly be above 6% vol; otherwise, the 30 second count must be restarted (see § 5.1.3.1.14)
12. As already indicated in the changes to the MCTCNet file entries, results measured by the devices cannot be altered under any circumstances (even by entering a “#”).
13. All software modules for devices type-approved for DIR and/or RETE mode must allow the display of all ACC and/or AC2 files contained in the MCTCNet data exchange folders, only if device use is allowed for the vehicle type. For example, an analyser type-approved only for cars cannot display an AC2 file for which the vehicle type is MOTOR VEHICLE. The test can be started automatically only if a single ACC or AC2 file is present, when the technical manager need not be asked to select a vehicle.
14. Given that all weighing systems present on the market and type approved for MCTCNet are an integral part of the type approval performed for the brake test benche, it is considered pointless to write the AAnnntnn.PES file. Values measured by a type approved weighing system under the brake tester rollers or integral with the suspension test bench, will be entered in the AAnnntnn.PFR file (see 3.6 and 3.8). For this purpose, if the value of the brake test bench version contained in the MCTCVer.INI file is 200, the PCStazione should delete the DIR_PES folder from those present inside the MCTC folder on PCStazione, or the DIR_PES folder must be present if the brake test bench version is lower than 200.
15. All software must provide for management of the line Entry. It must only identify bookings destined for the line for which they are configured, and all those destined for “0”. If the line entry has been entered as “0” in the PRE or PR2 booking file, the PCStazione software, even if configured for a specific line, must keep the entry in the reception file “ACC” as “0”, unless it has been expressly modified by the operator during reception. On the request of the operator, the PCStazione must allow the display and amendment of bookings destined for different lines.
16. The technical manager must have the power to change the overall result of the test, accounting for the reasons in the notes.
17. PCPrenotazione must print the following data in the overall report, in addition to data already required by the new 8895 and later regulations:
Vehicle type approval number, in the section containing nominal vehicle data. Clearance test identification data: Manufacturer, Model, Type approval, Serial Number, Due date of the periodic test.

18. All items relative to visual faults must be specifically reported in the overall report, indicating the result determined by the technical manager.
19. It is not permitted for software types approved for DIR or RETE or for PCStazione software to use tests already carried out, loaded into memory or stored in the archive for testing purposes. It is not permitted for PCPrenotazione software to change a pre-test into an official test and vice versa.
20. For RS Senza Esito modules, all DIR or RETE and PCStazione modules must allow the operator to enter notes on the test carried out.
21. Use of a force meter is obligatory. The brake test bench software is not therefore allowed to carry out the test unless a force meter is applied to the pedal or lever to achieve maximum braking force or blocking of the roller. The entry may not therefore be completed with zero, except for the parking brake when AzionamentoFrenoStazionamento="ELETTRICO".
22. When the sound meter test is carried out, during the interim period, using equipment that has not yet been updated to MCTCNet2, the PCStazione must highlight the possible absence of tests on harmful effects by means of the wording laid down in Circular Official Register Protocol 67492 of 10 August 2010. Otherwise, if the above equipment has already been updated to the new specification, the note specified for the FON file will be sufficient and is in any case obligatory in such cases. In particular, note that evidence must be given of the "Note=" entries of all test in the overall test report, as well as of the value of the "Note=" entry for the AC2 file.

5. “PCStazione ↔ Apparecchiature” data exchange

Data may be exchanged between PCStazione and measuring devices via a “RS” connection or via a “Dir” connection (mixed system: file and connection defined by the manufacturer).

PCStazione is the software installed on the PC, responsible for synchronising service statuses, while the device is the software/firmware responsible for the measurements (brakes, gas, etc.).

The test session is always activated by PCStazione, and therefore the operating sequence is:

1. Activate question
2. Await response
3. Send response

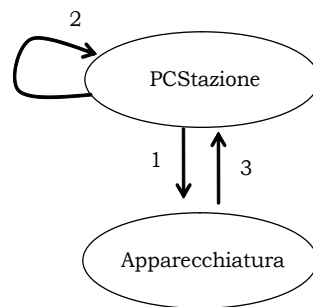


Figure B - PCStazione ↔ Apparecchiature “Domanda – Risposta” Diagram

The type and format of the question and the consequent response are determined by the characteristics of the device and the physical/logical connection used to connect it.

5.1 Device connected with RS protocol

This connection method involves the use of a logical protocol made up of control characters and data in ASCII format.

When exchanging data, the two parts, PCStazione and Device alternately act as “Master” or “Slave” according to the stage of the logical protocol session, in other words the “Master” is the part sending and the “Slave” is the part receiving.

Each question structure corresponds to the identification of a command for which there must be a particular response.

The connection options include:

- Connection with “Senza Elaborazione Esito” device
- Connection with “Con Elaborazione Esito” device

5.1.1 Serial connection specifications

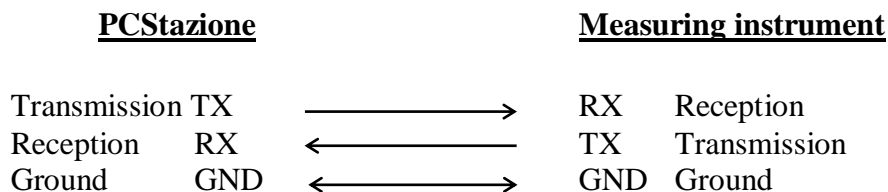
Serial connection (RS) denotes a direct connection between PCStazione and the equipment homologated in RS Senza Esito mode. The data exchange takes place via the transmission/reception of individual characters.

The following basic information is typical of a connection in accordance with RS-232 standards

The basic specifications for the use of a RS-232 connection must be:

➤ **Connection**

With reference to the signals to be used, the connection must comply with the setup described below; using the appropriate adapters (9 and 25 pin) where necessary.



➤ **Communication parameters**

The communication parameter configurations must include:

Data	PCStazione	Device
Baud Rate	600 - 1200 2400 - 4800 9600 - 19200 38400 - 57600 115200	one of those indicated by the PCStazione
Data bit		8
Stop bit		1
Parity bit		None
Character Tx/Rx Time-out (in seconds)		2
Response Rx Time-out (in seconds)		2

“PCS software programs that connect to instruments homologated in RS Senza Esito mode must make it possible to set the data update rate (serial enquiry frequency) from a minimum of 50 ms to a maximum of 500 ms.

The correct settings will have an impact on the performance of the connected device.

In addition to the above, note that for all devices connected in RS mode, the TX/RX timeout (2 seconds for RSSE) is modified to 45 seconds for the PW command only. This change is necessary to allow the connected device to describe the session key sent by the PCS.

For the Tachometer alone, the permitted range is 50 – 250 ms with the aim of allowing at least 4 readings per second.

5.1.2 Logical communication protocol

The logical protocol used is known as “controllata STX / ETX”.

With this method of data exchange, the Peripheral Unit (PU, receiving) notifies the Central Unit (CU, sending) of any line or buffer overflow errors.

This is applicable in two-way serial connections and involves the CU sending the data to the PU in strings enclosed between control characters at the start and end of the string (STX / ETX).

For each data string, the PU must respond to the CU to inform it whether the string has been received correctly or not by sending the CU an appropriate control character (ACK/NAK) upon recognition of the ETX code. In our case, to speed up communication and considering the fact that communication always involves a question and answer, transmission of an ACK control character is replaced by transmission of the required response.

Notification that the string has not been received correctly (NAK) involves deletion of these strings from the line buffer and retransmission by the CU (up to a maximum number of attempts).

The CU must not send the nth string before receiving the response for string n-1. If the response to n-1 is not received within the preset time (e.g. 1 second), the CU considers the time-out to be a NAK response and therefore retransmits string n-1. After a set number of attempts (e.g. 3) the communication error should be considered irretrievable and the operator must therefore be notified of this event.

“Devices type-approved in RS Senza Esito mode must be able to manage and follow the flow diagram.” In particular, the device will respond to commands received with the required responses if the command received is consistent with the flow diagram, otherwise it will respond with NAK. It is possible to repeat the last command sent.

The general device will send a Negative Acknowledge (NAK) only if it receives an MCTCNet string in the correct format, consistent with the checksum values but containing:

- *a command not supported by the device (e.g. “PQ” for an analyser);*
- or*
- *a command not consistent with the flow chart defined for instrument management;*
- or*
- *invalid data (e.g. “NAFTA” fuel).*

In all cases, the errors must be managed by the time-outs and a NAK must not be transmitted.

The ‘control’ characters are as follows:

STX = “Start of Text”, sent at the beginning of each data string (**02 Hex** code)

ETB = “End of Block”, determines the beginning of data field n (**17 Hex**)

ETX = “End of Text”, sent at the end of each data string (**03 Hex** code)

NAK = “Negative Acknowledge”, sent by PU to CU in response to a string for which an error has been found (**15 Hex** code)

CRC-H = First part of Checksum character, (High byte)

CRC-L = Second part of Checksum character, (Low byte)

The format of the string defined as the “Domanda” is made up as follows:

STX	Type	E T B	Add	E T B	Com	E T B	Datum 1	E T B	Datum n	CRC-H	CRC-L	ETX
------------	------	----------------------------------	-----	----------------------------------	-----	----------------------------------	------------	-------	----------------------------------	------------	--------------	--------------	------------

Where:

Type = The type of device to which the question is sent (always present immediately after the STX character). Assumes an alphabetical value referring to the device to which the command is sent:

- ✓ GAS, GAS analyser
- ✓ OPA, Opacimeter
- ✓ RPM, Rev counter
- ✓ FON, Sound meter
- ✓ FAR, Headlight tester
- ✓ PFR, brake tester
- ✓ DER, drift tester
- ✓ SOS, suspension tester

Add = Address referring to the nth device of the same type (always present after the “Tipo” field and preceded by the character ETB). Assumes a numerical value referring to the number allocated to the device (e.g. 1 = 31 Hex).

Note that

- a) *MCTCNet addresses may range from 0 to 999 (examples of valid addresses include: “0”, “1”, “01”, “002”, “15”, “015” and “990”); because the addresses are treated as strings, the address 1 is not equivalent to 01.*
- b) *any RS device, With or Without Result, must have an address that can be set to at least 0 to 9.*
- c) *the number of characters in the “indirizzo” field must be the same in the question and response.*
- d) *the null address management described by para. 5.1.1 of MCTCNet is abolished*

Com = Command requested of the device (always present after the field “Add” and preceded by the character ETB). Assumes an alphabetical value relating

to the command (e.g. request “**VA**lori” = “**VA**” = “56 hex 41hex”)

Dato 1 = first Data field sent (if present, preceded by the character ETB).

May assume an alphanumerical value according to the data (e.g. “12.5” = “31 hex 32 hex 2E hex 35 hex”)

Dato n = nth Data field sent (if present, preceded by the character ETB).

Transmitted data fields should neither start nor end with the space character (20 Hex)

The format of the defined “Risposta” strings may be:

- response for string received correctly

STX	Type	$\begin{matrix} E \\ T \\ B \end{matrix}$	Add	$\begin{matrix} E \\ T \\ B \end{matrix}$	Com	$\begin{matrix} E \\ T \\ B \end{matrix}$	Datum 1		$\begin{matrix} E \\ T \\ B \end{matrix}$	Datum n	CRC-H	CRC-L	ETX
------------	------	---	-----	---	-----	---	------------	--	---	------------	--------------	--------------	------------

Where:

Tipo = Type of device to which the question is sent.

Add = Address referring to the nth device of the same type

Com = Command requested of the device

Dato 1 = First Data field sent (if present).

Dato n = nth Data field sent (if present).

- response for transmission error

STX	Type	$\begin{matrix} E \\ T \\ B \end{matrix}$	Add	$\begin{matrix} E \\ T \\ B \end{matrix}$	Com	$\begin{matrix} E \\ T \\ B \end{matrix}$	NAK	CRC-H	CRC-L	ETX
------------	------	---	-----	---	-----	---	------------	--------------	--------------	------------

- response for device measurement error or fault

STX	Type	$\begin{matrix} E \\ T \\ B \end{matrix}$	Add	$\begin{matrix} E \\ T \\ B \end{matrix}$	Com	$\begin{matrix} E \\ T \\ B \end{matrix}$	COD	$\begin{matrix} E \\ T \\ B \end{matrix}$	NumCod	CRC-H	CRC-L	ETX
------------	------	---	-----	---	-----	---	------------	---	--------	--------------	--------------	------------

Where:

Tipo = Type of device to which the question is sent.

Add = Address referring to the nth device of the same type

Com = Command requested of the device

COD = Indicates that an error or fault condition has occurred in the device (43 Hex 44 Hex)

NumCod = Coding number of error or anomal type (defined by the manufacturer)

N.B.: The manufacturer can use this response to manage the various faults or errors that may occur in the various RS links with regard to the device and to be communicated to PCStazione.

Calculating the CRC (Checksum) involves adding the bytes included between but excluding the fields: excluding the fields STX and Checksum; the CRC is always inserted before the ETX character.

By convention, the checksum of all RS connections is generated in upper case characters.

Example:

“Richiesta Valori di misura” string sent to the GAS analyser identified by number 1

STX	GAS	$\begin{matrix} E \\ T \\ B \end{matrix}$	Add	$\begin{matrix} E \\ T \\ B \end{matrix}$	VA	CRC-H	CRC-L	ETX
------------	-----	---	-----	---	----	--------------	--------------	------------

String in hexadecimal format without CRC and STX and ETX characters:

47 41 53	17	31	17	56 41
----------	-----------	----	-----------	-------

CRC calculation: 47 hex + 41 hex + 53 hex + 17 hex + 31 hex + 17 hex + 56 hex + 41 hex =
01D1 hex

Now we consider the least significant byte, i.e. D1 hex, breaking it down into two half-bytes “D” and “1” and considering the hexadecimal codes in the ASCII character set, i.e. for the character “D” the value 44 hex and for the character “1” the value 31 hex. The CRC will therefore be:

44 hex (CRC-high) and 31 hex (CRC-low)

String in hexadecimal form with CRC and STX and ETX characters:

02	47 41 53	17	31	17	56 41	44	31	03
-----------	----------	-----------	----	-----------	-------	-----------	-----------	-----------

5.1.3 Connection with “Senza Elaborazione Esito” device

“Senza Elaborazione Esito” devices are those devices able to manage measurements governed by PCStazione, but not able to process the calculations necessary to produce an overall test result.

The ID is always permitted at any time in the flow diagrams (RS Senza Esito) for the following equipment:

- Gas analyser
- Opacimeter
- Sound level meter
- Headlight aligner

Reception of the ID command leads to resetting of all stored data, including configurations. The flow diagram must be resumed from the beginning.

Note that the symbol (@) associated with a field name indicates that the transmitted data is encrypted as defined in the encryption system for the MCTCNet version of the device in use.

5.1.3.1 PCStazione ↔ GAS analyser Commands and Responses

The commands and responses that take place between PCStazione and the Exhaust GAS Analyser device are listed below.

The protocol sessions start with a command sent from the PCStazione and are ended by the GAS analyser when a response is sent.

The commands are as follows:

- Device IDentification data request (ID)
- Send test identification data (TG)
- Integral rev counter identification data request (IC)
- Configuration of integral rev counter (CC)
- Stand-By activation or deactivation (SB)
- Automatic zero request (AZ)
- Fuel type selection (SC)
- Performance of HC Test (HC)
- HC Test Result Request (HC)
- Performance of Seal Test (TT)
- Seal Test Result Request (TT)
- Status request (ST)
- Measuring VAlue request (VA)

5.1.3.1.1 Device identification data request

Command: “**ID**entification” (49 Hex 44 Hex)

Question:

STX	GAS	E T B	Add	E T B	ID	CRC-H	CRC-L	ETX
-----	-----	-------------	-----	-------------	----	-------	-------	-----

Where:

Field	Description
GAS	Question to GAS analyser device
Add	Address numbers referring to device
ID	Device identification data request command

Response:

STX	GAS	E T B	Add	E T B	ID	E T B	Mar	E T B	Mod	E T B	NumOm	E T B	NumSer	E T B	DataSca
E T B	NumVer	E T B	VerMCTCNet	CRC-H	CRC-L	ETX									

Where:

Field	Description	E.g. Format
GAS	Response from GAS analyser device	
Add	Numerical device address	
ID	Response to command “ ID entificazione”	
Mar	Make	
Mod	Model	
NumOm	Type approval number	
NumSer	Serial number	
DataSca	Due date of periodic check	“ggmmaaaa”
NumVer	Software version number	
VerMCTCNet	MCTCNet version number	“100”

If the gas analyser is recognised to be type approved also for motorbikes, the field NumOm must contain both type approval separated by the character “-”

5.1.3.1.2 Send test identification data

Command: "TarGa" (54 Hex 47 Hex)

Question:

STX	GAS	ETB	Add	ETB	TG	ETB	License plate	ETB	VIN no.	ETB	Reception date	ETB	Category	CRC-H	CRC-L	ETX
-----	-----	-----	-----	-----	----	-----	---------------	-----	---------	-----	----------------	-----	----------	-------	-------	-----

Where:

Field	Description	E.g. Format
GAS	Question to GAS analyser device	
Add	Numerical address referring to device	
TG	Command to send plate, VIN No and service reception date	
License plate	Licence plate of vehicle to be tested	
VIN no.	VIN No of vehicle to be tested	
DataAccettazione	Reception date of vehicle being tested	
Category	International category of vehicle being tested	May assume one of Categorie Internazionali constants defined in MCTC.INI

Response:

STX	GAS	ETB	Add	ETB	TG	ETB	Key ID	ETB	Key date	ETB	NumOm	ETB	Hash	CRC-H	CRC-L	ETX
-----	-----	-----	-----	-----	----	-----	--------	-----	----------	-----	-------	-----	------	-------	-------	-----

Where:

Field	Description	E.g. Format
GAS	Response from GAS analyser device	
Add	Numerical device address	
TG	Response to "TarGa" command	
IdChiave	Public key registration numerical identification	00000
DataChiave	Public key registration date in the form "ggmmaaaa"	01012000
NumOm	Type approval number (if the gas analyser is type approved also for motorbikes, the field must contain the type approval number for the vehicle currently being tested)	
Hash	String of 40 hexadecimal characters (160 bits expressed as hexadecimal figures). Hash is represented by SHA-1 of the message obtained by linking the strings for the device secret seed, licence plate, VIN No, reception date and category of the vehicle	

5.1.3.1.3 Integral rev counter identification data request

Command: “Identificazione Contagiri” (49 Hex 43 Hex)

Question:

STX	GAS	E T B	Add	E T B	IC	CRC-H	CRC-L	ETX
------------	-----	----------------------------------	-----	----------------------------------	----	--------------	--------------	------------

Where:

Field	Description	Format e.g.
GAS	Question to analyser device	
Add	Numerical device address	
IC	Rev counter identification request command	

Response:

STX	GAS	E T B	Add	E T B	IC	E T B	Make	E T B	Model	E T B	NumOmø	E T B
~~~~~												
~~~~~			<b>E</b> <b>T</b> <b>B</b>	DataScadenza	<b>E</b> <b>T</b> <b>B</b>	NumVer	<b>CRC-H</b>	<b>CRC-L</b>	<b>ETX</b>			

Where:

Field	Description	E.g. Format
GAS	Response to GAS analyser device	
Add	Numerical device address	
IC	Respond to “IC” command	
Make	Make	
Model	Model	
NumOm	Type approval number	
NSerie	Serial number	
DataScadenza	Periodic check due date	01012000
NumVer	Software version number	1.0

The analyser responds with NAK in the following cases:
 The instrument does not include an integral rev counter
 Integral rev counter not operational or not responding.

5.1.3.1.4 Configuration of integral rev counter

Command: “Configurazione Contagiri “ (43 Hex 43 Hex)

Question:

STX	GAS	E T B	Add	E T B	“C C”	E T B	NTempi	E T B	NCil	CRC-H	CRC-L	ETX
-----	-----	-------------	-----	-------------	----------	-------------	--------	-------------	------	-------	-------	-----

Where:

Field	Description	E.g. Format
GAS	Question to GAS analyser device	
Add	Numerical device address	
“CC”	Rev counter configuration command	
NTempi	Number of engine strokes	May assume: “2T” “4T” “DIS”
NCil	Number of cylinders	N 2

If the instrument does not use or does not incorporate a rev counter, it will nevertheless store the number of cylinders and strokes and respond correctly to the VA command, indicating in its reply the nominal data received through the CC command. The instrument will also be concerned to find out whether the vehicle is 2 Stroke, in order to carry out the HC test with the hexane HC threshold at 400 ppmvol and the CO calculation corrected by a factor of 10.

Response:

STX	GAS	E T B	Add	E T B	“C C”	CRC-H	CRC-L	ETX
-----	-----	-------------	-----	-------------	----------	-------	-------	-----

Where:

Field	Description
GAS	Response from GAS analyser device
Add	Numerical device address
“CC”	Command performed

5.1.3.1.5 Stand-By Actvation or Deactivation

Command: "Stand-By" (53 Hex 42 Hex)

Question:

STX	GAS	E T B	Add	E T B	SB	CRC-H	CRC-L	ETX
-----	-----	-------------	-----	-------------	----	-------	-------	-----

Where:

Field	Description
GAS	Question to GAS analyser device
Add	Numerical device address
SB	Inactivity (energy saving) or activity status selection

Response:

STX	GAS	E T B	Add	E T B	SB	CRC-H	CRC-L	ETX
-----	-----	-------------	-----	-------------	----	-------	-------	-----

Where:

Field	Description
GAS	Response from GAS analyser device
Add	Numerical device address
SB	Command performed

5.1.3.1.6 Automatic zero request

Command: "AZzeramento" (41 Hex 5A Hex)

Question:

STX	GAS	E T B	Add	E T B	A Z	CRC-H	CRC-L	ETX
-----	-----	-------------	-----	-------------	--------	-------	-------	-----

Where:

Field	Description
GAS	Question to GAS analyser device
Add	Numerical device address
AZ	Measuring chamber cleaning performed

Response:

STX	GAS	E T B	Add	E T B	A Z	CRC-H	CRC-L	ETX
-----	-----	-------------	-----	-------------	--------	-------	-------	-----

Where:

Field	Description
GAS	Response from GAS analyser device
Add	Numerical device address
AZ	Command performed

5.1.3.1.7 Fuel type selection

Command: “Selezione tipo Carburante” (53 Hex 43 Hex)

Question:

STX	GAS	E T B	Add	E T B	SC	E T B	Fuel	CRC-H	CRC-L	ETX
------------	-----	----------------------	-----	----------------------	----	----------------------	------	--------------	--------------	------------

Where:

Field	Description	E.g. Format
GAS	Question to GAS analyser device	
Add	Numerical device address	
SC	Fuel type command	
Fuel	Fuel type	Possible types: “BENZINA” “GPL” “METANO”

Response:

STX	GAS	E T B	Add	E T B	SC	CRC-H	CRC-L	ETX
------------	-----	----------------------	-----	----------------------	----	--------------	--------------	------------

Where:

Field	Description
GAS	Response from GAS analyser device
Add	Numerical device address
SC	Command performed

5.1.3.1.8 Performance of HC Test

Command: "HC test" (48 Hex 43 Hex)

Question:

STX	GAS	E T B	Add	E T B	HC	CRC-H	CRC-L	ETX
-----	-----	-------------	-----	-------------	----	-------	-------	-----

Where:

Field	Description
GAS	Question to GAS analyser device
Add	Numerical device address
HC	Check cleanliness of chamber and probe

Response:

STX	GAS	E T B	Add	E T B	HC	CRC-H	CRC-L	ETX
-----	-----	-------------	-----	-------------	----	-------	-------	-----

Where:

Field	Description
GAS	Response from GAS analyser device
Add	Numerical device address
HC	Command performed

5.1.3.1.9 HC Test Result Request

Command: “Esito HC” (45 Hex 48 Hex)

Question:

STX	GAS	E T B	Add	E T B	E H	CRC-H	CRC-L	ETX
-----	-----	-------------	-----	-------------	--------	-------	-------	-----

Where:

Field	Description
GAS	Question to GAS analyser device
Add	Numerical device address
EH	Request result of last test performed

Response:

STX	GAS	E T B	Add	E T B	E H	E T B	Outco me	CRC-H	CRC-L	ETX
-----	-----	-------------	-----	-------------	--------	-------------	-------------	-------	-------	-----

Where:

Field	Description	E.g. Format
GAS	Response from GAS analyser device	
Add	Numerical device address	
EH	Command performed	
Outco me	Test outcome	Possible outcomes: “R” = regular “I” = irregular “E” = in progress

5.1.3.1.10 Performance of Seal Test

Command: "Test Tenute" (54 Hex 54 Hex)

Question:

STX	GAS	E T B	Add	E T B	TT	CRC-H	CRC-L	ETX
-----	-----	-------------	-----	-------------	----	-------	-------	-----

Where:

Field	Description
GAS	Question to GAS analyser device
Add	Numerical device address
TT	Check seal of sampling air circuit

Response:

STX	GAS	E T B	Add	E T B	TT	CRC-H	CRC-L	ETX
-----	-----	-------------	-----	-------------	----	-------	-------	-----

Where:

Field	Description
GAS	Response from GAS analyser device
Add	Numerical device address
TT	Command performed

5.1.3.1.11 Seal Test Result Request

Command: “Esito Test” (45 Hex 54 Hex)

Question:

STX	GAS	ETB	Add	ETB	ET	CRC-H	CRC-L	ETX
-----	-----	-----	-----	-----	----	-------	-------	-----

Where:

Field	Description
GAS	Question to GAS analyser device
Add	Numerical device address
ET	Request result of last test performed

Response:

STX	GAS	ETB	Add	ETB	ET	ETB	Vector IV	ETB	Outcome (@)	ETB	Date (@)	ETB	Time (@)	ETB	CRC-32 (@)	CRC-H	CRC-L	ETX
-----	-----	-----	-----	-----	----	-----	-----------	-----	-------------	-----	----------	-----	----------	-----	------------	-------	-------	-----

Where:

Field	Description	E.g. Format
GAS	Response from GAS analyser device	
Add	Numerical device address	
ET	Command performed	
VettoreIV	Initialisation vector IV, for RC4 encryption	“15AF7B”
Outcome (@)	Test outcome	Possible outcomes: “R” = regular “I” = irregular “E” = in progress
Date (@)	Date of last regular test	ddmmyyyy
Time (@)	Time of last regular test	hhmmss
CRC-32 (@)	Checksum CRC-32 on encrypted data (@)	“23D19B3F”

5.1.3.1.12 Status request

Command: "STato" (53 Hex 54 Hex)

Question:

STX	GAS	E T B	Add	E T B	ST	CRC-H	CRC-L	ETX
-----	-----	-------------	-----	-------------	----	-------	-------	-----

Where:

Field	Description
GAS	Question to GAS analyser device
Add	Numerical device address
ST	Device work status request

Response:

STX	GAS	E T B	Add	E T B	ST	E T B	Vector IV	E T B	ST1 (@)	E T B	ST2 (@)	E T B	CRC-32 (@)	CRC-H	CRC-L	ETX
-----	-----	-------------	-----	-------------	----	-------------	--------------	-------------	------------	-------------	------------	-------------	---------------	-------	-------	-----

Where:

Field	Description	Format e.g.
GAS	Response from GAS analyser device	
Add	Numerical device address	
ST	Command performed	
VettoreIV	Initialisation vector IV, for RC4 encryption	
ST1 (@)	First status field (byte)	
	Bit no	State = meaning
	0	1 = warm_up
	1	1 = stand-by state
	2	1 = autozero in progress
	3	1 = measurement in progress
	4 - 5 - 6	Not used
	7	Always = 1
ST2 (@)	Second state field (byte)	
	Bit no	State = meaning
	0	1 = lambda Petrol
	1	1 = lambda Methane
	2	1 = lambda LPG
	3 - 4 - 5 - 6	Not used
	7	Always = 1
CRC-32 (@)	Checksum CRC-32 on encrypted data (@)	"23D19B3F"

Only one of the 0-1-2-3 bits of state byte ST1 must be set to "1".

Only one of the 0-1-2 bits of state byte ST2 may be set to "1" simultaneously.

All bits described as "non utilizzati" must be set to "0".

The status byte must be considered in accordance with the computer convention in use (assigning weighting of 0 to bit 0, i.e. the least significant and weighting of 7 to bit 7, i.e. the most significant).

5.1.3.1.13 Measuring value request

Command: “**VA**lori” (56 Hex 41 Hex)

Question:

STX	GAS	E T B	Add	E T B	VA	CRC-H	CRC-L	ETX
------------	-----	----------------------	-----	----------------------	----	--------------	--------------	------------

Where:

Field	Description	Format e.g.
GAS	Question to analyser device	
Add	Numerical device address	
VA	Command request “ VA lori”	

Response:

STX	GAS	E T B	Add	E T B	V A	E T B	Vector IV	E T B	CO (@)	E T B	COcorr (@)	E T B	CO2 (@)	E T B	HC (@)	E T B	O2 (@)
E T B	Lambda (@)	E T B	T.Olio (@)	E T B	GiriMot (@)	E T B	NCil (@)	E T B	Ntempi (@)	E T B	CRC-32 (@)	CRC-H	CRC-L	ETX			

Where:

Field	Description	E.g. Format
GAS	Response from GAS analyser device	
Add	Numerical device address	
VA	Response to “ VA lori” command	
VettoreIV	Initialisation vector IV, for RC4 encryption	“15AF7B”
CO (@)	% vol	0.000
Cocorr (@)	% vol	0.000
CO2 (@)	% vol	00.00
HC (@)	ppm vol	00000
O2 (@)	% vol	00.00
Lambda (@)	% vol	0.000

T.Olio (@)	Oil temperature (°C) (if integral with analyser)	000.0
GiriMot (@)	Engine revs (rpm) (if integral with the analyser). Must assume value of 0 if not used or not present	0000
NCil (@)	Number of cylinders set in instrument.	N 2
NTempi (@)	Engine strokes set in instrument.	Permitted values: "2T" "4T" "DIS"
CRC-32 (@)	Checksum CRC-32 on encrypted data (@)	"23D19B3F"

5.1.3.1.14 Exhaust gas test flow diagram

The exhaust gas tests should be carried out in accordance with the specifications shown in the following flow diagram.

These must be implemented by all software, with regard to the vehicle categories for which they are recognised to be type-approved, whether this is DIR, RETE or RS Senza Esito.

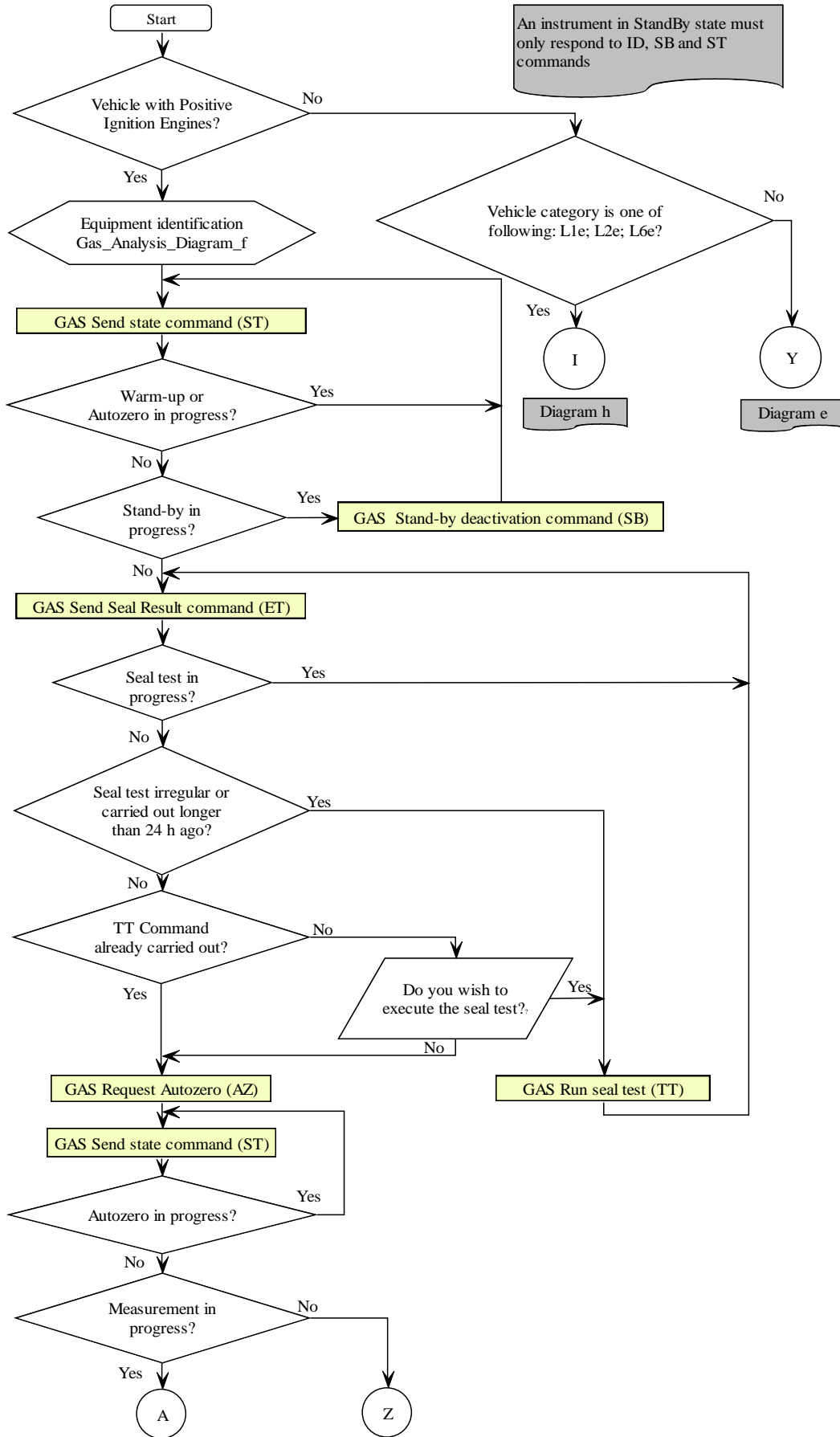
It must not be possible to start the test if no connection to a rev counter is present, whether integral or external to MCTCNet, **even by entering the rpm manually**.

The PCStazione must allow for the possibility of setting the frequency with which requests are made to RS Senza Esito instruments.

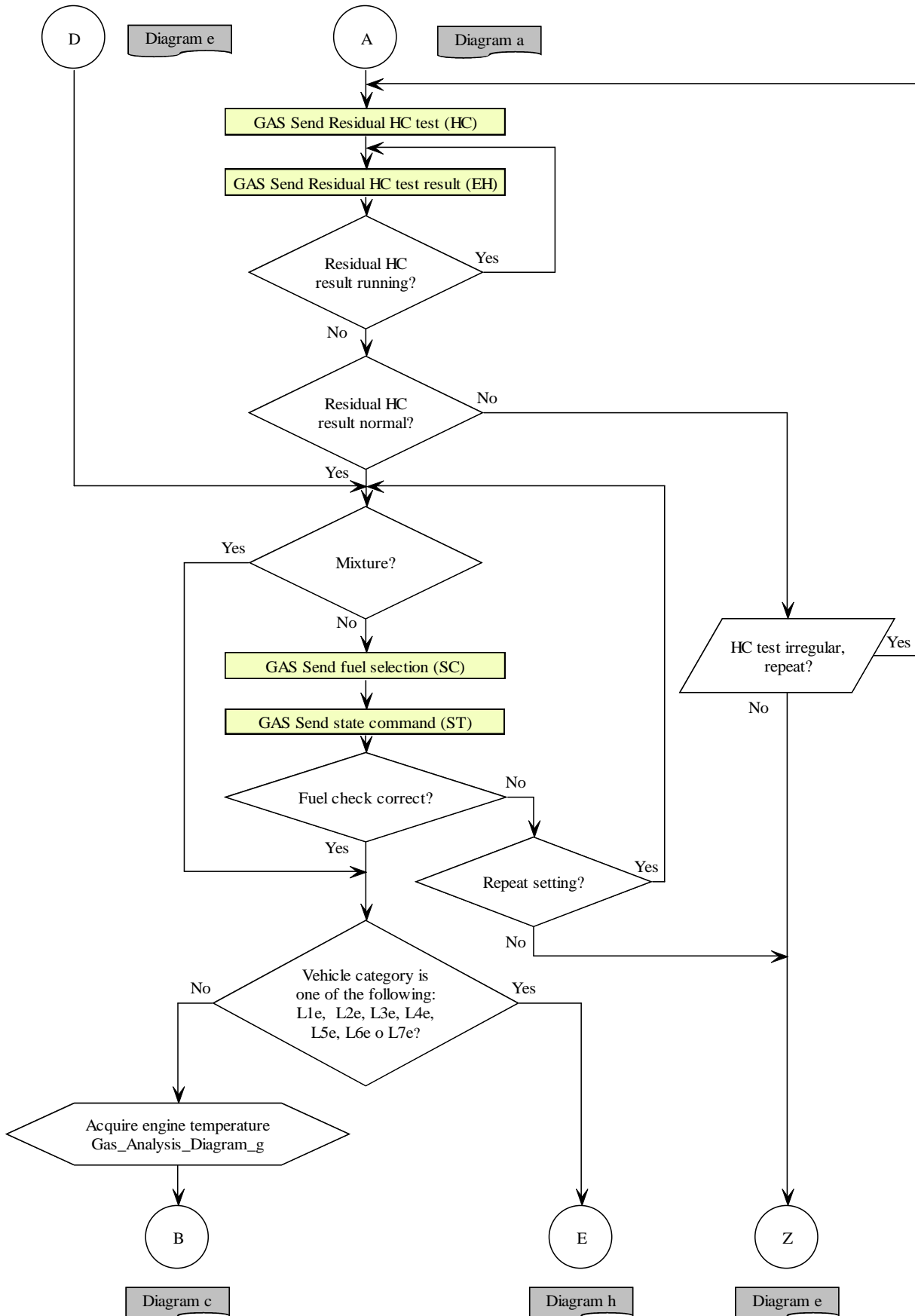
The check on the environmental data, necessary for determining whether it is possible to carry out a test, has been omitted from the flow diagrams because the DIR, RETE and PCStazione (for RSs) are required to check whether the weather conditions respect the parameters required in the regulation before starting the test.

Note that at each reading of data relating to the rev counter, whether this is external (rev counter VX command) or integral (instrument VA command), congruence with the engine cylinder and stroke settings must be checked against data in the ACC file. In the case of incongruence, a message must be displayed on the screen and the test must be cancelled and repeated.

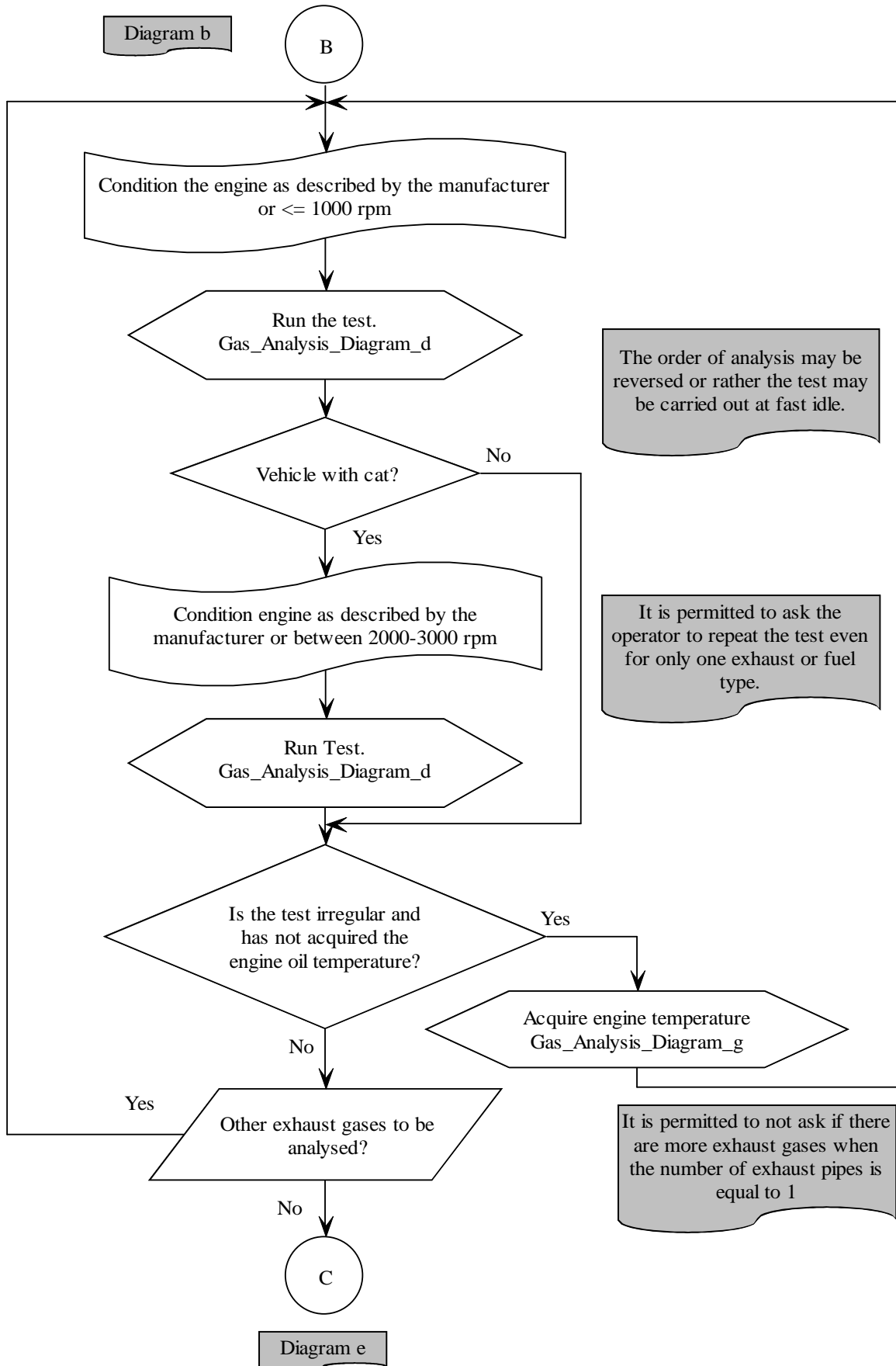
Note that with regard to diagram f), the data received must be checked following an IC command, with particular reference to the expiry date of the periodic rev counter check.



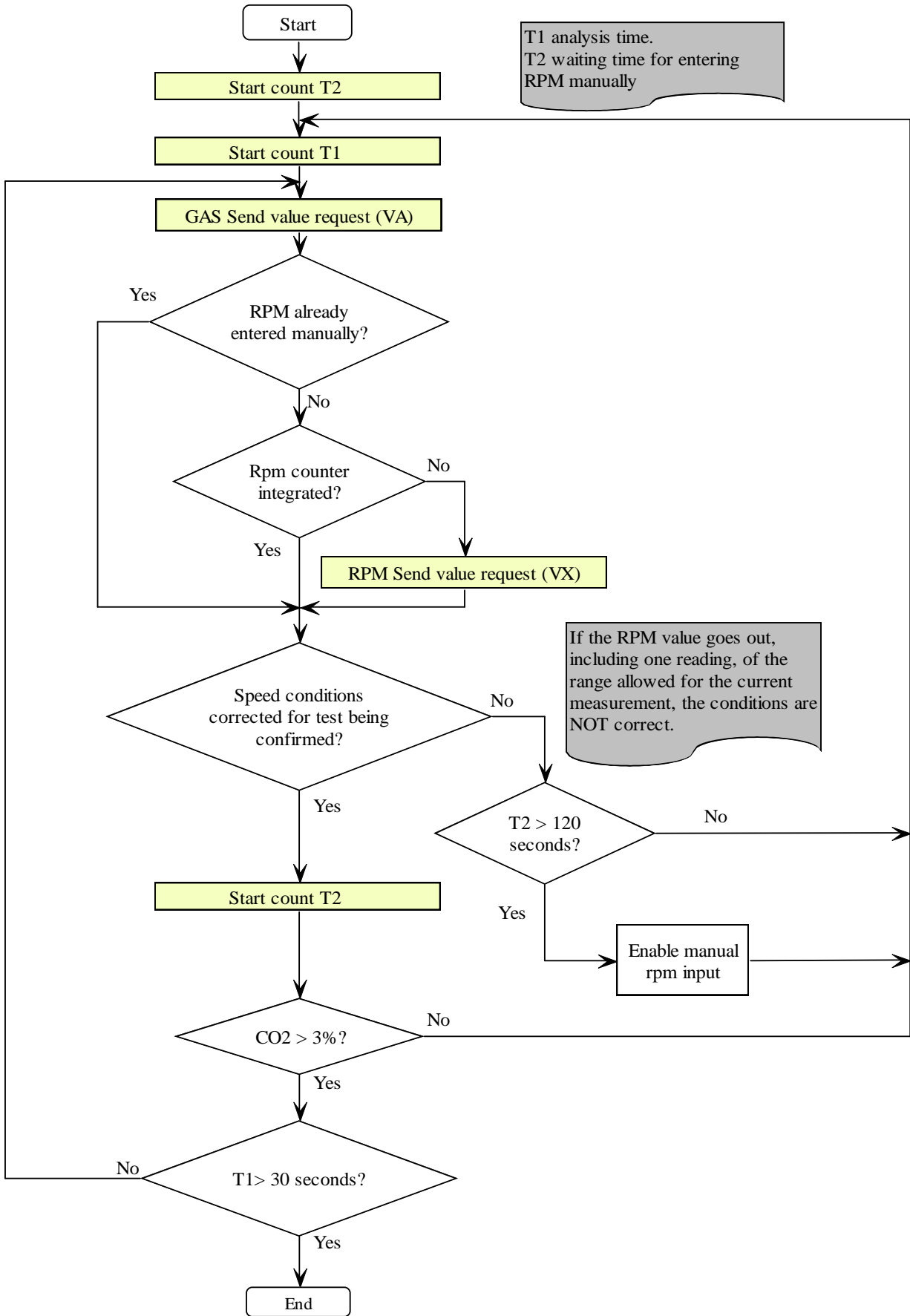
Gas_Analysis_Diagram_a



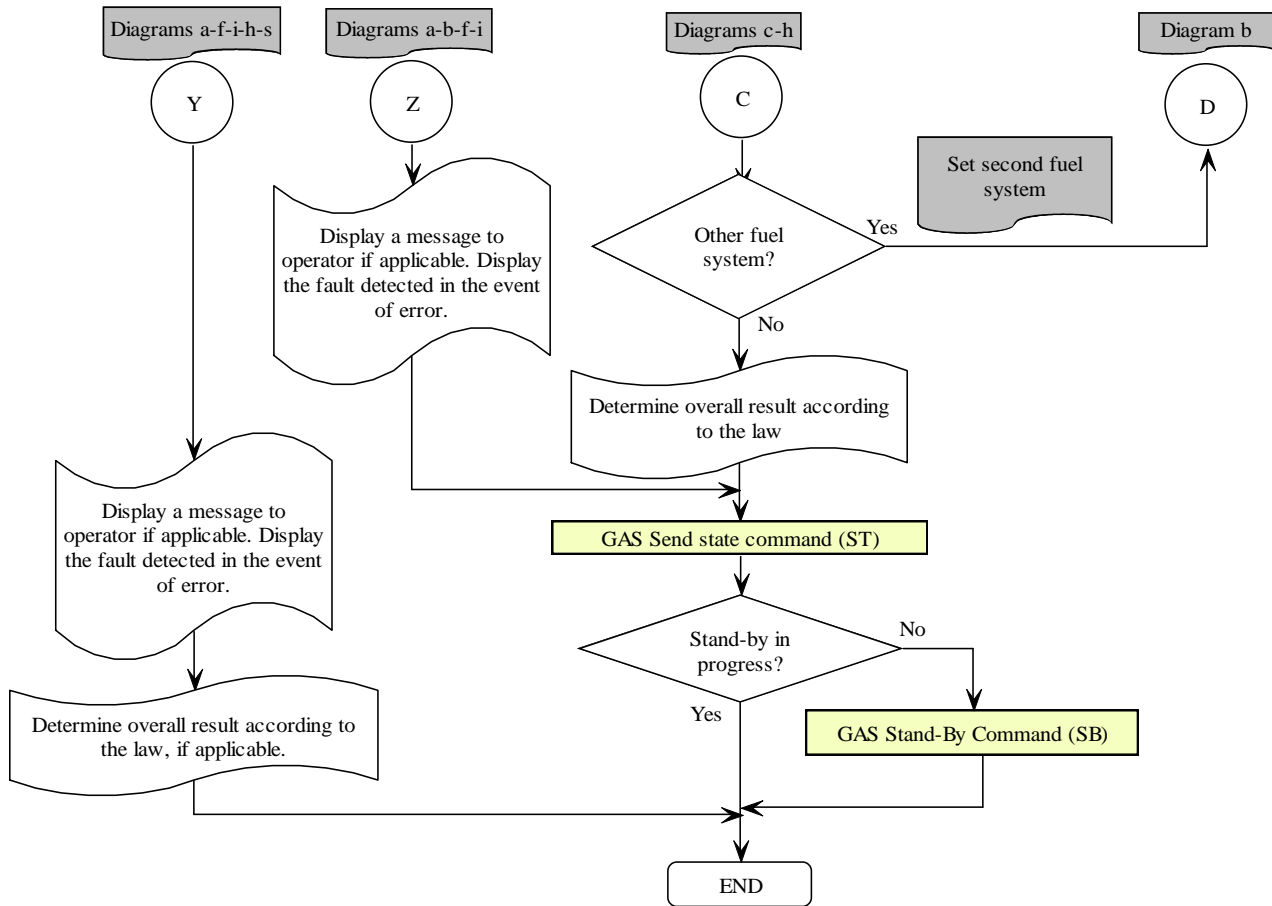
Gas_Analysis_Diagram_b



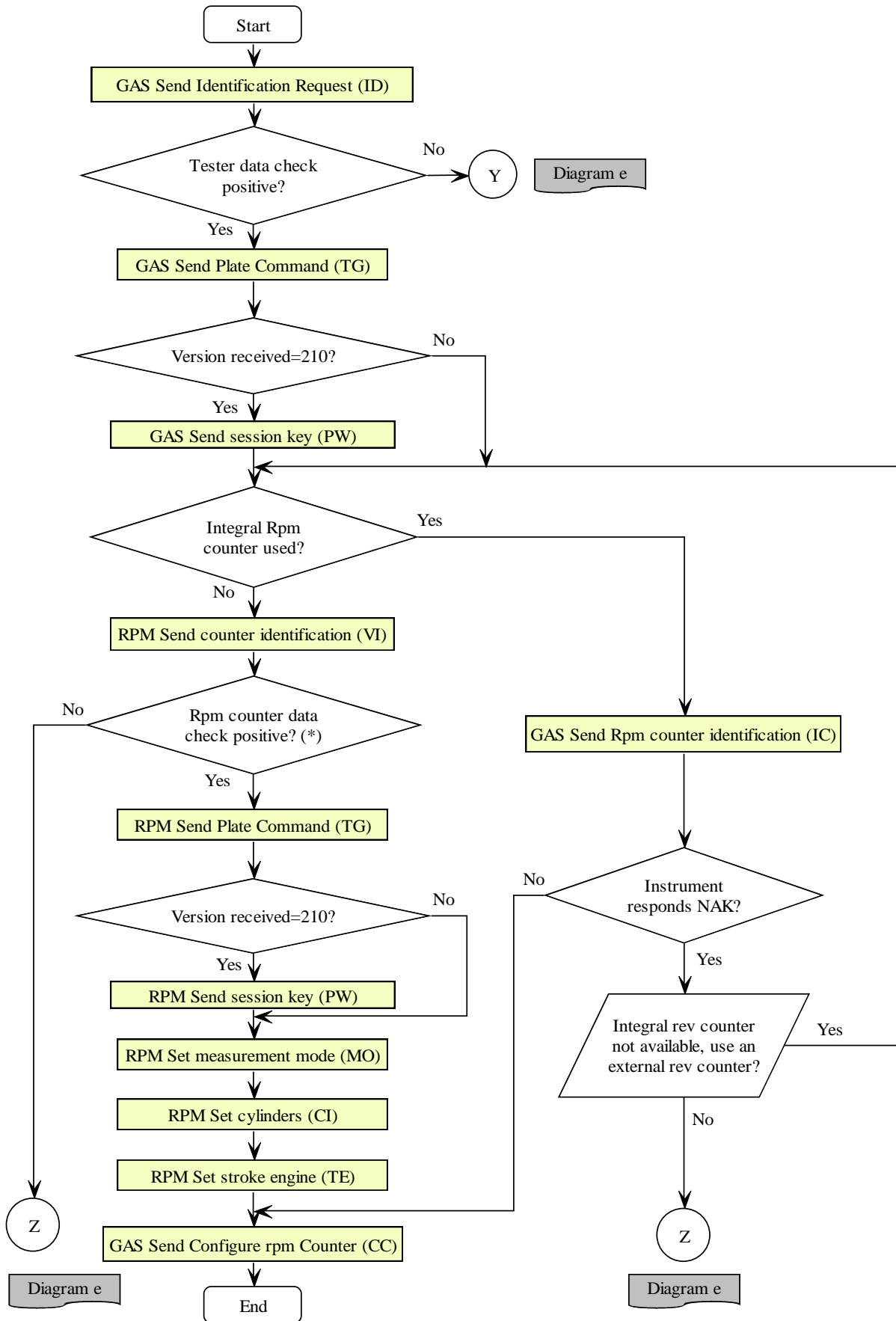
Gas_Analysis_Diagram_c



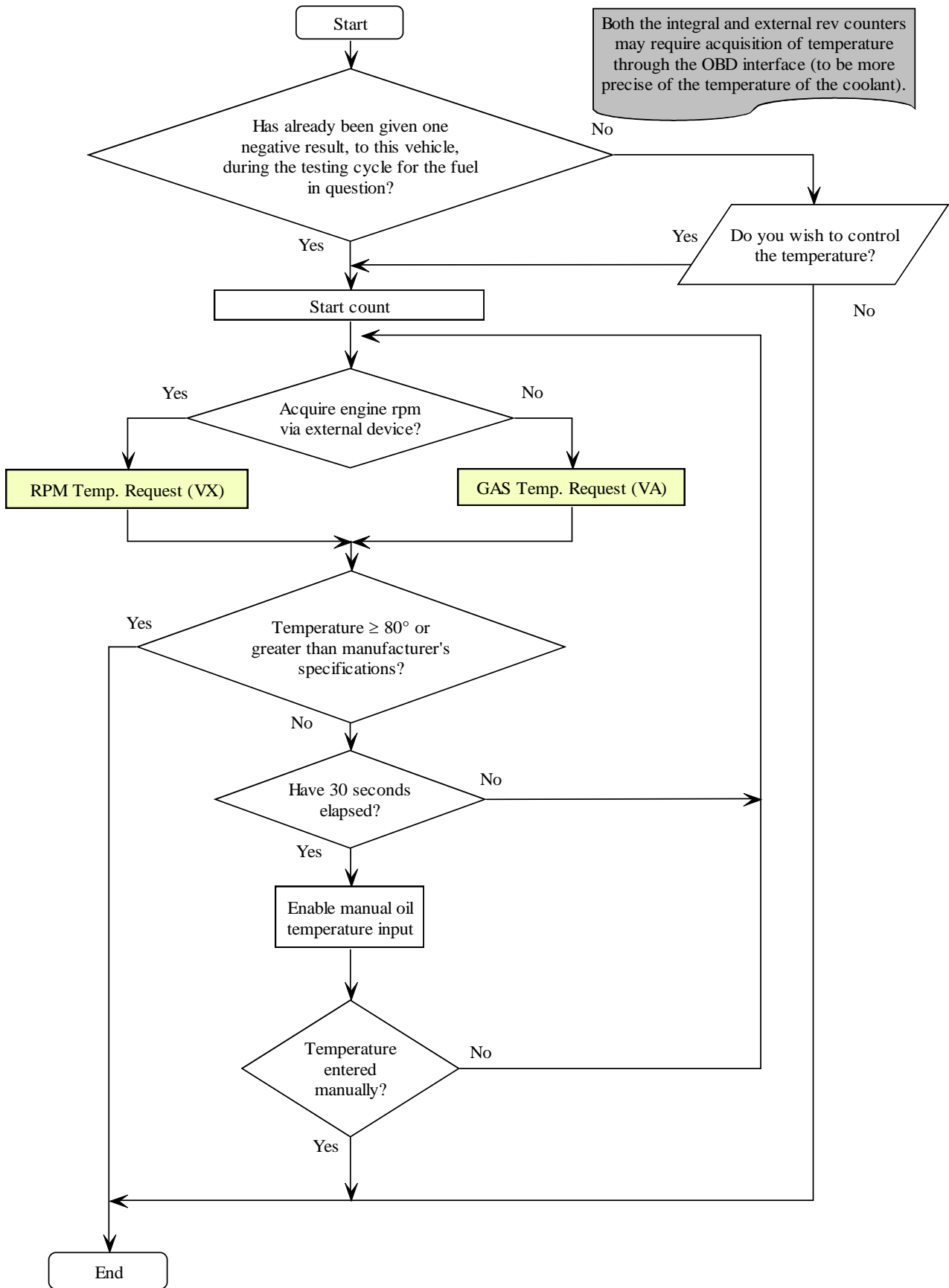
Gas_Analysis_Diagram_d



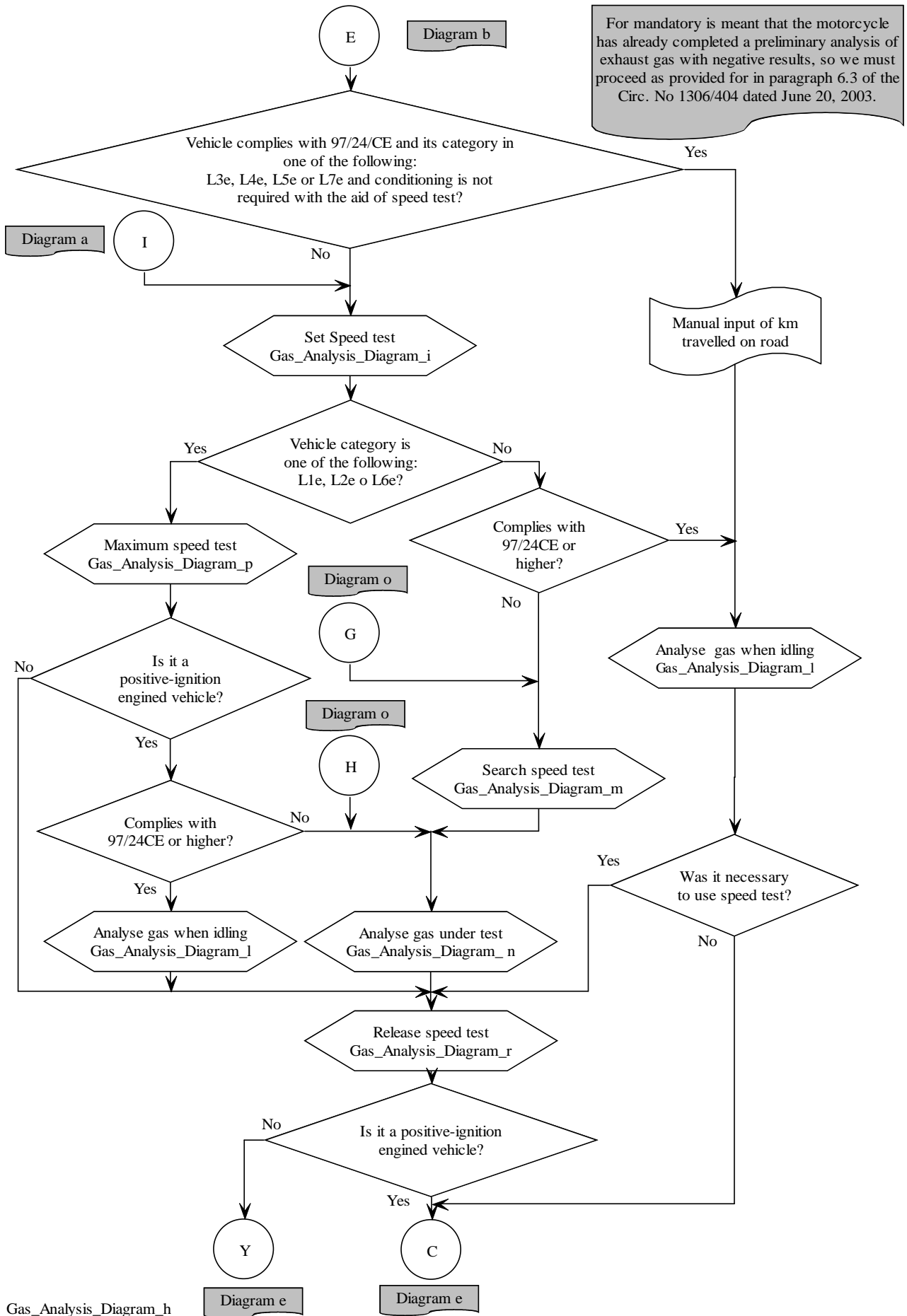
Gas_Analysis_Diagram_e

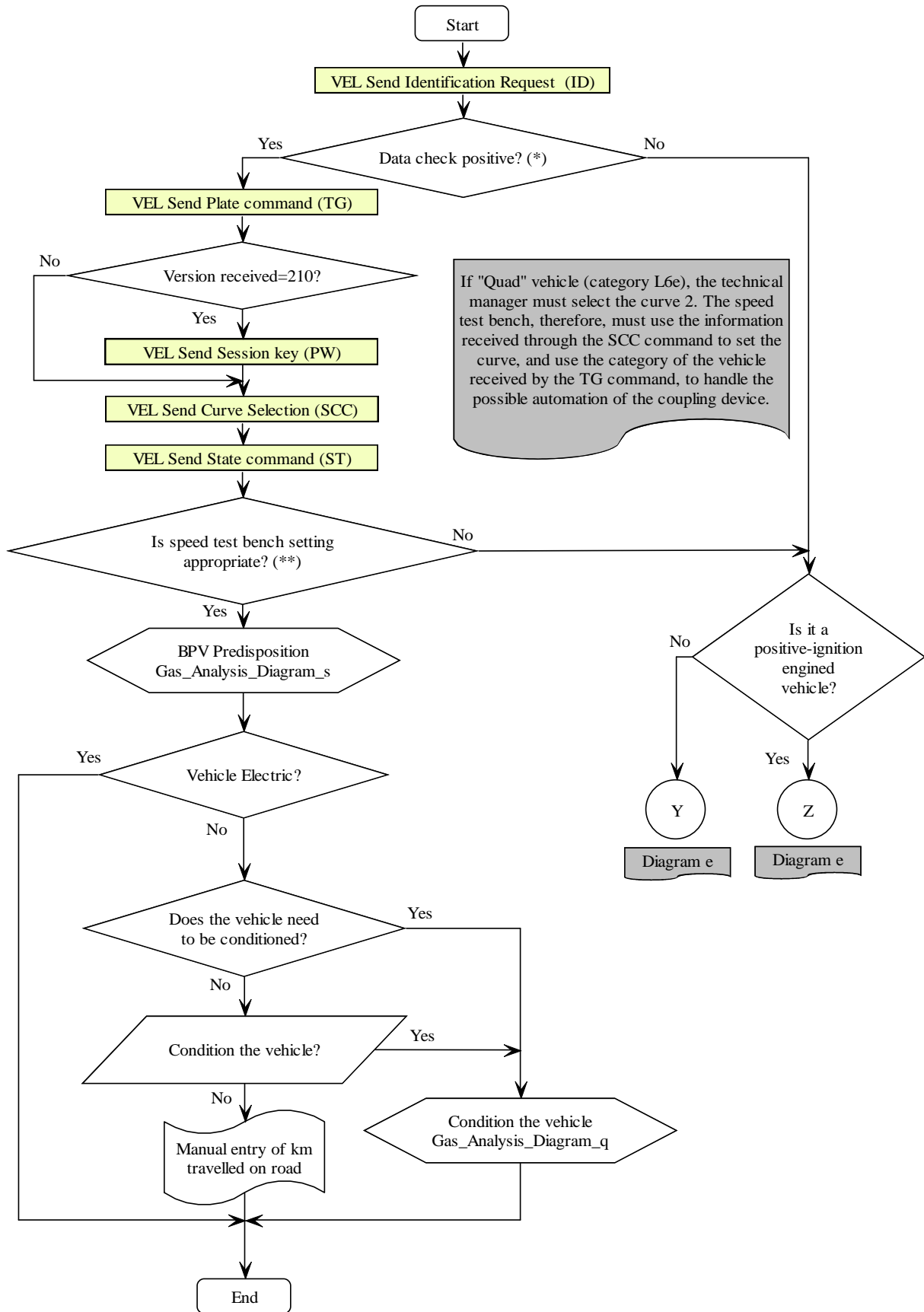


(*) Check whether the MCTCNet protocol is supported (except the integral rev counter).
 Check the last periodic check data and, if applicable, enter the due date as specified in 4.3 No 8 of this document.
 Gas_Analysis_Diagram_f



Gas_Analysis_Diagram_g

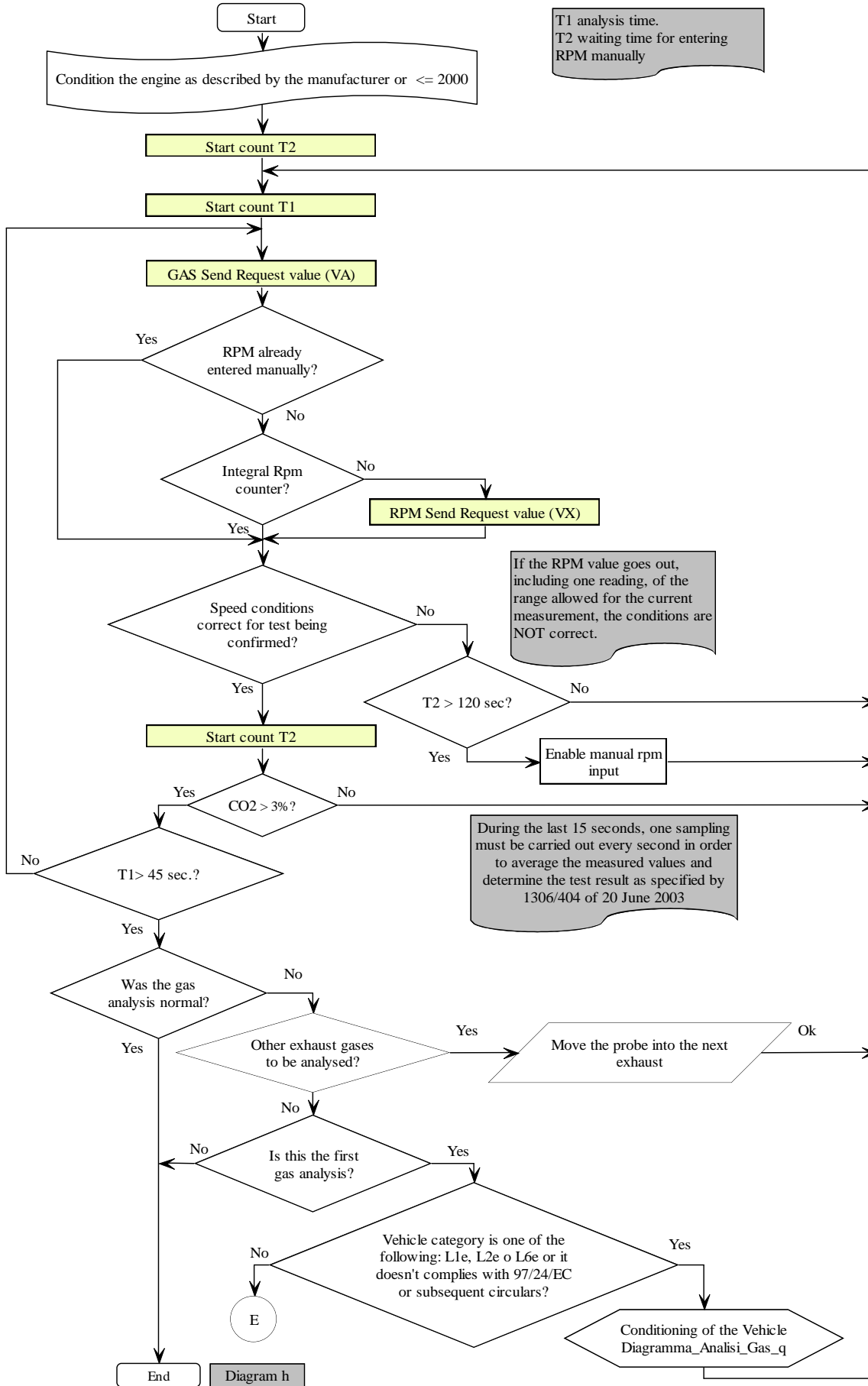




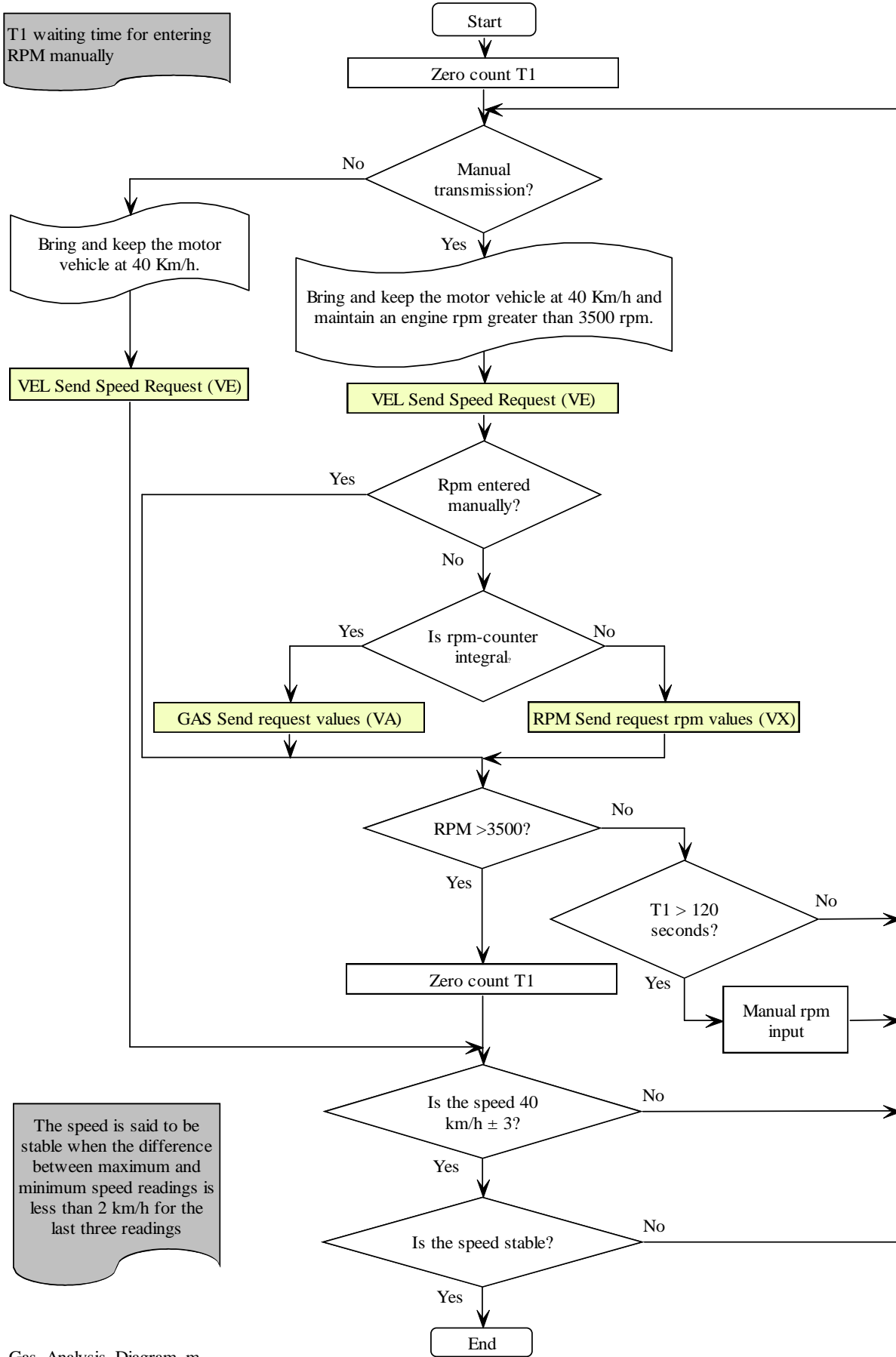
(*) Check whether the MCTCNet protocol version is supported. Check data of last regular check and, if applicable, indicate the due date as specified under 4.3 No 8 of this document.

(**) Check that the set curve is the one required for the type of vehicle to be tested.

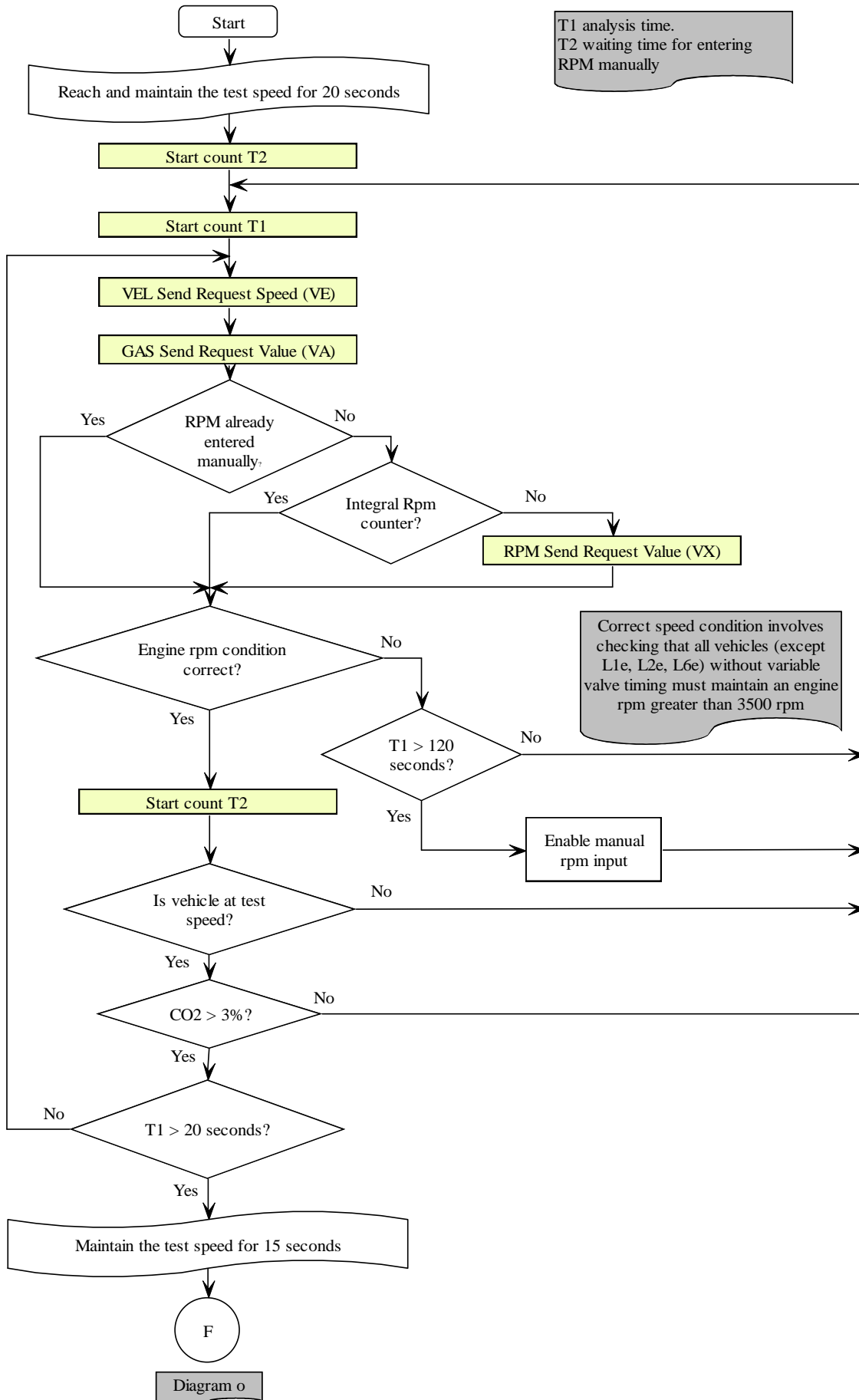
Gas_Analysis_Diagram_i



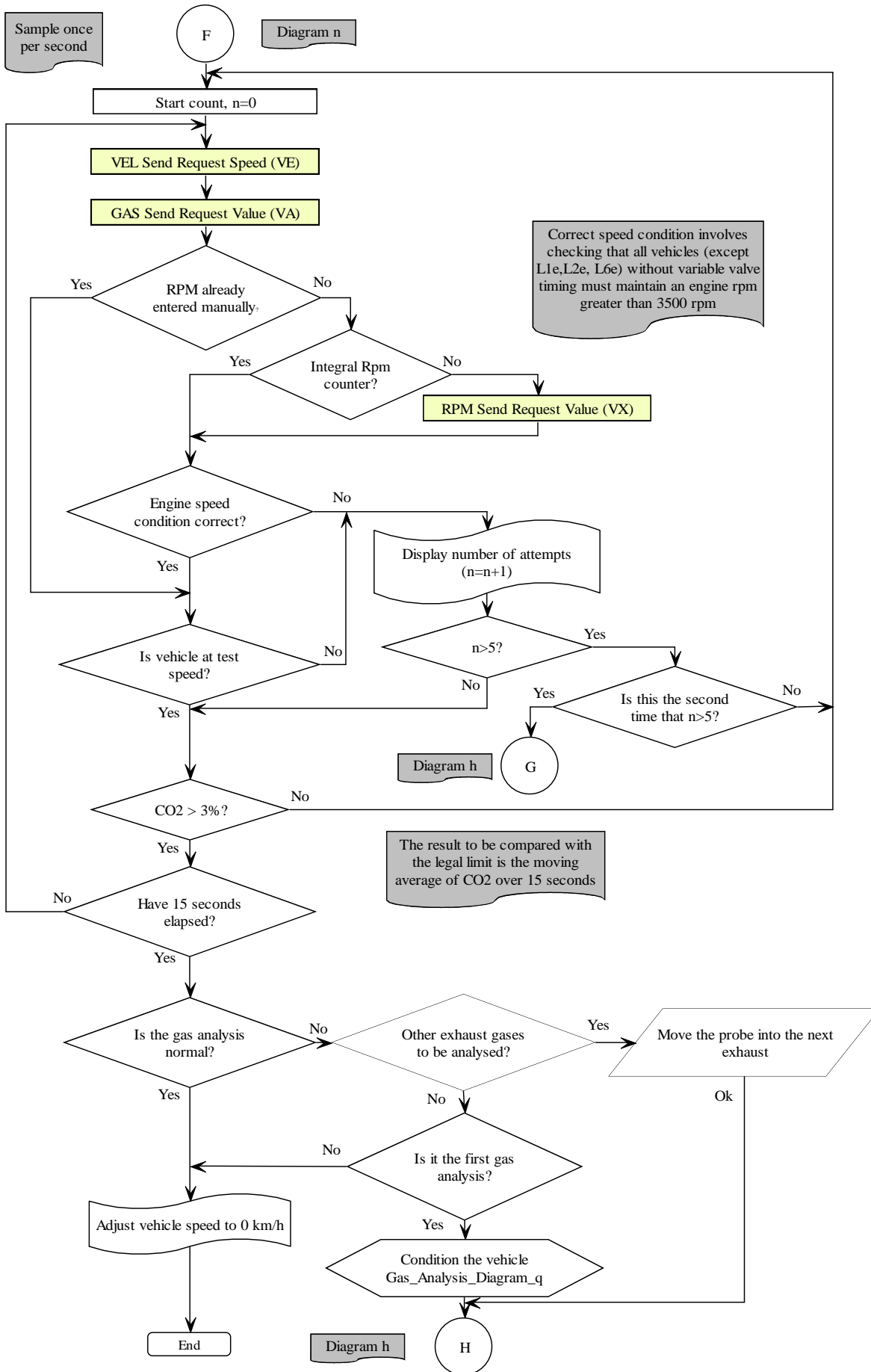
Gas_Analysis_Diagram_1



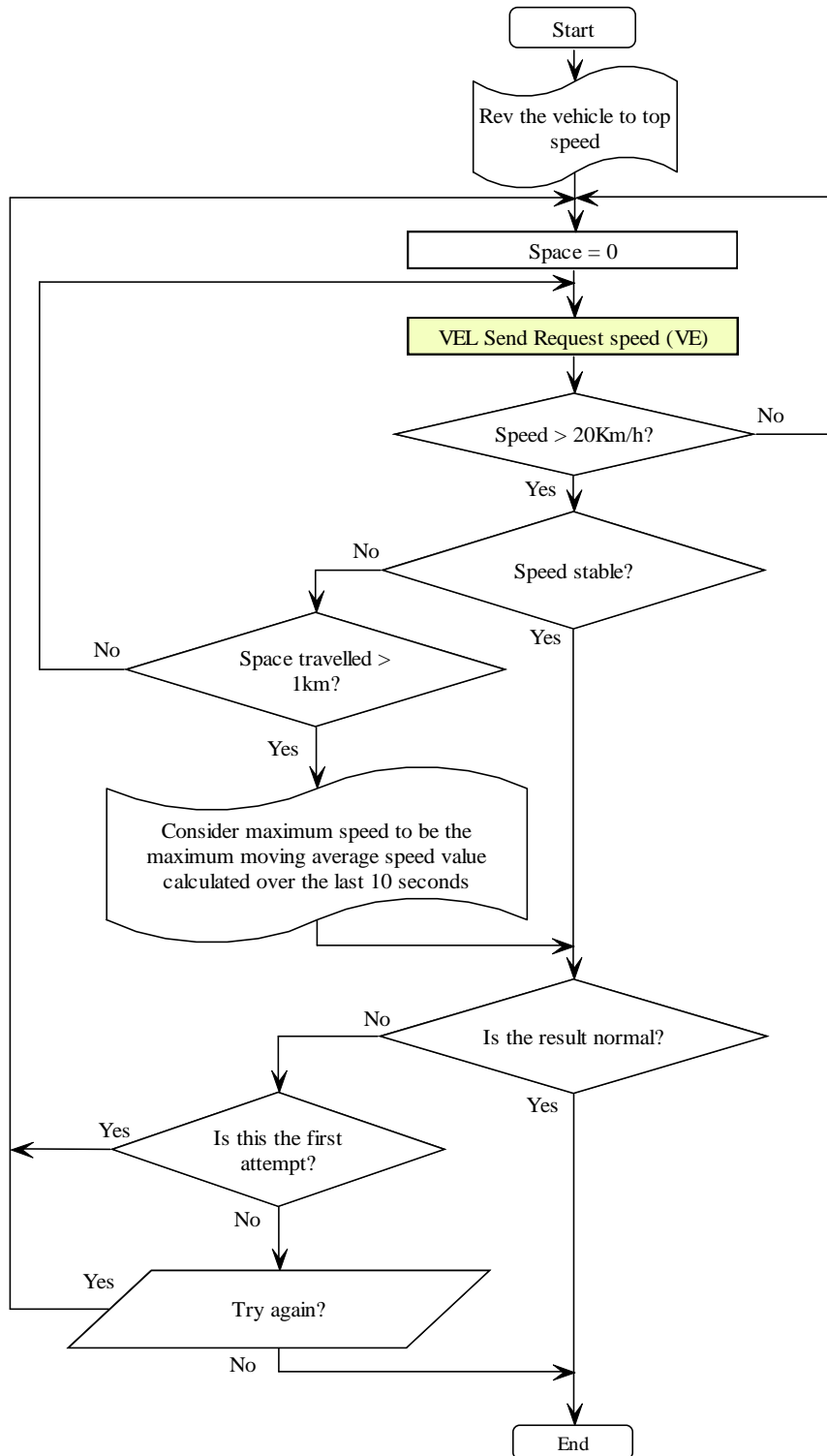
Gas_Analysis_Diagram_m



Gas_Analysis_Diagram_n



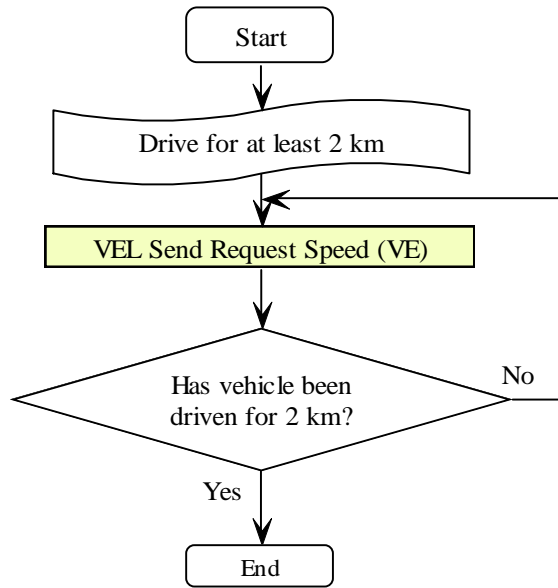
Gas_Analysis_Diagram_o



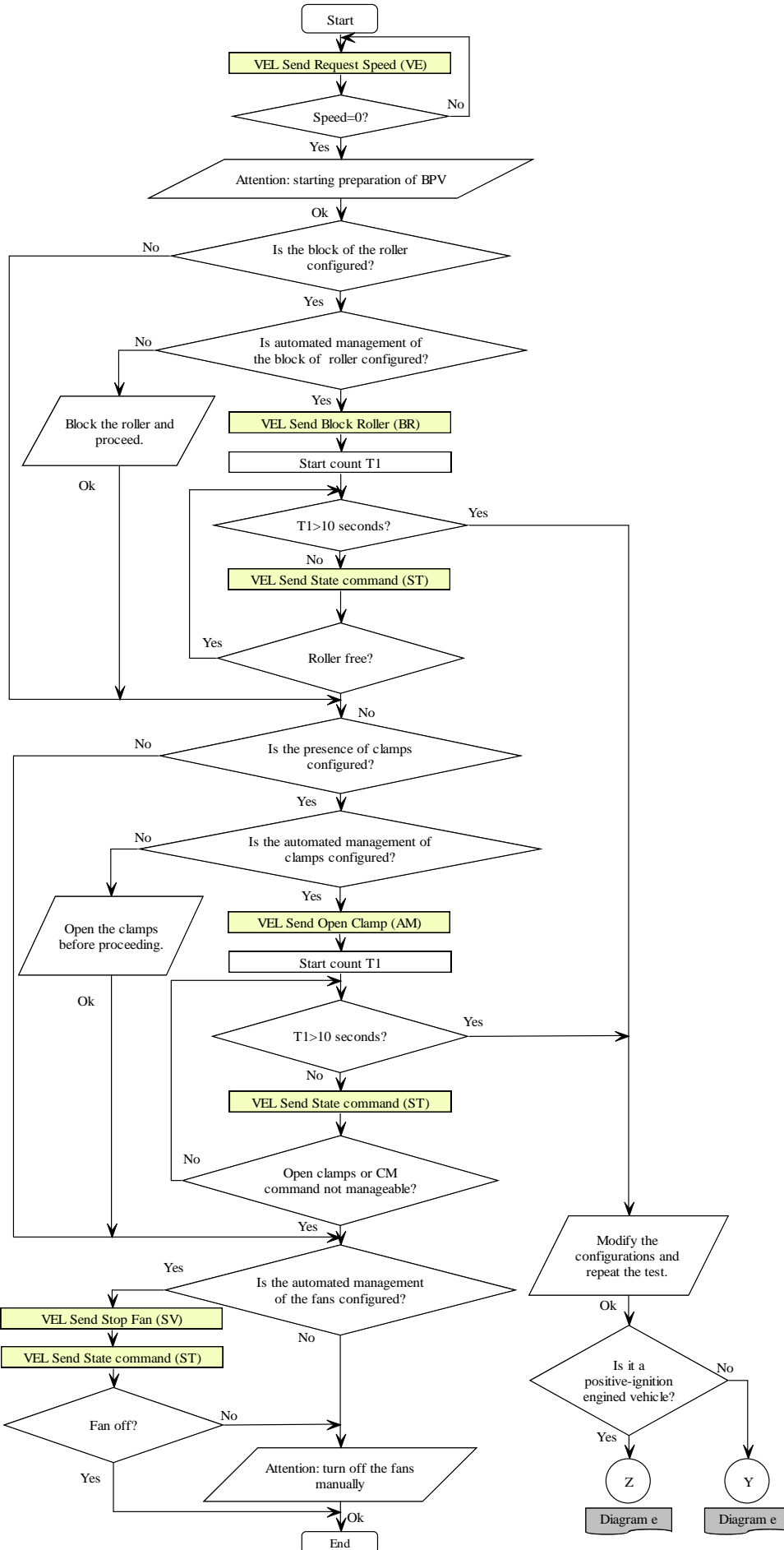
If necessary for the gas test, store the "Test speed", which will be 40km/h±3 if the vehicle reaches 45km/h, otherwise it will be the maximum speed achieved minus 5 km/h, with a tolerance of ±3 in all cases.
 Test speed for three-wheeled mopeds is 30km/h±3
 Test speed for light quadricycles is 25km/h±3

Stable speed describes the condition whereby the maximum value and the minimum value of the moving average speed in a 10 s time interval differ by a value of less than or equal to 2 km/h

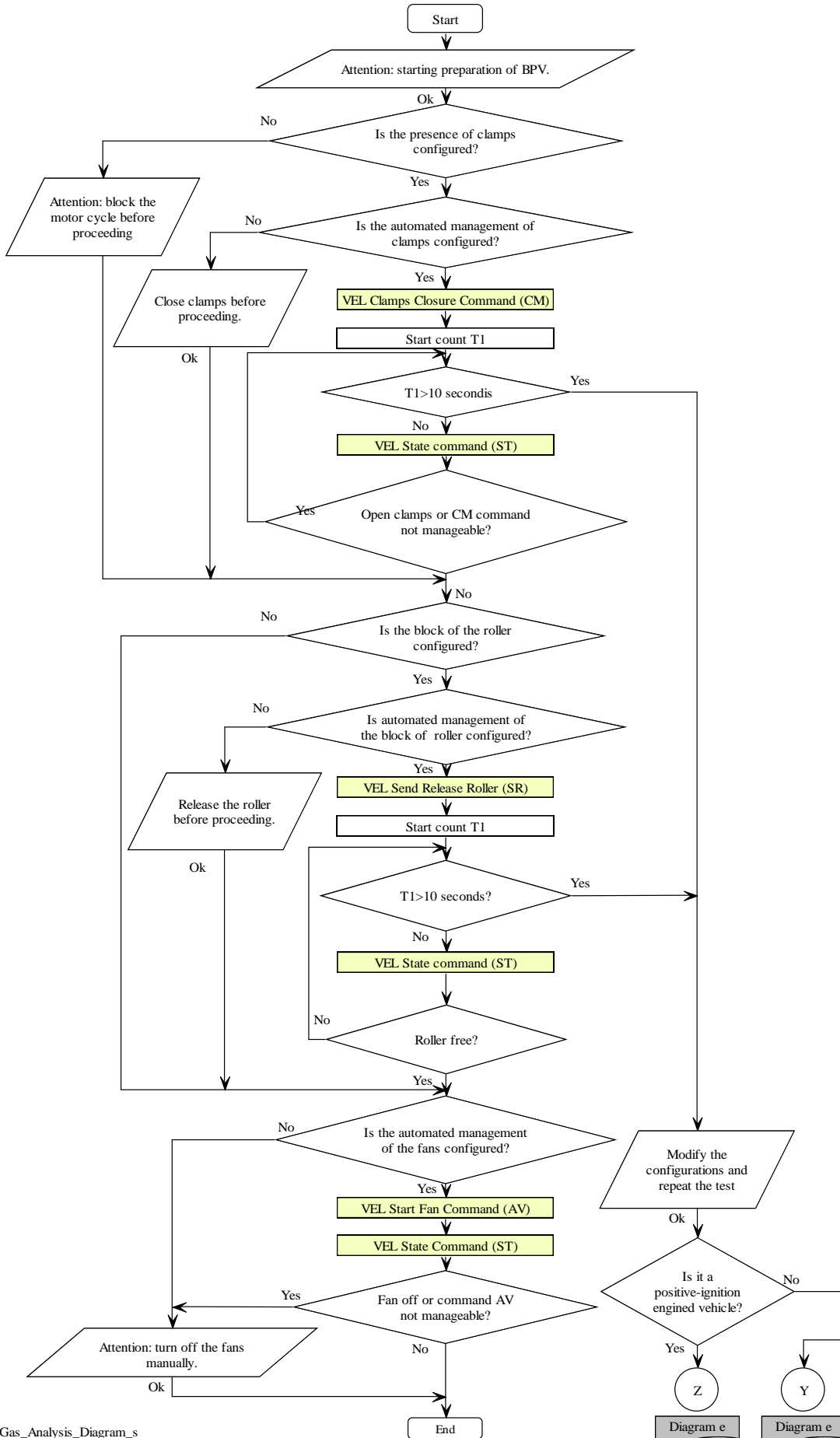
Gas_Analysis_Diagram_p



Gas_Analysis_Diagram_q



Gas_Analysis_Diagram_r



Gas_Analysis_Diagram_s

5.1.3.2 PCStazione ↔ OPACIMETER commands and responses

The commands and responses that take place between PCStazione and the Opacimeter device are listed below.

The protocol sessions start with a command sent from the PCStazione and are ended by the Opacimeter when a response is sent.

The commands are as follows:

- Device identification data request
- Send test identification data (TG)
- Integral rev counter identification data request
- Configuration of integral rev counter
- Stand-By activation or deactivation
- Automatic zero request
- Peak zero request
- Status request
- Measuring value request

5.1.3.2.1 Device identification data request

Command: “**ID**entification” (49 Hex 44 Hex)

Question:

STX	OPA	$\begin{matrix} E \\ T \\ B \end{matrix}$	Add	$\begin{matrix} E \\ T \\ B \end{matrix}$	ID	CRC-H	CRC-L	ETX
-----	-----	---	-----	---	----	-------	-------	-----

Where:

Field	Description
OPA	Question to Opacimeter device
Add	Numerical device address
ID	Device identification data request command

Response:

STX	OPA	$\begin{matrix} E \\ T \\ B \end{matrix}$	Add	$\begin{matrix} E \\ T \\ B \end{matrix}$	ID	$\begin{matrix} E \\ T \\ B \end{matrix}$	Mar	$\begin{matrix} E \\ T \\ B \end{matrix}$	Mod	$\begin{matrix} E \\ T \\ B \end{matrix}$	NumOm	$\begin{matrix} E \\ T \\ B \end{matrix}$	NumSer	$\begin{matrix} E \\ T \\ B \end{matrix}$	DataSca
-----	-----	---	-----	---	----	---	-----	---	-----	---	-------	---	--------	---	---------

$\begin{matrix} E \\ T \\ B \end{matrix}$	NumVer	$\begin{matrix} E \\ T \\ B \end{matrix}$	VerMCTCNet	CRC-H	CRC-L	ETX
---	--------	---	------------	-------	-------	-----

Where:

Field	Description	E.g. Format
OPA	Response to Opacimeter device	
Add	Numerical device address	
ID	Response to “ ID entificazione” command	
Mar	Make	
Mod	Model	
NumOm	Type approval number	
NumSer	Serial number	
DataSca	Due date of periodic check	“ggmmaaaa”
NumVer	Software version number	
VerMCTCNet	MCTCNet version number	“100”

5.1.3.2.2 Send test identification data

Command: "TarGa" (54 Hex 47 Hex)

Question:

STX	OPA	ETB	Add	ETB	TG	ETB	License plate	ETB	VIN no.	ETB	Reception date	ETB	Category	CRC-H	CRC-L	ETX
-----	-----	-----	-----	-----	----	-----	---------------	-----	---------	-----	----------------	-----	----------	-------	-------	-----

Where:

Field	Description	E.g. Format
OPA	Question to Opacimeter device	
Add	Numerical address referring to device	
TG	Command to send license plate, VIN no and test reception date	
License plate	Licence plate of vehicle being tested	
VIN no.	VIN No of vehicle being tested	
DataAccettazione	Reception date of vehicle being tested	
Category	International category of vehicle being tested	May assume one of the Categorie Internazionali constants defined in the MCTC.INI file

Response:

STX	OPA	ETB	Add	ETB	TG	ETB	Key ID	ETB	Key date	ETB	NumOm	ETB	Hash	CRC-H	CRC-L	ETX
-----	-----	-----	-----	-----	----	-----	--------	-----	----------	-----	-------	-----	------	-------	-------	-----

Where:

Field	Description	E.g. Format
OPA	Response to Opacimeter device	
Add	Numerical device address	
TG	Response to "TarGa" command	
IdChiave	Public key registration numerical identification	00000
DataChiave	Public key registration date in the form "ggmmaaaa"	01012000
NumOm	Type approval number	
Hash	String of 40 hexadecimal characters (160 bits expressed as hexadecimal figures). Hash is represented by SHA-1 of the message obtained by linking the strings for the device secret seed, licence plate, VIN No, reception date and category of the vehicle	

5.1.3.2.3 Integral rev counter identification data request

Command: “Identificazione Contagiri” (49 Hex 43 Hex)

Question:

STX	OPA	E T B	Add	E T B	IC	CRC-H	CRC-L	ETX
------------	-----	----------------------	-----	----------------------	----	--------------	--------------	------------

Where:

Field	Description
OPA	Question to Opacimeter device
Add	Numerical device address
IC	Rev counter identification request command

Response:

STX	OPA	E T B	Add	E T B	IC	E T B	Make	E T B	Model	E T B	NumOm	E T B
~~~~~												
NSerie		<b>E T B</b>	DataScadenza	<b>E T B</b>	NumVer	<b>CRC-H</b>	<b>CRC-L</b>	<b>ETX</b>	~~~~~			

Where:

Field	Description	E.g. Format
OPA	Response to Opacimeter device	
Add	Numerical device address	
IC	Respond to “IC” command	
Make	Make	
Model	Model	
NumOm	Type approval number	
NSerie	Serial number	
DataScadenza	Periodic check due date	
NumVer	Software version number	

The opacimeter responds with NAK in the following cases:

- The instrument does not include an integral rev counter
- Integral rev counter not operational or not responding.

## 5.1.3.2.4 Configuration of integral rev counter

Command: “Configurazione Contagiri “ ( 43 Hex 43 Hex)

Question:

STX	OPA	E T B	Add	E T B	“C C”	E T B	NTempi	E T B	NCil	CRC-H	CRC-L	ETX
-----	-----	-------------	-----	-------------	----------	-------------	--------	-------------	------	-------	-------	-----

Where:

Field	Description	E.g. Format
OPA	Question to Opacimeter device	
Add	Numerical device address	
“CC”	Fuel type command	
NTempi	Number of engine strokes	May assume: “2T” “4T” “DIS”
NCil	Number of cylinders	N 2

If the instrument does not use or does not incorporate a rev counter, it will nevertheless store the number of cylinders and strokes and respond correctly to the VA command, indicating in its reply the nominal data received through the CC command.

Response:

STX	OPA	E T B	Add	E T B	“C C”	CRC-H	CRC-L	ETX
-----	-----	-------------	-----	-------------	----------	-------	-------	-----

Where:

Field	Description
OPA	Response to Opacimeter device
Add	Numerical device address
“CC”	Command performed

## 5.1.3.2.5 Stand-By Activation or deactivation

Command: "Stand-By" (53 Hex 42 Hex)

Question:

STX	OPA	E T B	Add	E T B	SB	CRC-H	CRC-L	ETX
-----	-----	-------------	-----	-------------	----	-------	-------	-----

Where:

Field	Description
OPA	Question to Opacimeter device
Add	Numerical device address
SB	Inactivity (energy saving) or activity status selection

Response:

STX	OPA	E T B	Add	E T B	SB	CRC-H	CRC-L	ETX
-----	-----	-------------	-----	-------------	----	-------	-------	-----

Where:

Field	Description
OPA	Response to Opacimeter device
Add	Numerical device address
SB	Command performed

## 5.1.3.2.6 Automatic zero request

Command: “AZzeramento” (41 Hex 5A Hex)

Question:

STX	OPA	E T B	Add	E T B	A Z	CRC-H	CRC-L	ETX
-----	-----	-------------	-----	-------------	--------	-------	-------	-----

Where:

Field	Description
OPA	Question to Opacimeter device
Add	Numerical device address
AZ	Measuring chamber cleaning performed

Response:

STX	OPA	E T B	Add	E T B	A Z	CRC-H	CRC-L	ETX
-----	-----	-------------	-----	-------------	--------	-------	-------	-----

Where:

Field	Description
OPA	Response to Opacimeter device
Add	Numerical device address
AZ	Command performed

## 5.1.3.2.7 Peak zero request

Command: “Azzramento Picchi” (41 Hex 50 Hex)

Question:

STX	OPA	E T B	Add	E T B	AP	CRC-H	CRC-L	ETX
-----	-----	-------------	-----	-------------	----	-------	-------	-----

Where:

Field	Description
OPA	Question to Opacimeter device
Add	Numerical device address
AP	Run zeroing of stored peak value

Response:

STX	OPA	E T B	Add	E T B	AP	CRC-H	CRC-L	ETX
-----	-----	-------------	-----	-------------	----	-------	-------	-----

Where:

Field	Description
OPA	Response to Opacimeter device
Add	Numerical device address
AP	Command performed

To be able to reset the peak, the opacimeter must have received at least one AZ command once the flow has started (or once it has received an ID command), otherwise it must respond with NAK.

## 5.1.3.2.8 Status request

Command: “STato” (53 Hex 54 Hex)

Question:

STX	OPA	E T B	Add	E T B	ST	CRC-H	CRC-L	ETX
-----	-----	-------------	-----	-------------	----	-------	-------	-----

Where:

Field	Description
OPA	Question to Opacimeter device
Add	Numerical device address
ST	Device work status request

Response:

STX	OPA	E T B	Add	E T B	ST	E T B	Vector IV	E T B	ST1 (@)	E T B	CRC-32 (@)	CRC-H	CRC-L	ETX
-----	-----	-------------	-----	-------------	----	-------------	--------------	-------------	------------	-------------	---------------	-------	-------	-----

Where:

Field	Description	E.g. Format	
OPA	Response to Opacimeter device		
Add	Numerical device address		
ST	Command performed		
VettoreIV	Initialisation vector IV, for RC4 encryption	“15AF7B”	
ST1 (@)	First status field (byte)		
	<b>Bit no</b> | <b>State = meaning</b>		
	0	1 = warm_up	
	1	1 = stand-by state	
	2	1 = autozero in progress	
	3	1 = stored measurement peak	
	4	1 = measurement in progress	
	5 - 6	Not used	
7	Always = 1		
CRC-32 (@)	Checksum CRC-32 on encrypted data (@)	“23D19B3F”	

All bits described as “non utilizzati” must be set to 0.

Only one of the 0-1-2-3-4 bits of state byte ST1 must be set to “1”.

The status byte must be considered in accordance with the computer convention in use (assigning weighting of 0 to bit 0, i.e. the least significant and weighting of 7 to bit 7, i.e. the most significant).

## 5.1.3.2.9 Measuring value request

Command: “VAlori” (56 Hex 41 Hex)

### Question:

STX	OPA	E T B	Add	E T B	VA	CRC-H	CRC-L	ETX
-----	-----	-------------	-----	-------------	----	-------	-------	-----

### Where:

Field	Description	Format e.g.
OPA	Question to Opacimeter device	
Add	Numerical device address	
VA	Command request “VAlori”	

### Response:

STX	OPA	E T B	Add	E T B	VA	E T B	Vector IV	E T B	Measu rement (@)	E T B	RPM (@)	E T B	PiccoMisura (@)
E T B	PiccoGiri (@)	E T B	TOlio (@)	E T B	NCil (@)	E T B	NTempi (@)	E T B	CRC32 (@)	CRC-H	CRC-L	ETX	

### Where:

Field	Description	E.g. Format
OPA	Response to Opacimeter device	
Add	Numerical device address	
VA	Response to “VAlori” <b>command</b>	
VettoreIV	Initialisation vector IV, for RC4 encryption	“15AF7B”
Misura (@)	Recorded opacimeter measurement (m ⁻¹ )	00.00
rpm (@)	Engine revolutions (rpm) (if integral with analyser). Must assume value of 0 if not used or not present	0000
PiccoMisura (@)	Opacity measurement peak recorded (m ⁻¹ )	00.00
PiccoGiri (@)	Engine revolution peak (rpm) (if available).	0000
TOlio (@)	Oil temperature (°C) (if available)	000.0
NCil (@)	Number of cylinders set in instrument.	N 2
NTempi (@)	Strokes set in instrument.	Permitted values: “2T” “4T” “DIS”
CRC-32 (@)	Checksum CRC-32 on encrypted data (@)	“23D19B3F”

## 5.1.3.2.10 Opacity test flow diagram



The opacity test should be carried out in accordance with the specifications shown in the following flow diagram.

The following flow diagrams replace those in circular 2344-404 of 06 October 2003.

These must be implemented by all software managing the instruments involved, whether they are type-approved for DIR, RETE or RS Senza Esito.

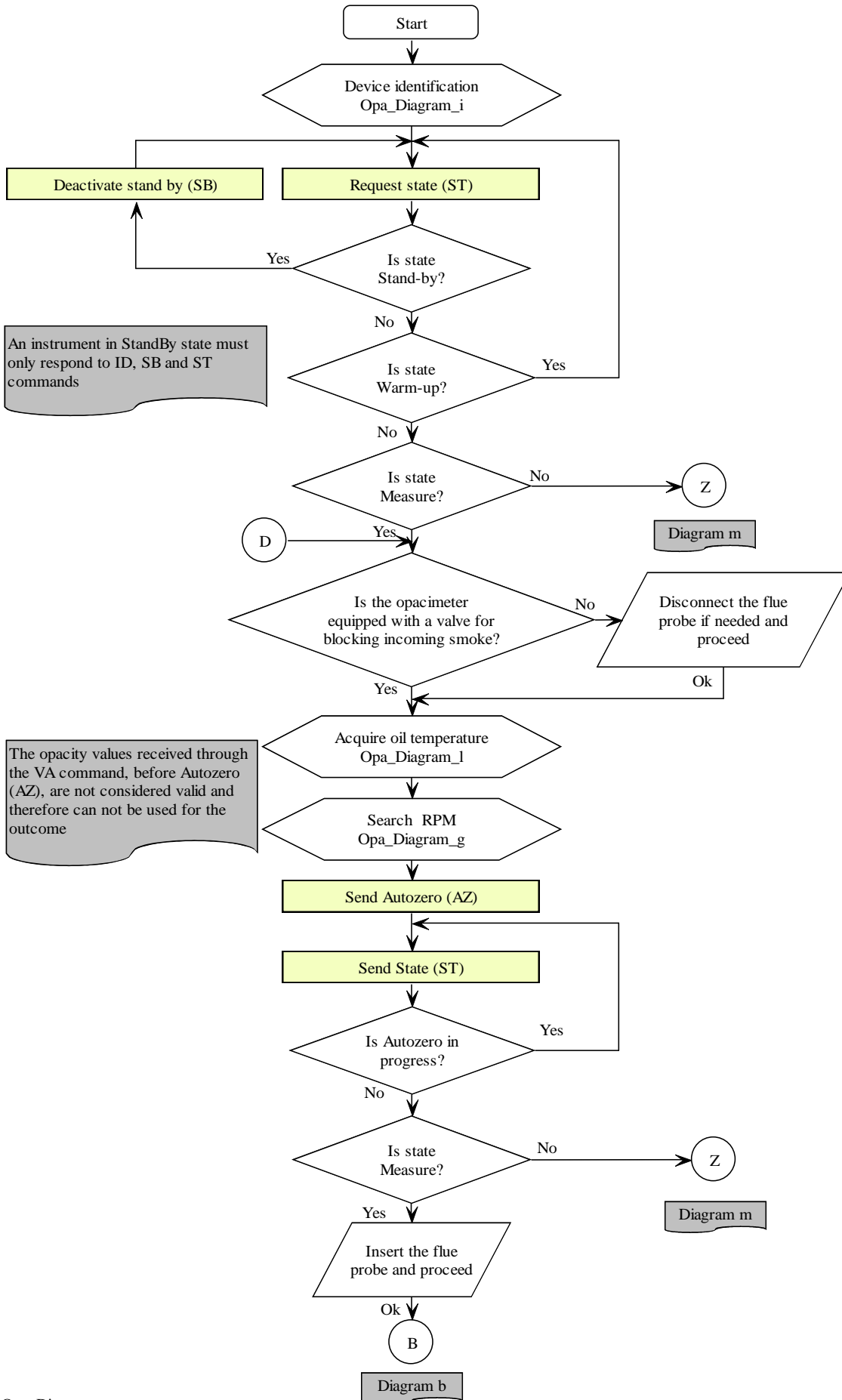
It must not be possible to start the test if no connection to a rev counter is present, whether integral or external to MCTCNet, even by entering the rpm manually.

The PCStazione must allow for the possibility of setting the frequency with which requests are made to RS Senza Esito instruments.

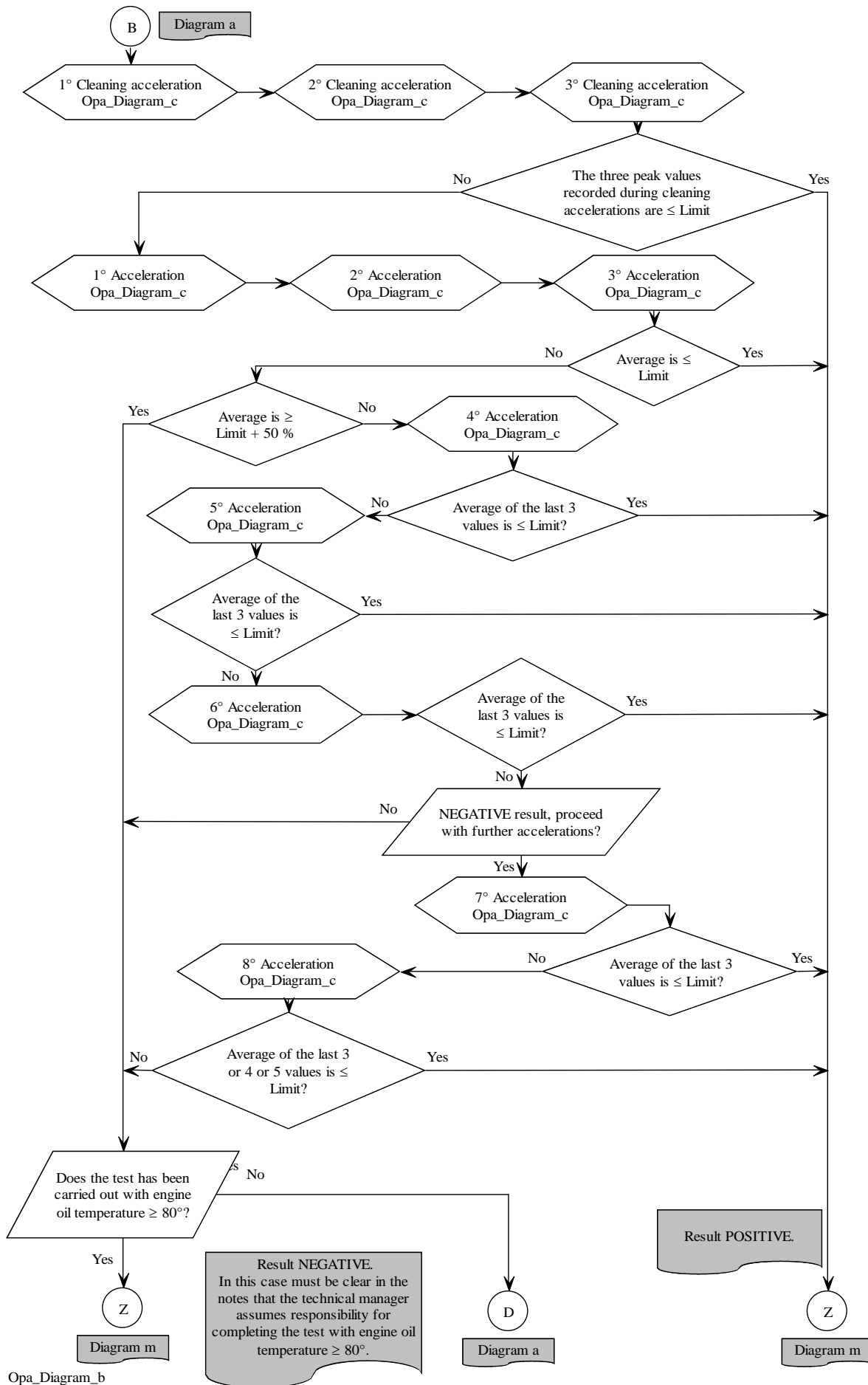
The check on the environmental data, necessary for determining whether it is possible to carry out a test, has been omitted from the flow diagrams because the DIR, RETE and PCStazione (for RSs) are required to check whether the weather conditions respect the parameters required in the regulation before starting the test.

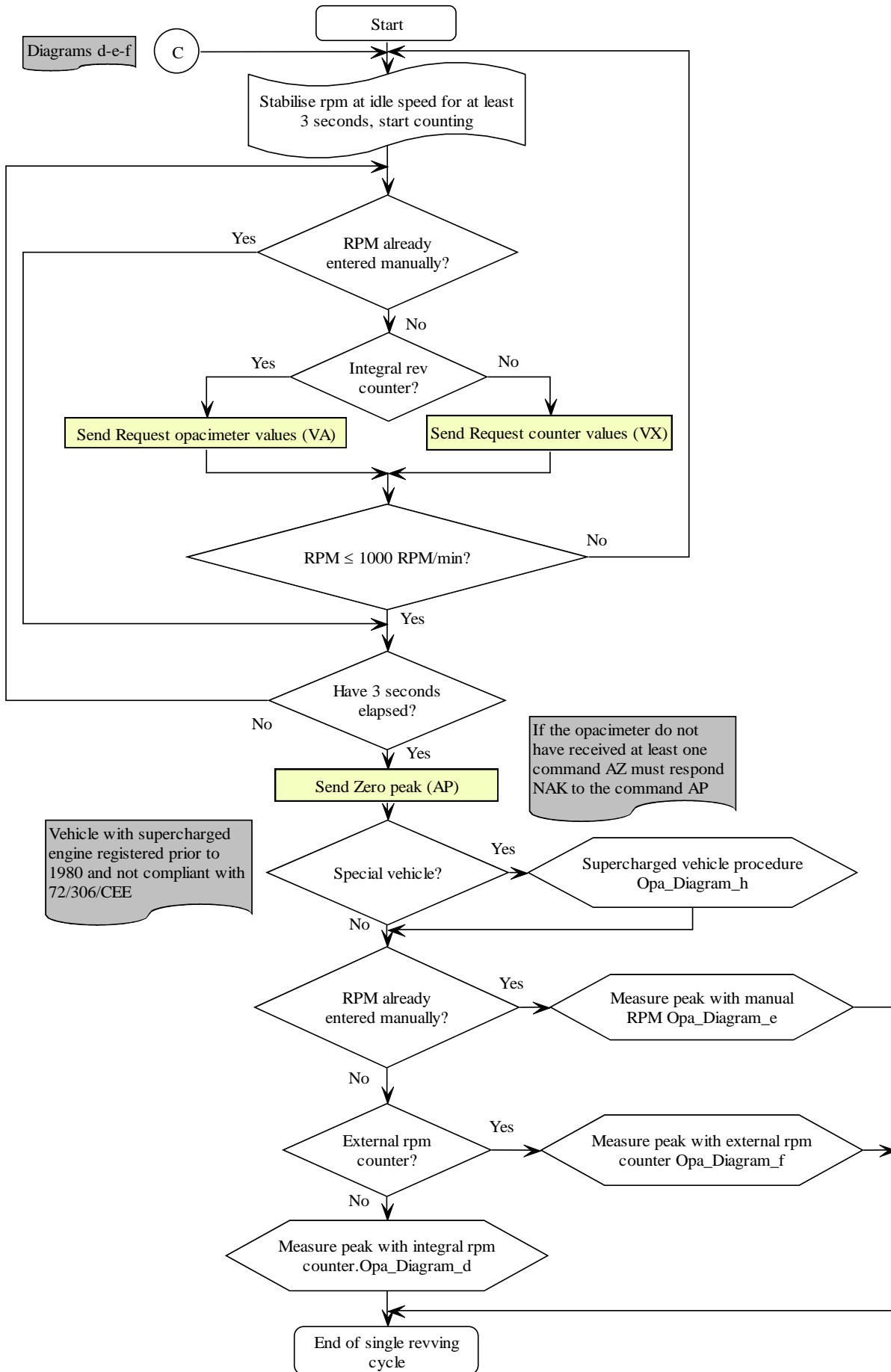
Note that at each reading of data relating to the rev counter, whether this is external (rev counter VX command) or integral (instrument VA command), congruence with the engine cylinder and stroke settings must be checked against data in the ACC file. In the case of incongruence, a message must be displayed on the screen and the test must be cancelled and repeated.

Note that with regard to diagram f), the data received must be checked following an IC command, with particular reference to the expiry date of the periodic rev counter check.

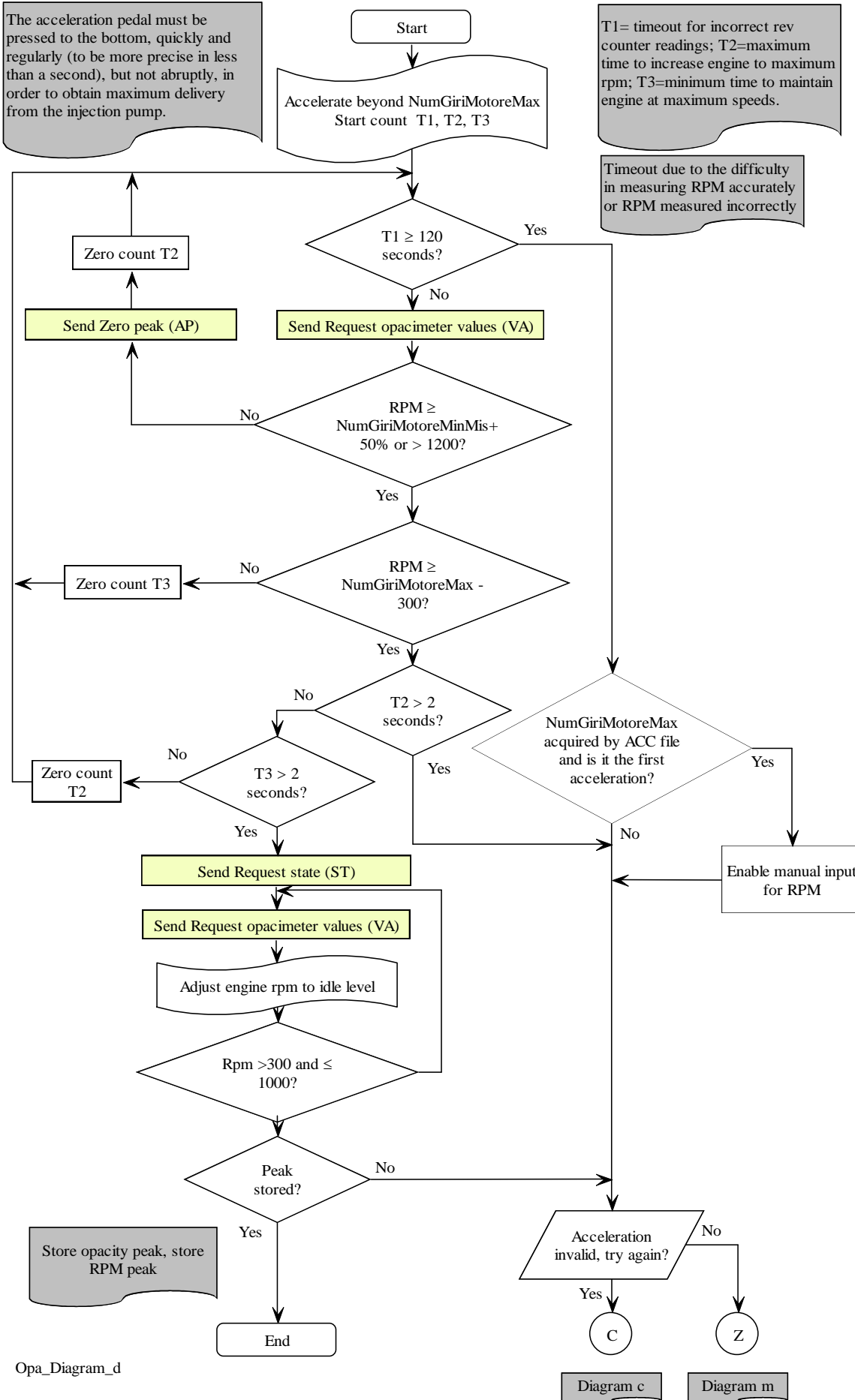


Opa_Diagram_a



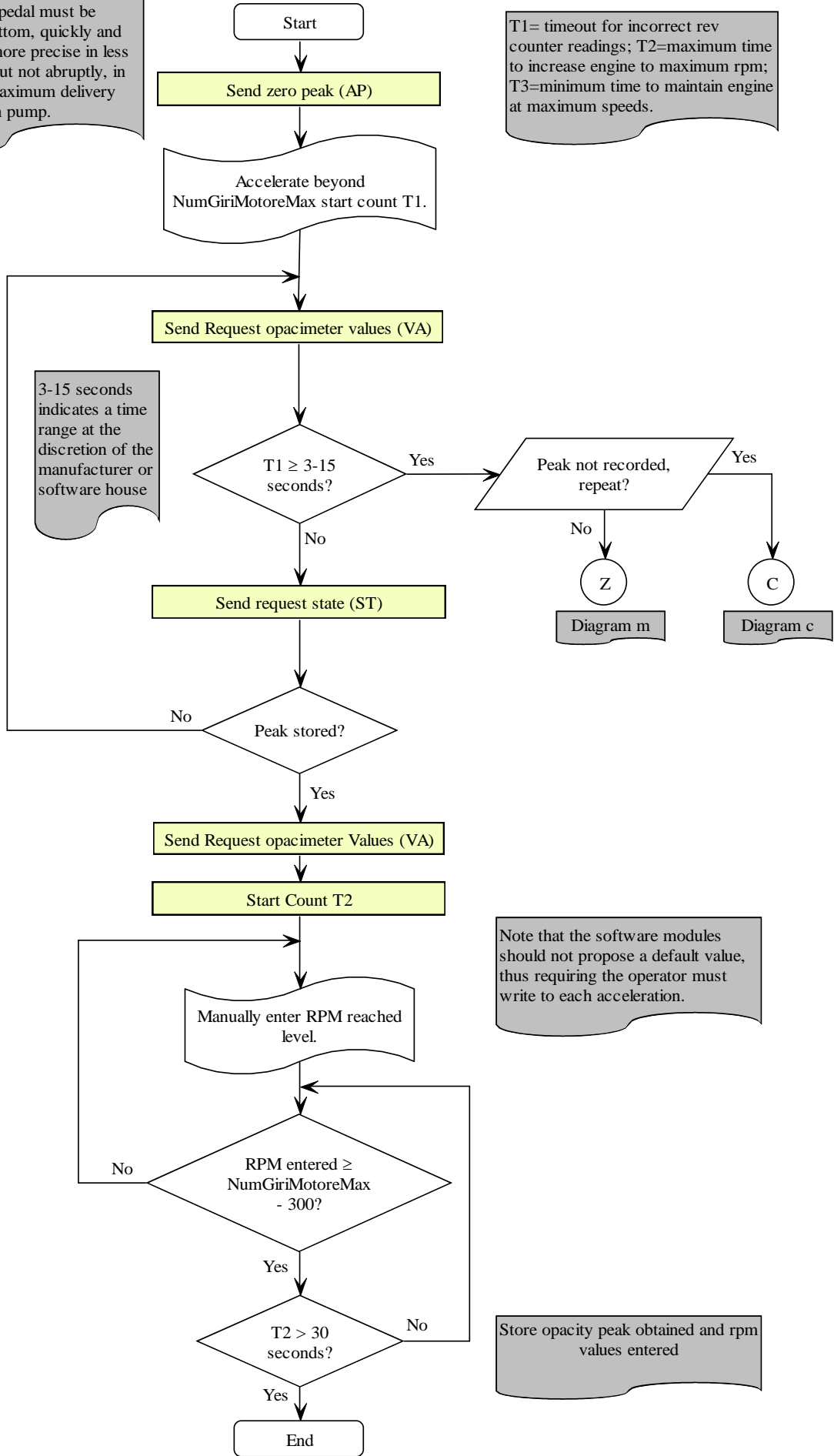


Opa_Diagram_c



The acceleration pedal must be pressed to the bottom, quickly and regularly (to be more precise in less than a second), but not abruptly, in order to obtain maximum delivery from the injection pump.

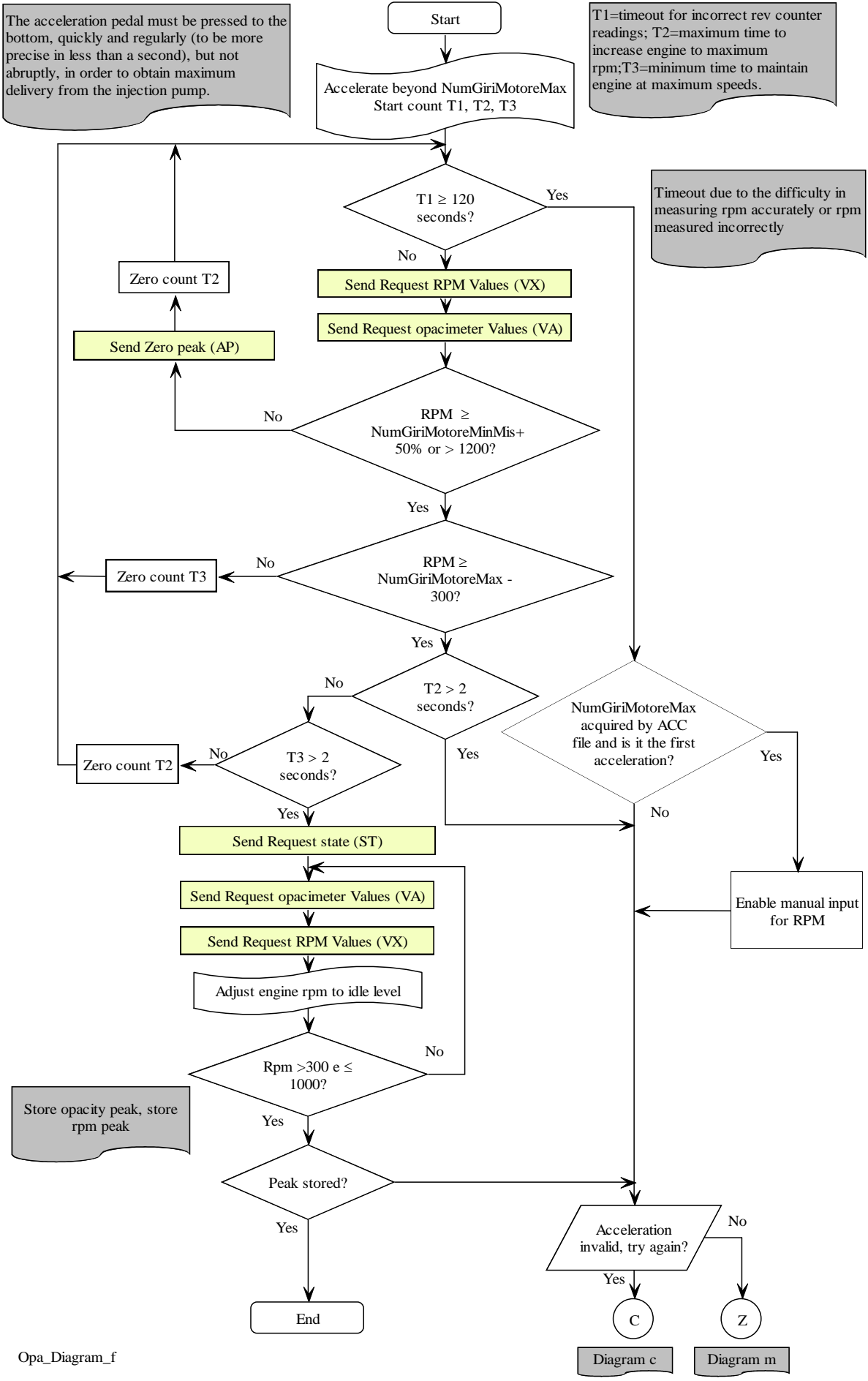
T1= timeout for incorrect rev counter readings; T2=maximum time to increase engine to maximum rpm; T3=minimum time to maintain engine at maximum speeds.

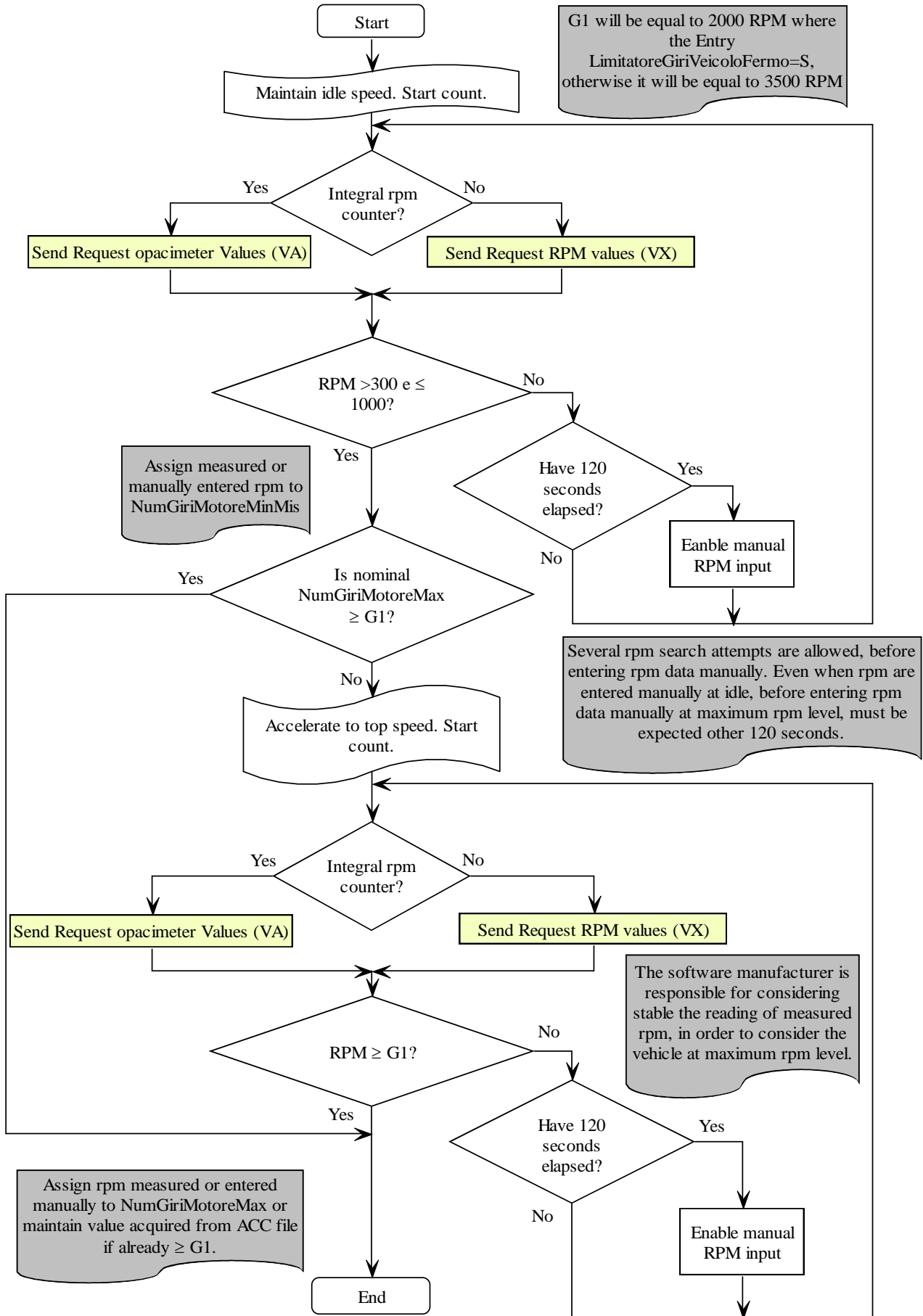


3-15 seconds indicates a time range at the discretion of the manufacturer or software house

Note that the software modules should not propose a default value, thus requiring the operator must write to each acceleration.

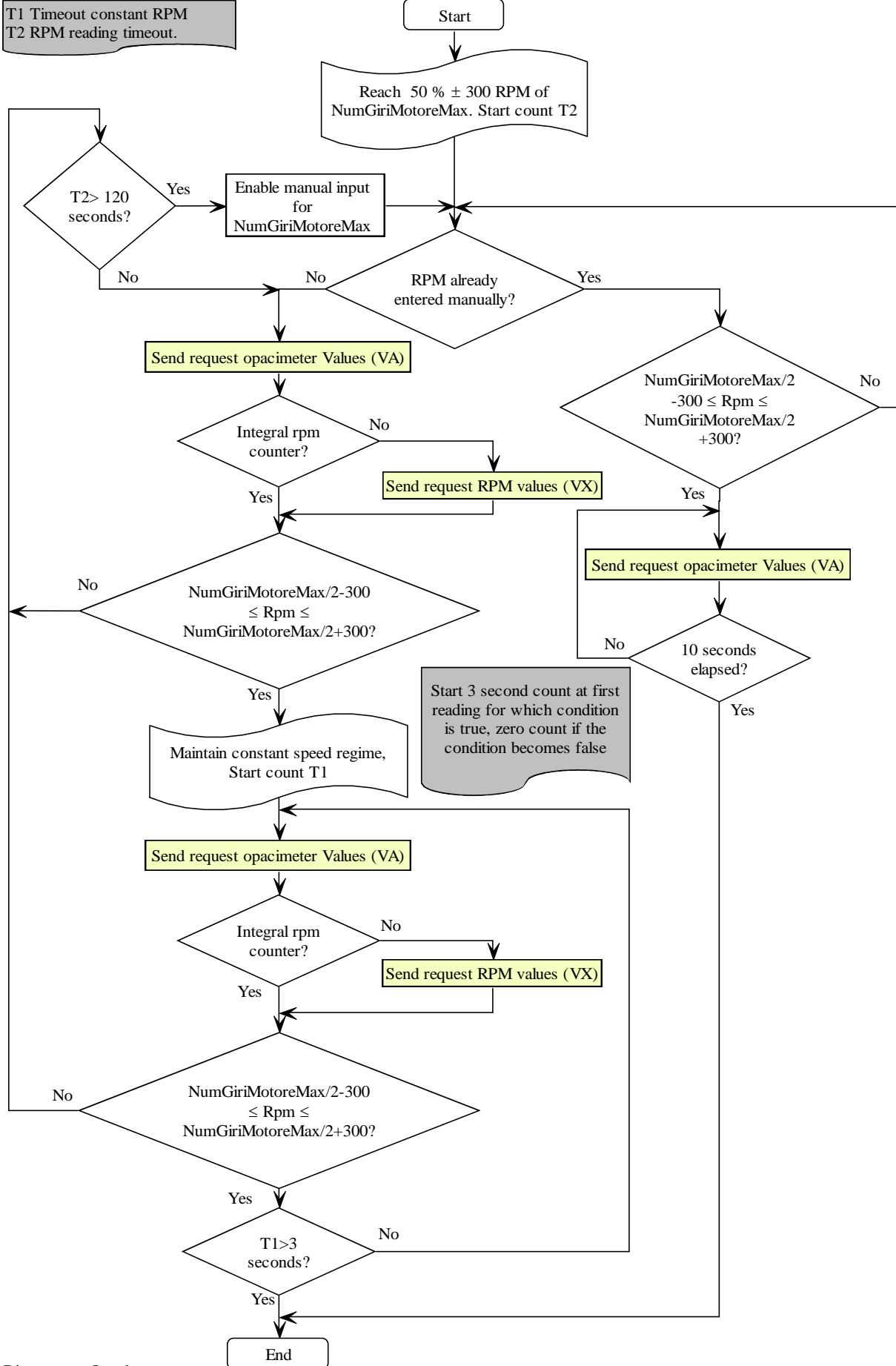
Store opacity peak obtained and rpm values entered



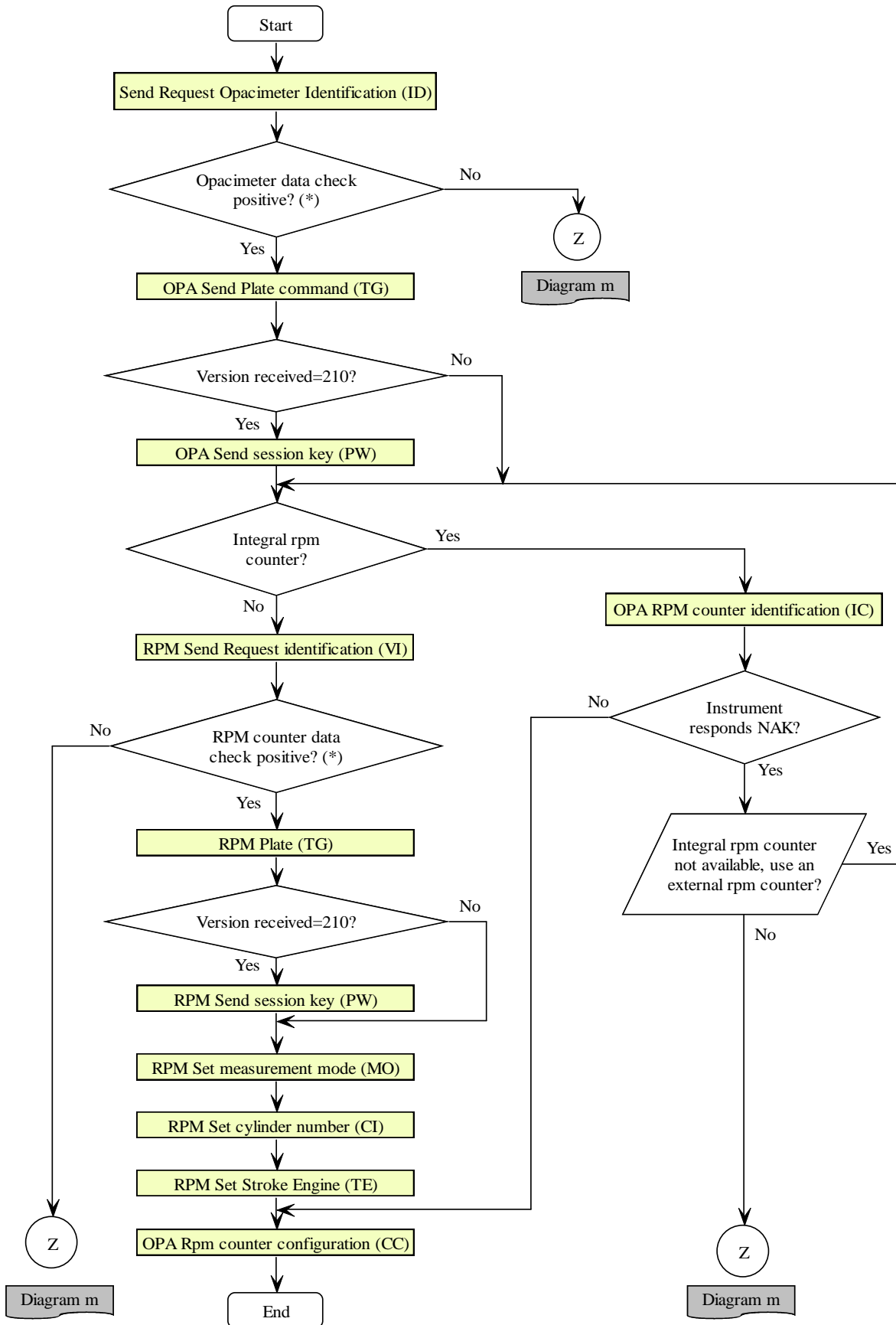


Opa_Diagram_g



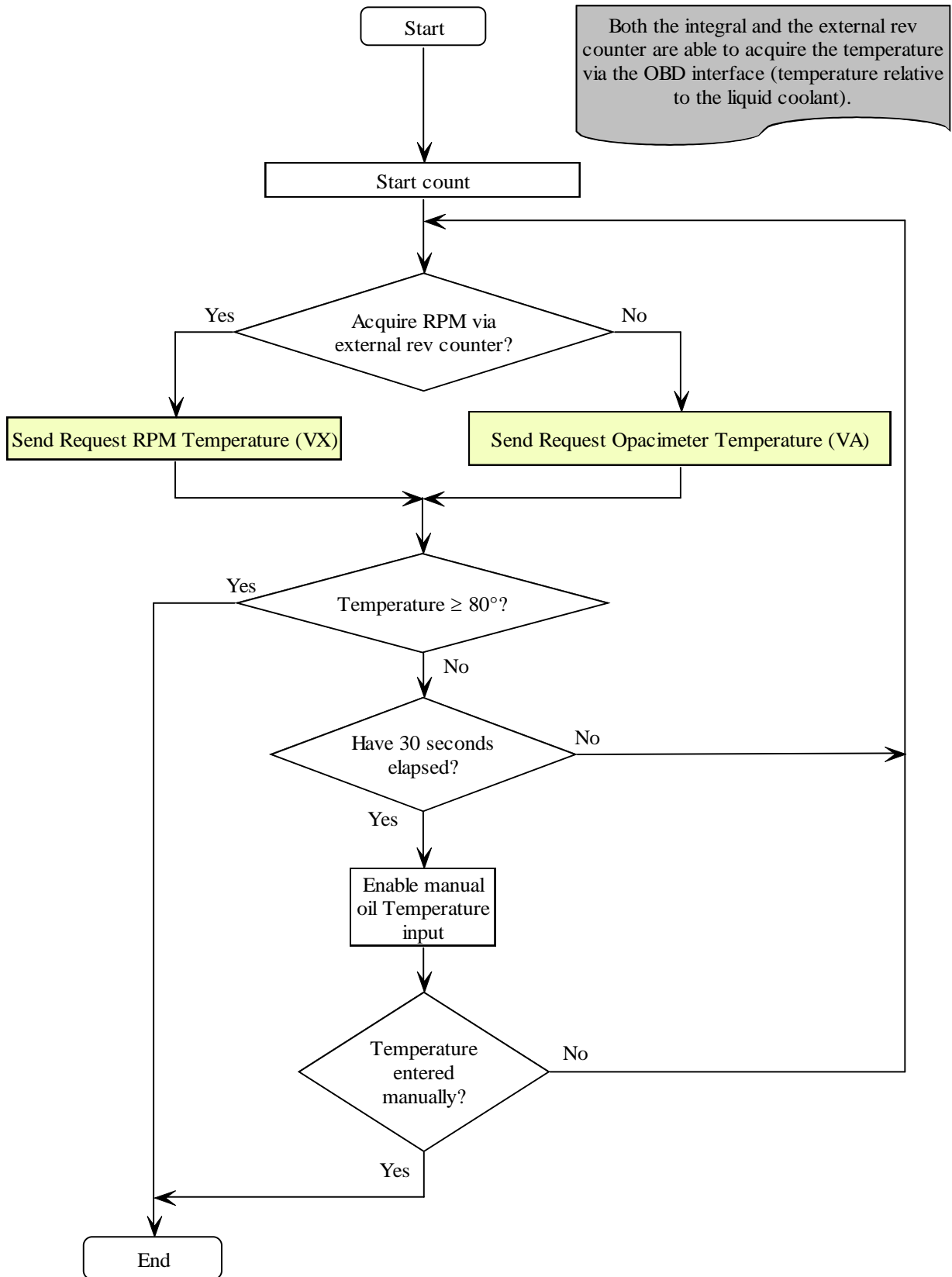


Diagramma_Opa_h

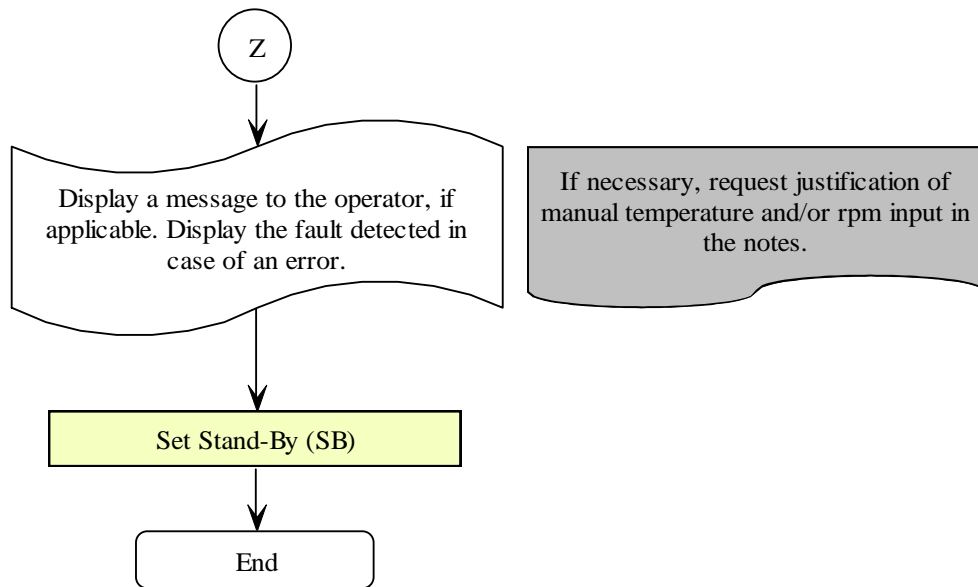


(*) Check whether the MCTCNet protocol version is supported (excluding integral rev counter).  
 Check the periodic check due date as specified under point 8 No 4.3 of this document.

Opa_Diagram_i



Opa_Diagram_1



Opa_Diagram_m

## 5.1.3.3 PCStazione ↔ REV COUNTER commands and responses

On all software modules that use a rev counter for testing, it must be possible to choose between an integral rev counter and MCTCNet rev counter. This choice may be carried out once only at the installation stage but the operator must be able to gain access to the configurations to change the type of rev counter used.

The RS Senza Esito approved external rev counter must be updated to MCTCNet version 2.00.

In order to guarantee interchangeability and correct operation, even during the transitional period, the rev counter updated to MCTCNet version 2.00 must communicate in both version 1.00 and version 2.00.

The version 1.00 commands are therefore kept unchanged and new commands are defined for version 2.00.

For example, when the version 2.00 rev counter receives the ID command or VA command (from the MCTCNet V.1.0 specification) it must respond in the same way as described in version 1.00, in particular, the protocol version defined in the “VerMCTCNet” field response string must be completed with “100” even though the MCTCNet version really in use is 2.00.

The commands used in version 2.00 are VI, VX, CI, TE, MO where: VI and VX are data request commands, while CI, TE and MO are setting commands and may not be received by the instrument, according to its manufacturing specifications. Even when the instrument does not carry out any setting following the CI, TE and MO commands, it must nevertheless respond correctly to the question, as described in the command specifications. Any instrument that does not receive the setting request through the CI, TE and MO commands must still respond to the VX, including the setting in use, which may evidently be modified manually by the operator or acquired automatically by the instrument (e.g.: measurement mode).

If the rev counter is used in MCTCNet mode it must not require the use of commands other than those set out in this specification.

The ID and VI commands must be used by the rev counter to identify the working mode:

- √ Following the ID command, the rev counter will use the mode specified in version 1.00 of MCTCNet and will respond NAK to all commands not specified by the above version, therefore also to the commands specified by version 2.00 (excluding VI)
- √ Following the VI command, the rev counter will use the mode specified in version 2.00 of MCTCNet and will respond NAK to all commands not specified by the above version, therefore also to the commands specified by version 1.00 (excluding ID)

If the settings are modified, both by means of the CI, TE and MO commands and manually by the operator, the rev counter must remain in AUTOSETUP mode for at least 2 seconds. During AUTOSETUP status, the rpm (measurement field of response to VX command) must be set to 0.

The commands and responses exchanged between PCStazione and the Rev counter are listed below. The protocol sessions start with a question sent from the PCStazione and are ended by the Rev counter when a response is sent.

The commands are as follows:

- Device IDentification data request (ID)
- Send test identification data (TG)
- Measured value request (VA)
- Device identification data request (IV)
- Measured value, status and setting request (VX)
- Set cylinder number request (CI)
- Set stroke number request (TE)
- Set measuring mode request (MO)

## 5.1.3.3.1 Device identification data request

Command: “**ID**entification” (49 Hex 44 Hex)

Question:

STX	RPM	$\begin{matrix} E \\ T \\ B \end{matrix}$	Add	$\begin{matrix} E \\ T \\ B \end{matrix}$	ID	CRC-H	CRC-L	ETX
-----	-----	-------------------------------------------	-----	-------------------------------------------	----	-------	-------	-----

Where:

Field	Description
RPM	Question to Rev counter device
Add	Numerical device address
ID	Device identification data request command

Response:

STX	RPM	$\begin{matrix} E \\ T \\ B \end{matrix}$	Add	$\begin{matrix} E \\ T \\ B \end{matrix}$	ID	$\begin{matrix} E \\ T \\ B \end{matrix}$	Mar	$\begin{matrix} E \\ T \\ B \end{matrix}$	Mod	$\begin{matrix} E \\ T \\ B \end{matrix}$	NumOm	$\begin{matrix} E \\ T \\ B \end{matrix}$	NumSer	$\begin{matrix} E \\ T \\ B \end{matrix}$	DataSca
-----	-----	-------------------------------------------	-----	-------------------------------------------	----	-------------------------------------------	-----	-------------------------------------------	-----	-------------------------------------------	-------	-------------------------------------------	--------	-------------------------------------------	---------

$\begin{matrix} E \\ T \\ B \end{matrix}$	NumVer	$\begin{matrix} E \\ T \\ B \end{matrix}$	VerMCTCNet	CRC-H	CRC-L	ETX
-------------------------------------------	--------	-------------------------------------------	------------	-------	-------	-----

Where:

Field	Description	E.g. Format
RPM	Response from rev counter device	
Add	Numerical device address	
ID	Response to “ <b>ID</b> entificazione” command	
Mar	Make	
Mod	Model	
NumOm	Type approval number	
NumSer	Serial number	
DataSca	Due date of periodic check	“ggmmaaaa”
NumVer	Software version number	
VerMCTCNet	MCTCNet version number	“100”

## 5.1.3.3.2 Send test identification data

Command: "TarGa" (54 Hex 47 Hex)

Question:

STX	RPM	ETB	Add	ETB	TG	ETB	License plate	ETB	VIN no.	ETB	Reception date	ETB	Category	CRC-H	CRC-L	ETX
-----	-----	-----	-----	-----	----	-----	---------------	-----	---------	-----	----------------	-----	----------	-------	-------	-----

Where:

Field	Description	E.g. Format
RPM	Question to Rev counter device	
Add	Numerical address referring to device	
TG	Command to send license plate, VIN number and test reception date	
License plate	Licence plate of vehicle being tested	
VIN no.	VIN No of vehicle being tested	
DataAccettazione	Reception date of vehicle being tested	
Category	International category of vehicle being tested	May assume one of the <b>Categorie Internazionali</b> constants defined in the MCTC.INI file

Response:

STX	RPM	ETB	Add	ETB	TG	ETB	Key ID	ETB	Key date	ETB	NumOm	ETB	Hash	CRC-H	CRC-L	ETX
-----	-----	-----	-----	-----	----	-----	--------	-----	----------	-----	-------	-----	------	-------	-------	-----

Where:

Field	Description	E.g. Format
RPM	Response from rev counter device	
Add	Numerical device address	
TG	Response to "TarGa" command	
IdChiave	Public key registration numerical identification	00000
DataChiave	Public key registration date in the form "ggmmaaaa"	01012000
NumOm	Type approval number	
Hash	String of 40 hexadecimal characters (160 bits expressed as hexadecimal figures). Hash is represented by SHA-1 of the message obtained by linking the strings for the device secret seed, licence plate, VIN No, reception date and category of the vehicle	



### 5.1.3.3.3 Measured value request

Command: "VAlori" (56 Hex 41 Hex)

Question:

STX	RPM	ETB	Add	ETB	VA	CRC-H	CRC-L	ETX
-----	-----	-----	-----	-----	----	-------	-------	-----

Where:


Field	Description
RPM	Question to Rev counter device
Add	Numerical device address
VA	"VAlori" request command

Response:

Response:

STX	RPM	ETB	Add	ETB	VA	ETB	Measurement	CRC-H	CRC-L	ETX
-----	-----	-----	-----	-----	----	-----	-------------	-------	-------	-----

Where:

Field	Description	e.g. format
RPM	Response from rev counter device	
Add	Numerical device address	
VA	Response to "VAlore" command	
Measurement	Measured value:	0000 (can be entered manually by placing "#" before the value entered, e.g. "#0000") (  3)

## 5.1.3.3.4 Device identification data request

Command: “VI” (56 Hex 49 Hex)

Question:

STX	RPM	E T B	Add	E T B	VI	CRC-H	CRC-L	ETX
-----	-----	-------------	-----	-------------	----	-------	-------	-----

Where:

Field	Description	Format e.g.
RPM	Question to Rev counter device	
Add	Numerical device address	
VI	Identification request command	

Response:

STX	RPM	E T B	Add	E T B	VI	E T B	Make	E T B	Model	E T B	NumOm	E T B
~~~~~												
NSerie	E T B	DataScadenza	E T B	NumVer	E T B	VerMCTCNet	CRC-H	CRC-L	ETX			
~~~~~												

Where:

Field	Description	E.g. Format
RPM	Response from rev counter device	
Add	Numerical device address	
VI	Respond to command “VI”	
Make	Make	
Model	Model	
NumOm	Type approval number	
NSerie	Serial number	
DataScadenza	Periodic check due date	01012000
NumVer	Software version number	
VerMCTCNet	MCTCNet version number	200

## 5.1.3.3.5 Measured values, status and setting request

Command: “VX” (56 Hex 58 Hex)

Question:

STX	RPM	E T B	Add	E T B	VX	CRC- H	CRC- L	ETX
-----	-----	-------------	-----	-------------	----	-----------	-----------	-----

Where:

Field	Description
RPM	Question to Rev counter device
Add	Numerical device address
VX	Measured values, status and setting request

Response:

STX	RPM	E T B	Add	E T B	VX	E T B	Vector IV	E T B	Measu rement (@)	E T B	Temp (@)	E T B	ST (@ )	E T B	Mode (@)	E T B
NCil (@)	E T B	Strokes (@)	E T B	CRC-32 (@)	CRC-H	CRC-L	ETX									

Where:

Field	Description	Format e.g.
RPM	Response from rev counter device	
Add	Numerical device address	
VX	Command performed	
VettoreIV	Initialisation vector IV, for RC4 encryption	“15AF7B”
Misura (@)	Engine rpm measured value	N 5
Temp (@)	Measured engine oil temperature °C	N 5(1) If the instrument is NOT equipped with an oil temperature probe and Mode<>“D” Temp assumes “0.0”
ST (@)	Status field (byte)	
	<b>Bit no</b>	<b>State = meaning</b>
	0 (LSB)	1 = MEASUREMENT
	1	1 = AUTOSETUP
	2	1 = ERROR
	3-4-5-6	Not used
7 (MSB)	Always = 1	
Mode (@)	Measuring mode imposed in instrument.	Possible values: “A” acoustic “B” battery ripple “I” induction “N” aerial “O” optical “V” vibration “P” piezoelectric “D” OBD

NCil (@)	Number of cylinders set in instrument.	N 2
NTempi (@)	Strokes set in instrument.	Permitted values: "2T" "4T" "DIS"
CRC-32 (@)	Checksum CRC-32 on encrypted data (@)	"23D19B3F"

Only one of the 0-1-2 bits of state byte ST must be set to "1".

### 5.1.3.3.6 Set cylinder number request

Command: "CIindri" (43 Hex 49 Hex)

Question:

STX	RPM	E T B	Add	E T B	CI	E T B	Ncil	CRC-H	CRC-L	ETX
-----	-----	-------------	-----	-------------	----	-------------	------	-------	-------	-----

Where:

Field	Description	E.g. Format
RPM	Question to Rev counter device	
Add	Numerical device address	
CI	Set cylinder number request command	
Ncil	Number of cylinders	N 2

Response:

STX	RPM	E T B	Add	E T B	CI	CRC-H	CRC-L	ETX
-----	-----	-------------	-----	-------------	----	-------	-------	-----

Where:

Field	Description	E.g. Format
RPM	Response from rev counter device	
Add	Numerical device address	
CI	Response to "CI" command	

The rev counter (used in MCTCNet V. 2.0 mode) responds to the CI command in any case, irrespective of whether the command is used to set the number of cylinders requested in the question.

## 5.1.3.3.7 Set stroke number request

Command: “TEmpi” (54 Hex 45 Hex)

Question:

<b>STX</b>	RPM	<b>E</b> <b>T</b> <b>B</b>	Add	<b>E</b> <b>T</b> <b>B</b>	TE	<b>E</b> <b>T</b> <b>B</b>	Ntempi	<b>CRC-H</b>	<b>CRC-L</b>	<b>ETX</b>
------------	-----	----------------------------------	-----	----------------------------------	----	----------------------------------	--------	--------------	--------------	------------

Where:

Field	Description	E.g. Format
RPM	Question to Rev counter device	
Add	Numerical device address	
TE	Set stroke number request command	
Ntempi	Number of engine strokes	Possible values: “2T” “4T” “DIS”

Response:

<b>STX</b>	RPM	<b>E</b> <b>T</b> <b>B</b>	Add	<b>E</b> <b>T</b> <b>B</b>	TE	<b>CRC-H</b>	<b>CRC-L</b>	<b>ETX</b>
------------	-----	----------------------------------	-----	----------------------------------	----	--------------	--------------	------------

Where:

Field	Description	E.g. Format
RPM	Response from rev counter device	
Add	Numerical device address	
TE	Response to command “TE”	

The rev counter (used in MCTCNet V. 2.0 mode) responds to the TE command in any case, irrespective of whether the command is used to set the engine strokes requested in the question.

### 5.1.3.3.8 Set measuring mode request

Command: “**MO**do misura” (4D Hex 4F Hex)

Question:

<b>STX</b>	RPM	<b>E</b> <b>T</b> <b>B</b>	Add	<b>E</b> <b>T</b> <b>B</b>	MO	<b>E</b> <b>T</b> <b>B</b>	Mode	<b>CRC-H</b>	<b>CRC-L</b>	<b>ETX</b>
------------	-----	----------------------------------	-----	----------------------------------	----	----------------------------------	------	--------------	--------------	------------

Where:

Field	Description	E.g. Format
RPM	Question to Rev counter device	
Add	Numerical device address	
MO	Set measuring mode request command	
Mode	Measuring method	Possible values: “A” acoustic “B” battery ripple “I” induction “N” aerial “O” optical “V” vibration “P” piezoelectric “D” OBD

Response:

<b>STX</b>	RPM	<b>E</b> <b>T</b> <b>B</b>	Add	<b>E</b> <b>T</b> <b>B</b>	MO	<b>CRC-H</b>	<b>CRC-L</b>	<b>ETX</b>
------------	-----	----------------------------------	-----	----------------------------------	----	--------------	--------------	------------

Where:

Field	Description	E.g. Format
RPM	Response from rev counter device	
Add	Numerical device address	
MO	Response to “ <b>MO</b> ” command	

The rev counter (used in MCTCNet V. 2.0 mode) responds to the MO command in any case, irrespective of whether the command is used to set the measuring method requested in the question.

## 5.1.3.4 PCStazione ↔ Speed test commands and responses

The minimum speed test bench instrument specifications, necessary to achieve type approval, allow it to be used in stand alone configuration, i.e. disconnected from other equipment. This information is provided to clarify that the serial protocol described below cannot and must not be used as an alternative to the safety checks that are the responsibility of the speed test bench. The auxiliary commands (BR, SR, CM, AM, AV, SV) may not necessarily be m by the speed test bench, depending on the approval specifications. Also, if the speed test bench does not support the execution of these auxiliary commands it will always respond as if it had followed them. The software that manages the speed test will be responsible for checking the effective execution of the command via the status command (ST) as indicated in the description of the single commands. In this case, the speed test bench must ensure that performance of a command does not affect the safety specifications, applying the same checks required for manual commands specified in the speed test bench type approval technical bulletins. As an example, the AM command may not be received if the roller is moving.

As with the rev counter, the speed test may be interfaced with both the PCStazione and DIR and RETE software for the exhaust gas analyser.

Since not all the Vehicle Test Benches type approved and installed in the test centres and equipped with automated management commands for the vices, wheel lock and fan activation have a retroactive device that guarantees effective vice opening/closure, effective roller lock/release and effective fan activation/deactivation, the Master software controlling the BPV must await an additional confirmation from the technical manager carrying out the test before sending the command. In the event of a communication error during the test or voluntary cancellation by the technical manager, if the motor vehicle is locked on the speed test bench and it is equipped with automatic devices for managing vice opening/closure and/or roller lock release, the Master software must carry out the necessary part of the procedure, specified in diagram R, to release the motor vehicle from the bench.

The commands and responses that take place between PCStazione (or the exhaust gas analysis device) and the speed test bench are listed below.

The protocol sessions start with a question sent from the PCStazione and are ended by the speed tester when a response is sent.

The commands are as follows:

- Device IDentification data request (ID)
- Send test identification data (TG)
- Measured speed value request (VA)
- Torque curve selection request (SCC)
- Roller lock request (BR)
- Roller release request (BR)
- Clamp closure request CM)
- Clamp opening request CM)
- Fan activation request (AV)
- Fan deactivation request (SV)
- SStatus request (ST)

## 5.1.3.4.1 Device identification data request

Command: “**ID**entification” (49 Hex 44 Hex)

Question:

<b>STX</b>	VEL	<b>E T B</b>	Add	<b>E T B</b>	ID	<b>CRC-H</b>	<b>CRC-L</b>	<b>ETX</b>
------------	-----	----------------------	-----	----------------------	----	--------------	--------------	------------

Where:

Field	Description	Format e.g.
VEL	Question to Speed test device	
Add	Numerical device address	
ID	Identification request command	

Response:

<b>STX</b>	VEL	<b>E T B</b>	Add	<b>E T B</b>	ID	<b>E T B</b>	Make	<b>E T B</b>	Model	<b>E T B</b>	NumOm	<b>E T B</b>
~~~~~												
~~~~~												
NSerie	<b>E T B</b>	DataScadenza	<b>E T B</b>	NumVer	<b>E T B</b>	VerMCTCNet	<b>CRC-H</b>	<b>CRC-L</b>	<b>ETX</b>			

Where:

Field	Description	E.g. Format
VEL	Response from speed test device	
Add	Numerical device address	
ID	Response to “ <b>ID</b> ” command	
Make	Make of speed tester	
Model	Model of speed tester	
NumOm	Speed tester type approval number	
NSerie	Speed tester serial number	
DataScadenza	Speed tester periodic check due date	01012000
NumVer	Speed tester software version number	
VerMCTCNet	MCTCNet version number	200

If the speed test bench is recognised to be type approved for 2 and for 3-4 wheels, the field NumOm must contain both type approvals separated by the character “-”.



## 5.1.3.4.2 Send test identification data

Command: "TarGa" (54 Hex 47 Hex)

Question:

STX	VEL	ETB	Add	ETB	TG	ETB	License plate	ETB	VIN no.	ETB	Reception date	ETB	Category	CRC-H	CRC-L	ETX
-----	-----	-----	-----	-----	----	-----	---------------	-----	---------	-----	----------------	-----	----------	-------	-------	-----

Where:

Field	Description	E.g. Format
VEL	Question to Speed test device	
Add	Numerical address referring to device	
TG	Command to send license plate, VIN number and test reception date	
License plate	Licence plate of vehicle being tested	
VIN no.	VIN No of vehicle being tested	
DataAccettazione	Reception date of vehicle being tested	
Category	International category of vehicle being tested	May assume one of the <b>Categorie Internazionali</b> constants defined in the MCTC.INI file

Response:

STX	VEL	ETB	Add	ETB	TG	ETB	Key ID	ETB	Key date	ETB	NumOm	ETB	Hash	CRC-H	CRC-L	ETX
-----	-----	-----	-----	-----	----	-----	--------	-----	----------	-----	-------	-----	------	-------	-------	-----

Where:

Field	Description	E.g. Format
VEL	Response from speed test device	
Add	Numerical device address	
TG	Response to "TarGa" command	
IdChiave	Public key registration numerical identification	00000
DataChiave	Public key registration date in the form "ggmmaaaa"	01012000
NumOm	Type approval number	
Hash	String of 40 hexadecimal characters (160 bits expressed as hexadecimal figures). Hash is represented by SHA-1 of the message obtained by linking the strings for the device secret seed, licence plate, chassis, reception date and category of the vehicle	

## 5.1.3.4.3 Measured speed value request

Command: “**VE**locità” (56 Hex 45 Hex)

Question:

<b>STX</b>	VEL	<b>E T B</b>	Add	<b>E T B</b>	VE	<b>CRC-H</b>	<b>CRC-L</b>	<b>ETX</b>
------------	-----	----------------------	-----	----------------------	----	--------------	--------------	------------

Where:

Field	Description	Format e.g.
VEL	Question to Speed test device	
Add	Numerical device address	
VE	Speed request command	

Response:

<b>STX</b>	VEL	<b>E T B</b>	Add	<b>E T B</b>	VE	<b>E T B</b>	Vector IV	<b>E T B</b>	Speed (@)	<b>E T B</b>	Space (@)	<b>E T B</b>	Curve (@)	<b>E T B</b>	<b>CRC-32 (@)</b>	<b>CRC-H</b>	<b>CRC-L</b>	<b>ETX</b>
------------	-----	----------------------	-----	----------------------	----	----------------------	--------------	----------------------	--------------	----------------------	--------------	----------------------	--------------	----------------------	-----------------------	--------------	--------------	------------

Where:

Field	Description	E.g. Format
VEL	Response from speed test device	
Add	Numerical device address	
VE	Response to speed request command <b>VE</b>	
VettoreIV	Initialisation vector IV, for RC4 encryption	“15AF7B”
Speed (@)	Km/h with 1 km/h minimum resolution	9.1
Space (@)	distance travelled in m	750
Curve (@)	Selected absorption curve	2,3,4****
CRC-32 (@)	Checksum CRC-32 on encrypted data (@)	“23D19B3F”

## 5.1.3.4.4 Torque curve selection request

Command: “Selezione Curva Coppia” (53 Hex 43 Hex)

Question:

<b>STX</b>	VEL	<b>E T B</b>	Add	<b>E T B</b>	SCC	<b>E T B</b>	Curve	<b>CRC-H</b>	<b>CRC-L</b>	<b>ETX</b>
------------	-----	----------------------	-----	----------------------	-----	----------------------	-------	--------------	--------------	------------

Where:

Field	Description	Format e.g.
VEL	Question to Speed test device	
Add	Numerical device address	
SCC	Torque curve selection command	
Curve	Absorption curve selected, to set curve for 2 wheels, 3 wheels or 4 wheels.	Possible types: “2” “3” “4”

Response:

<b>STX</b>	VEL	<b>E T B</b>	Add	<b>E T B</b>	SCC	<b>CRC-H</b>	<b>CRC-L</b>	<b>ETX</b>
------------	-----	----------------------	-----	----------------------	-----	--------------	--------------	------------

Where:

Field	Description	E.g. Format
VEL	Response from speed test device	
Add	Numerical device address	
SCC	Command received	2,3,4****

The speed test bench must always respond to the SCC command, even in cases where methods are not supported (e.g. speed bench for 2 wheels only, to which a command with curve type equal to 3 or 4 is sent). The speed test bench will then respond to the status command with the selected curve. In the case of the sample above, the speed test bench for 2 wheels only will respond to the status command indicating that it is set to curve 2. A response to the command is not sufficient to assume that it has been set to the required curve.

## 5.1.3.4.5 Roller lock request

Command: “**B**loccaggio **R**ulli” (42 Hex 52 Hex)

Question:

<b>STX</b>	VEL	<b>E</b> <b>T</b> <b>B</b>	Add	<b>E</b> <b>T</b> <b>B</b>	BR	<b>CRC-H</b>	<b>CRC-L</b>	<b>ETX</b>
------------	-----	----------------------------------	-----	----------------------------------	----	--------------	--------------	------------

Where:

Field	Description	Format e.g.
VEL	Question to Speed test device	
Add	Numerical device address	
BR	Roller lock command.	

Response:

<b>STX</b>	VEL	<b>E</b> <b>T</b> <b>B</b>	Add	<b>E</b> <b>T</b> <b>B</b>	BR	<b>CRC-H</b>	<b>CRC-L</b>	<b>ETX</b>
------------	-----	----------------------------------	-----	----------------------------------	----	--------------	--------------	------------

Where:

Field	Description	E.g. Format
VEL	Response from speed test device	
Add	Numerical device address	
BR	Command received	

All speed test benches must respond to the BR command whether or not the on-board electronics manage this function or not. The command may be used to confirm whether the electronic system has locked the roller or not. It will not therefore be sufficient to send the command and receive a response to consider the roller locked.

## 5.1.3.4.6 Roller release request

Command: “Sbloccaggio Rulli” (53 Hex 52 Hex)

Question:

STX	VEL	E T B	Add	E T B	SR	CRC-H	CRC-L	ETX
-----	-----	-------------	-----	-------------	----	-------	-------	-----

Where:

Field	Description	Format e.g.
VEL	Question to Speed test device	
Add	Numerical device address	
BR	Roller release command.	

Response:

STX	VEL	E T B	Add	E T B	SR	CRC-H	CRC-L	ETX
-----	-----	-------------	-----	-------------	----	-------	-------	-----

Where:

Field	Description	E.g. Format
VEL	Response from speed test device	
Add	Numerical device address	
BR	Command received	

All speed test benches must respond to the SR command whether or not the on-board electronics manage this function or not. The command may be used to confirm whether the electronic system has released the roller or not. It will not therefore be sufficient to send the command and receive a response to consider the roller released.

## 5.1.3.4.7 Clamp closure request

Command: “Chiusura Morse” (43 Hex 4D Hex)

Question:

STX	VEL	E T B	Add	E T B	CM	CRC-H	CRC-L	ETX
-----	-----	-------------	-----	-------------	----	-------	-------	-----

Where:

Field	Description	Format e.g.
VEL	Question to Speed test device	
Add	Numerical device address	
CM	Clamp closure command	

Response:

STX	VEL	E T B	Add	E T B	CM	CRC-H	CRC-L	ETX
-----	-----	-------------	-----	-------------	----	-------	-------	-----

Where:

Field	Description	E.g. Format
VEL	Response from speed test device	
Add	Numerical device address	
CM	Command received	

All speed test benches must respond to the CM command whether or not the on-board electronics manage this function or not. The command may be used to confirm whether the electronic system has closed the clamps or not. It will not therefore be sufficient to send the command and receive a response to consider the clamp closed.

## 5.1.3.4.8 Clamp opening request

Command: “Apertura Morse” (41 Hex 4D Hex)

Question:

STX	VEL	E T B	Add	E T B	AM	CRC-H	CRC-L	ETX
-----	-----	-------------	-----	-------------	----	-------	-------	-----

Where:

Field	Description	Format e.g.
VEL	Question to Speed test device	
Add	Numerical device address	
AM	Clamp opening command	

Response:

STX	VEL	E T B	Add	E T B	AM	CRC-H	CRC-L	ETX
-----	-----	-------------	-----	-------------	----	-------	-------	-----

Where:

Field	Description	E.g. Format
VEL	Response from speed test device	
Add	Numerical device address	
AM	Command received	

All speed test benches must respond to the AM command whether or not the on-board electronics manage this function or not. The command may be used to confirm whether the electronic system has opened the clamps or not. It will not therefore be sufficient to send the command and receive a response to consider the clamp opened.

## 5.1.3.4.9 Fan activation request

Command: “Accensione Ventola” (41 Hex 56 Hex)

Question:

STX	VEL	E T B	Add	E T B	AV	CRC-H	CRC-L	ETX
-----	-----	-------------	-----	-------------	----	-------	-------	-----

Where:

Field	Description	Format e.g.
VEL	Question to Speed test device	
Add	Numerical device address	
AV	Fan activation request	

Response:

STX	VEL	E T B	Add	E T B	AV	CRC-H	CRC-L	ETX
-----	-----	-------------	-----	-------------	----	-------	-------	-----

Where:

Field	Description	E.g. Format
VEL	Response from speed test device	
Add	Numerical device address	
AV	Command received	

All speed test benches must respond to the AV command whether or not the on-board electronics manage this function or not. The command may be used to confirm whether the electronic system has started the fans or not. It will not therefore be sufficient to send the command and receive a response to consider the fans activated.



## 5.1.3.4.10 Fan deactivation request

Command: “Spegnimento Ventola” (53 Hex 56 Hex)

Question:

STX	VEL	E T B	Add	E T B	SV	CRC-H	CRC-L	ETX
-----	-----	-------------	-----	-------------	----	-------	-------	-----

Where:

Field	Description	Format e.g.
VEL	Question to Speed test device	
Add	Numerical device address	
SV	Fan deactivation request	

Response:

STX	VEL	E T B	Add	E T B	SV	CRC-H	CRC-L	ETX
-----	-----	-------------	-----	-------------	----	-------	-------	-----

Where:

Field	Description	E.g. Format
VEL	Response from speed test device	
Add	Numerical device address	
SV	Command received	

All speed test benches must respond to the SV command whether or not the on-board electronics manage this function or not. The command may be used to confirm whether the electronic system has turned off the fans or not. It will not therefore be sufficient to send the command and receive a response to consider the fans deactivated.

## 5.1.3.4.11 SStatus request

Command: “STato” (53 Hex 54 Hex)

Question:

STX	VEL	E T B	Add	E T B	ST	CRC-H	CRC-L	ETX
-----	-----	-------------	-----	-------------	----	-------	-------	-----

Where:

Field	Description
VEL	Question to Speed test device
Add	Numerical device address
ST	Device work status request

Response:

STX	VEL	E T B	Add	E T B	ST	E T B	Vector IV	E T B	ST1 (@)	E T B	CRC-32 (@)	CRC-H	CRC-L	ETX
-----	-----	-------------	-----	-------------	----	-------------	--------------	-------------	------------	-------------	---------------	-------	-------	-----

Where:

Field	Description	Format e.g.
VEL	Response from speed test device	
Add	Numerical device address	
ST	Command performed	
VettoreIV	Initialisation vector IV, for RC4 encryption	“15AF7B”
ST1 (@)	Status field (byte)	
	<b>Bit no</b> <b>State = meaning</b>	
	0 (LSB)    1 = Clamp closed; 0= clamp open or command not managed	
	1            1 = Roller free; 0= Roller locked or command cannot be managed	
	2            1 = Fan on; 0= Fan off or command not managed	
	3-4         00 (4 bit and 3 bit respectively): Curve 2 cannot be modified because speed test only for 2 wheels 01 (4 bit and 3 bit respectively): Curve 2 indicates that test bench is also 3-4 wheels. 10 (4 bit and 3 bit respectively): Curve 3 11 (4 bit and 3 bit respectively): Curve 4 Note that status 00 cannot be set for speed test benches that are also for 3-4 wheels. Conversely, status 01 cannot be set for speed test benches that are only for 2 wheels.	
	5            1=Rollers coupled; 0= rollers not connected or command not managed	
	6            Not used	
	7 (MSB)    Always = 1	
CRC-32 (@)	Checksum CRC-32 on encrypted data (@)	“23D19B3F”

## 5.1.3.5 PCStazione ↔ SOUND LEVEL METER commands and responses

The commands and responses exchanged between PCStazione and the Sound meter are listed below.

The protocol sessions start with a question sent from the PCStazione and are ended by the Sound meter when a response is sent.

The commands are as follows:

- Device identification data request
- Send test identification data
- Integral rev counter identification data request
- Configuration of integral rev counter
- Full scale deflection value configuration
- RUN status selection
- STOP status selection
- RESET status selection
- Type A weighing selection
- Type B weighing selection
- FAST measurement selection
- SLOW measurement selection
- Configuration value request
- Measurement value request

## 5.1.3.5.1 Device identification data request

Command: **“IDentification”** (49 Hex 44 Hex)

Question:

STX	FON	E T B	Add	E T B	ID	CRC-H	CRC-L	ETX
-----	-----	-------------	-----	-------------	----	-------	-------	-----

Where:

Field	Description
FON	Question to Sound meter device
Add	Numerical device address
ID	Device identification data request command

Response:

STX	FON	E T B	Add	E T B	ID	E T B	Mar	E T B	Mod	E T B	NumOm	E T B	NumSer	E T B	DataSca
-----	-----	-------------	-----	-------------	----	-------------	-----	-------------	-----	-------------	-------	-------------	--------	-------------	---------

E T B	NumVer	E T B	VerMCTCNet	CRC-H	CRC-L	ETX
-------------	--------	-------------	------------	-------	-------	-----

Where:

Field	Description	E.g. Format
FON	Response from Sound meter device	
Add	Numerical device address	
ID	Response to <b>“IDentificazione”</b> command	
Mar	Make	
Mod	Model	
NumOm	Type approval number	
NumSer	Serial number	
DataSca	Due date of periodic check	“ggmmaaaa”
NumVer	Software version number	
VerMCTCNet	MCTCNet version number	“100”
MarCal	Calibrator make.	
ModCal	Calibrator model	
NumSerCal	Calibrator serial number	
ClasseCal	Calibrator category	
DataScaCal	Calibrator expiry date	

## 5.1.3.5.2 Send test identification data

Command: "TarGa" (54 Hex 47 Hex)

Question:

<b>STX</b>	FON	<b>E T B</b>	Add	<b>E T B</b>	TG	<b>E T B</b>	Licence plate	<b>E T B</b>	VIN no.	<b>E T B</b>	Reception date	<b>E T B</b>	Category	<b>CRC-H</b>	<b>CRC-L</b>	<b>ETX</b>
------------	-----	----------------------	-----	----------------------	----	----------------------	------------------	----------------------	------------	----------------------	-------------------	----------------------	----------	--------------	--------------	------------

Where:

Field	Description	E.g. Format
FON	Question to Sound meter device	
Add	Numerical address referring to device	
TG	Command to send license plate, VIN number and test reception date	
License plate	Licence plate of vehicle being tested	
VIN no.	VIN No of vehicle being tested	
DataAccettazione	Reception date of vehicle being tested	
Category	International category of vehicle being tested	May assume one of the <b>Categorie Internazionali</b> constants defined in the MCTC.INI file

Response:

<b>STX</b>	FON	<b>E T B</b>	Add	<b>E T B</b>	TG	<b>E T B</b>	Key ID	<b>E T B</b>	Key date	<b>E T B</b>	NumOm	<b>E T B</b>	Hash	<b>CRC-H</b>	<b>CRC-L</b>	<b>ETX</b>
------------	-----	----------------------	-----	----------------------	----	----------------------	-----------	----------------------	-------------	----------------------	-------	----------------------	------	--------------	--------------	------------

Where:

Field	Description	E.g. Format
FON	Response from Sound meter device	
Add	Numerical device address	
TG	Response to "TarGa" command	
IdChiave	Public key registration numerical identification	00000
DataChiave	Public key registration date in the form "ggmmaaaa"	01012000
NumOm	Type approval number	
Hash	String of 40 hexadecimal characters (160 bits expressed as hexadecimal figures). Hash is represented by SHA-1 of the message obtained by linking the strings for the device secret seed, licence plate, VIN No, reception date and category of the vehicle	

## 5.1.3.5.3 Integral rev counter identification data request

Command: “Identificazione Contagiri” (49 Hex 43 Hex)

Question:

<b>STX</b>	FON	<b>E T B</b>	Add	<b>E T B</b>	IC	<b>CRC-H</b>	<b>CRC-L</b>	<b>ETX</b>
------------	-----	----------------------	-----	----------------------	----	--------------	--------------	------------

Where:

Field	Description
FON	Question to Sound meter device
Add	Numerical device address
IC	Rev counter identification request command

Response:

<b>STX</b>	FON	<b>E T B</b>	Add	<b>E T B</b>	IC	<b>E T B</b>	Make	<b>E T B</b>	Model	<b>E T B</b>	NumOm	<b>E T B</b>
~~~~~												
NSerie		E T B	DataScadenza	E T B	NumVer	CRC-H	CRC-L	ETX	~~~~~			

Where:

Field	Description	E.g. Format
FON	Response from Sound meter device	
Add	Numerical device address	
IC	Respond to “IC” command	
Make	Make	
Model	Model	
NumOm	Type approval number	
NSerie	Serial number	
DataScadenza	Periodic check due date	
NumVer	Software version number	

The sound meter responds with NAK in the following cases:

- √ The instrument does not include an integral rev counter
- √ Integral rev counter not operational or not responding.

5.1.3.5.4 Configuration of integral rev counter

Command: “Configurazione Contagiri “ (43 Hex 43 Hex)

Question:

STX	FON	E T B	Add	E T B	“C C”	E T B	NTempi	E T B	NCil	CRC-H	CRC-L	ETX
-----	-----	-------------	-----	-------------	----------	-------------	--------	-------------	------	-------	-------	-----

Where:

Field	Description	E.g. Format
FON	Question to Sound meter device	
Add	Numerical device address	
“CC”	Fuel type command	
NTempi	Number of engine strokes	May assume: “2T” “4T” “DIS”
NCil	Number of cylinders	N 2

If the instrument does not use or does not incorporate a rev counter, it will nevertheless store the number of cylinders and strokes and respond correctly to the VA command, indicating in its reply the nominal data received through the CC command.

Response:

STX	FON	E T B	Add	E T B	“C C”	CRC-H	CRC-L	ETX
-----	-----	-------------	-----	-------------	----------	-------	-------	-----

Where:

Field	Description
FON	Response from Sound meter device
Add	Numerical device address
“CC”	Command performed

5.1.3.5.5 Full scale deflection value configuration

Command: “Fondo Scala” (46 Hex 53 Hex)

Question:

STX	FON	$\begin{matrix} E \\ T \\ B \end{matrix}$	Add	$\begin{matrix} E \\ T \\ B \end{matrix}$	FS	$\begin{matrix} E \\ T \\ B \end{matrix}$	ScaMin	$\begin{matrix} E \\ T \\ B \end{matrix}$	ScaMax	CRC-H	CRC-L	ETX
-----	-----	---	-----	---	----	---	--------	---	--------	-------	-------	-----

Where:

Field	Description	E.g. Format
F O N	Question to Sound meter device	
Add	Numerical device address	
FS	“ Fondo Scala ” selection command	
ScaMin	Minimum full scale deflection value	000.0
ScaMax	Maximum full scale deflection value	000.0

Response:

STX	FON	$\begin{matrix} E \\ T \\ B \end{matrix}$	Add	$\begin{matrix} E \\ T \\ B \end{matrix}$	FS	CRC-H	CRC-L	ETX
-----	-----	---	-----	---	----	-------	-------	-----

Where:

Field	Description
F O N	Response from Sound meter device
Add	Numerical device address
FS	Response to “Fondo Scala” command

5.1.3.5.6 RUN status selection

Following this command, the status, in response to the CO command, must be RUN” **only when the sound meter is effectively carrying out a measurement.**

Command: “**RuN**” (52 Hex 4E Hex)

Question:

STX	FON	E T B	Add	E T B	RN	CRC-H	CRC-L	ETX
-----	-----	-------------	-----	-------------	----	-------	-------	-----

Where:

Field	Description
FON	Question to Sound meter device
Add	Numerical device address
RN	“ RuN ” selection command

Response:

STX	F O N	E T B	Add	E T B	RN	CRC-H	CRC-L	ETX
-----	-------	-------------	-----	-------------	----	-------	-------	-----

Where:

Field	Description
FON	Response from Sound meter device
Add	Numerical device address
RN	Response to “ RuN ” command

5.1.3.5.7 STOP status selection

Following this command, the response to the CO command must be “STOP”

Command: “STop” (53 Hex 54 Hex)

Question:

STX	FON	E T B	Add	E T B	ST	CRC-H	CRC-L	ETX
-----	-----	-------------	-----	-------------	----	-------	-------	-----

Where:

Field	Description
FON	Question to Sound meter device
Add	Numerical device address
ST	“STop” selection command

Response:

STX	FON	E T B	Add	E T B	ST	CRC-H	CRC-L	ETX
-----	-----	-------------	-----	-------------	----	-------	-------	-----

Where:

Field	Description
FON	Response from Sound meter device
Add	Numerical device address
ST	Respond to “STop” command

5.1.3.5.8 RESET status selection

The “ReSet” causes the sound meter to reset all the previously stored data. The status in response to the CO command must be “RESET”

Command: “ReSet” (52 Hex 53 Hex)

Question:

STX	FON	E T B	Add	E T B	RS	CRC-H	CRC-L	ETX
-----	-----	-------------	-----	-------------	----	-------	-------	-----

Where:

Field	Description
FON	Question to Sound meter device
Add	Numerical device address
RS	“ ReSet ” selection command

Response:

STX	FON	E T B	Add	E T B	RS	CRC-H	CRC-L	ETX
-----	-----	-------------	-----	-------------	----	-------	-------	-----

Where:

Field	Description
FON	Response from Sound meter device
Add	Numerical device address
RS	Response to “ ReSet ” command

5.1.3.5.9 Type A weighing selection

Command: “Pesatura A” (50 Hex 41 Hex)

Question:

STX	FON	E T B	Add	E T B	PA	CRC-H	CRC-L	ETX
-----	-----	-------------	-----	-------------	----	-------	-------	-----

Where:

Field	Description
FON	Question to Sound meter device
Add	Numerical device address
PA	“ Pesatura A” selection command

Response:

STX	FON	E T B	Add	E T B	PA	CRC-H	CRC-L	ETX
-----	-----	-------------	-----	-------------	----	-------	-------	-----

Where:

Field	Description
FON	Response from Sound meter device
Add	Numerical device address
PA	Response to “Pesatura A” command

5.1.3.5.10 Type B weighing selection

Command: “**Pesatura B**” (50 Hex 42 Hex)

Question:

STX	FON	E T B	Add	E T B	PB	CRC-H	CRC-L	ETX
------------	-----	----------------------	-----	----------------------	----	-------	-------	------------

Where:

Field	Description
FON	Question to Sound meter device
Add	Numerical device address
PB	“ Pesatura B ” selection command

Response:

STX	FON	E T B	Add	E T B	PB	CRC-H	CRC-L	ETX
------------	-----	----------------------	-----	----------------------	----	-------	-------	------------

Where:

Field	Description
FON	Response from Sound meter device
Add	Numerical device address
PB	Response to “ Pesatura B ” command

5.1.3.5.11 FAST measurement selection

Command: “Misura Fast” (4D Hex 46 Hex)

Question:

STX	FON	E T B	Add	E T B	MF	CRC-H	CRC-L	ETX
-----	-----	-------------	-----	-------------	----	-------	-------	-----

Where:

Field	Description
FON	Question to Sound meter device
Add	Numerical device address
MF	“Misura F” selection command

Response:

STX	FON	E T B	Add	E T B	MF	CRC-H	CRC-L	ETX
-----	-----	-------------	-----	-------------	----	-------	-------	-----

Where:

Field	Description
FON	Response from Sound meter device
Add	Numerical device address
MF	Response to “ Misura F ” command

5.1.3.5.12 SLOW measurement selection

Command: “Misura Slow” (4D Hex 53 Hex)

Question:

STX	FON	E T B	Add	E T B	MS	CRC-H	CRC-L	ETX
-----	-----	-------------	-----	-------------	----	-------	-------	-----

Where:

Field	Description
FON	Question to Sound meter device
Add	Numerical device address
MS	“Misura Slow” selection command

Response:

STX	FON	E T B	Add	E T B	MS	CRC-H	CRC-L	ETX
-----	-----	-------------	-----	-------------	----	-------	-------	-----

Where:

Field	Description
FON	Response from Sound meter device
Add	Numerical device address
MS	Response to “Misura Slow ” command

5.1.3.5.13 Configuration and status value request

Command: “CO~~n~~figurazione” (43 Hex 4F Hex)

Question:

STX	FON	E T B	Add	E T B	CO	CRC-H	CRC-L	ETX
-----	-----	-------------	-----	-------------	----	-------	-------	-----

Where:

Field	Description
FON	Question to Sound meter device
Add	Numerical device address
CO	“CO n figurazione” request command

Response:

STX	FON	E T B	Add	E T B	CO	E T B	Vector IV	E T B	Status (@)	E T B	TipMis (@)	E T B	TipPes (@)
E T B	ScaMin (@)	E T B	ScaMax (@)	E T B	CRC-32 (@)	CRC-H	CRC-L	ETX					

Where:

Field	Description	E.g. Format
FON	Response from Sound meter device	
Add	Numerical device address	
CO	Response to “CO n figurazione” command	
VettoreIV	Initialisation vector IV, for RC4 encryption	“15AF7B”
Stato (@)	Instrument status	Possible states: “RUN” “STOP” “RESET”
TipMis (@)	Measurement type	Possible types: “FAST” “SLOW”
TipPes (@)	dB weighting type	Possible types: “A” “B”
ScaMin (@)	Minimum full scale deflection value	000.0
ScaMax (@)	Maximum full scale deflection value	000.0
CRC-32 (@)	Checksum CRC-32 on encrypted data (@)	“23D19B3F”

5.1.3.5.14 Measurement value request

Command: "VAlori" (56 Hex 41 Hex)

Question:

STX	FON	E T B	Add	E T B	VA	CRC-H	CRC-L	ETX
-----	-----	-------------	-----	-------------	----	-------	-------	-----

Where:

Field	Description
FON	Question to Sound meter device
Add	Numerical device address
VA	Command request "VAlori"

Response:

STX	FON	E T B	Add	E T B	VA	E T B	Vector IV	E T B	Measu rement (@)	E T B	OverLoad (@)	E T B	GiriMot (@)
E T B	NCil (@)	E T B	Ntempi (@)	E T B	CRC-32 (@)	CRC-H	CRC-L	ETX					

Where:

Field	Description	E.g. Format
FON	Response from Sound meter device	
Add	Numerical device address	
VA	Response to "VAlori" command	
VettoreIV	Initialisation vector IV, for RC4 encryption	"15AF7B"
Misura (@)	Maximum measured value	"000.0"
OverLoad (@)	Overload status	Possible states: "R" = regular "I" = irregular
GiriMot (@)	Engine revs (rpm) (if built into the analyser). Must assume value of 0 if not used or not present	0000
NCil (@)	Number of cylinders set in instrument. If the instrument does not have this information because it has not received the CC command (electric vehicle), the field must be empty.	N 2
NTempi (@)	Strokes set in instrument. If the instrument does not have this information because it has not received the CC command (electric vehicle), the field must be empty.	Permitted values: "2T" "4T" "DIS"
CRC-32 (@)	Checksum CRC-32 on encrypted data (@)	"23D19B3F"

5.1.3.5.15 Integral rev counter measurement value request

Command: “VGlori” (56 Hex 47 Hex)

Question:

STX	FON	E T B	Add	E T B	VG	CRC-H	CRC-L	ETX
-----	-----	-------------	-----	-------------	----	-------	-------	-----

Where:

Field	Description
FON	Question to Sound meter device
Add	Numerical device address
VG	“ValoriGiri” request command

Response:

STX	FON	E T B	Add	E T B	VG	E T B	Vector IV	E T B	GiriMot (@)	E T B	NCil (@)	E T B	Ntempi (@)
E T B	CRC-32 (@)	CRC-H	CRC-L	ETX									

Where:

Field	Description	E.g. Format
FON	Response from Sound meter device	
Add	Numerical device address	
VG	Response to “ValoreGiri” command	
VettoreIV	Initialisation vector IV, for RC4 encryption	“15AF7B”
GiriMot (@)	Engine revs (rpm) (if built into the sound level meter). Must assume value of 0 if not used or not present	00000
NCil (@)	Number of cylinders set in instrument.	N 2
NTempi (@)	Strokes set in instrument.	Permitted values: “2T” “4T” “DIS”
CRC-32 (@)	Checksum CRC-32 on encrypted data (@)	“23D19B3F”

5.1.3.5.16 Sound meter test flow diagram

The sound meter test should be carried out in accordance with the specifications shown in the following flow diagram.

The following flow diagram replaces that in circular 2344-404 of 06 October 2003.

It must be implemented by all software packages involving performance of the sound meter test under regulatory conditions, whether they are type-approved for DIR, RETE or RS Senza Esito.

It must not be possible to start the test if no connection to a rev counter is present, whether integral or external to MCTCNet, even by entering the rpm manually.

The PCStazione must allow for the possibility of setting the frequency with which requests are made to RS Senza Esito instruments.

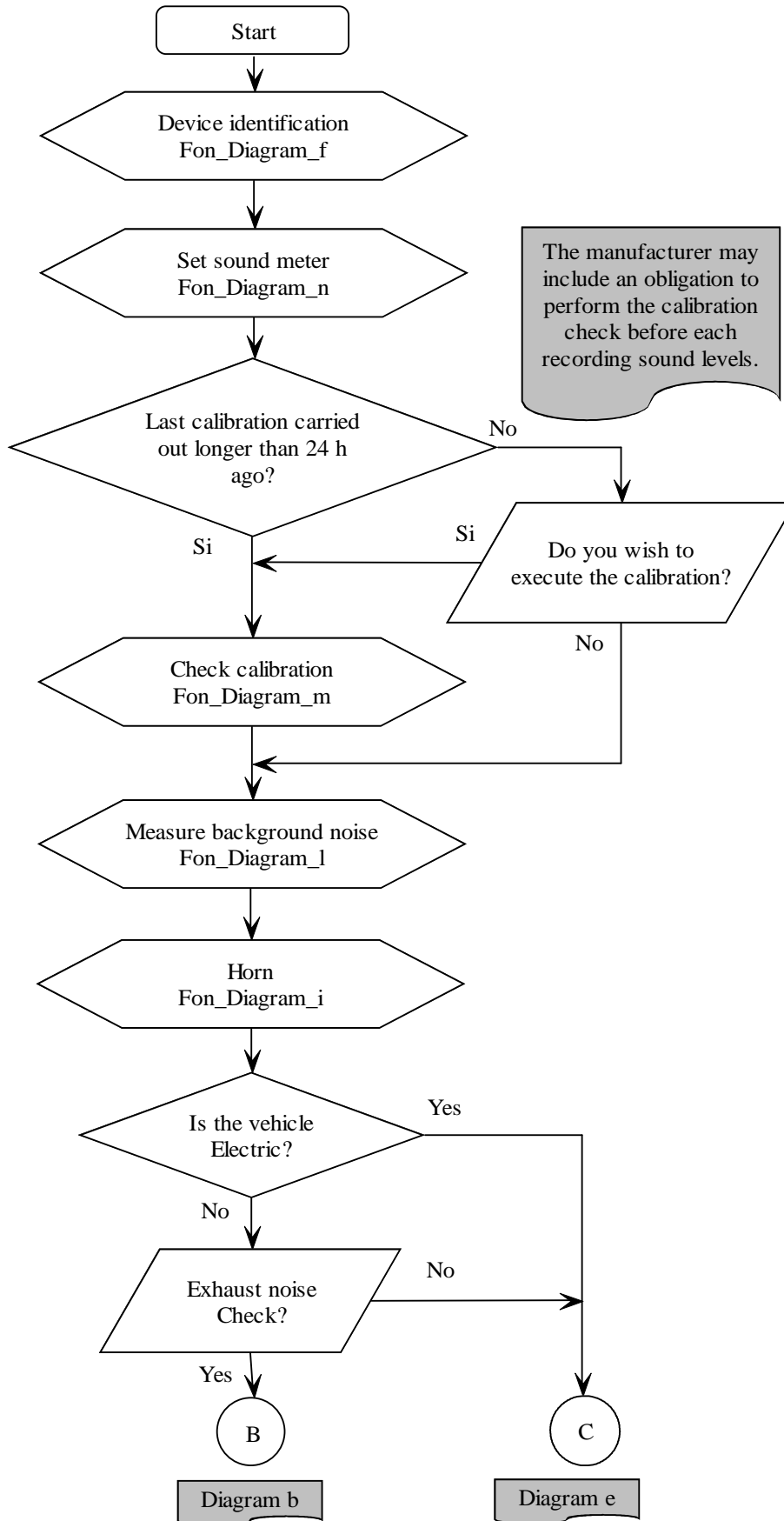
The check on the environmental data, necessary for determining whether it is possible to carry out a test, has been omitted from the flow diagrams because the DIR, RETE and PCStazione (for RSs) are required to check whether the weather conditions respect the parameters required in the regulation before starting the test.

Note that at each reading of data relating to the rev counter, whether this is external (rev counter VX command) or integral (instrument VA command), congruence with the engine cylinder and stroke settings must be checked against data in the ACC file. In the case of incongruence, a message must be displayed on the screen and the test must be cancelled and repeated.

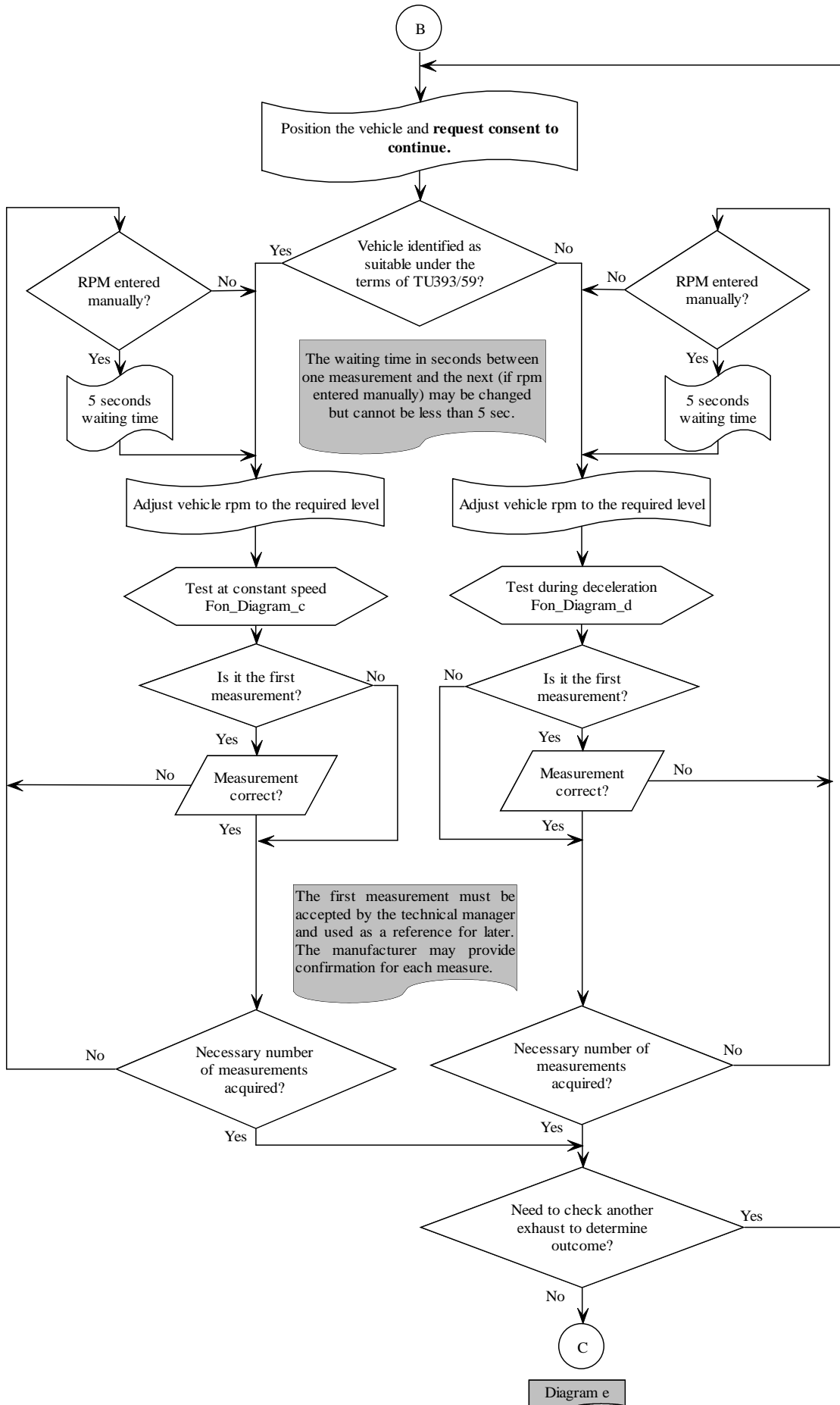
When the sound meter receives a reset (RS) command, it must delete the values from its memory but not change the weighting and full scale deflection. During the CO question reset stage, the instrument must respond with "RESET" status, at the end it must change to "STOP" status.

During start-up the instrument shall also be in STOP status or at least switch to this status following reception of the ID commands in order to ensure that it can always receive and process reconfiguration commands.

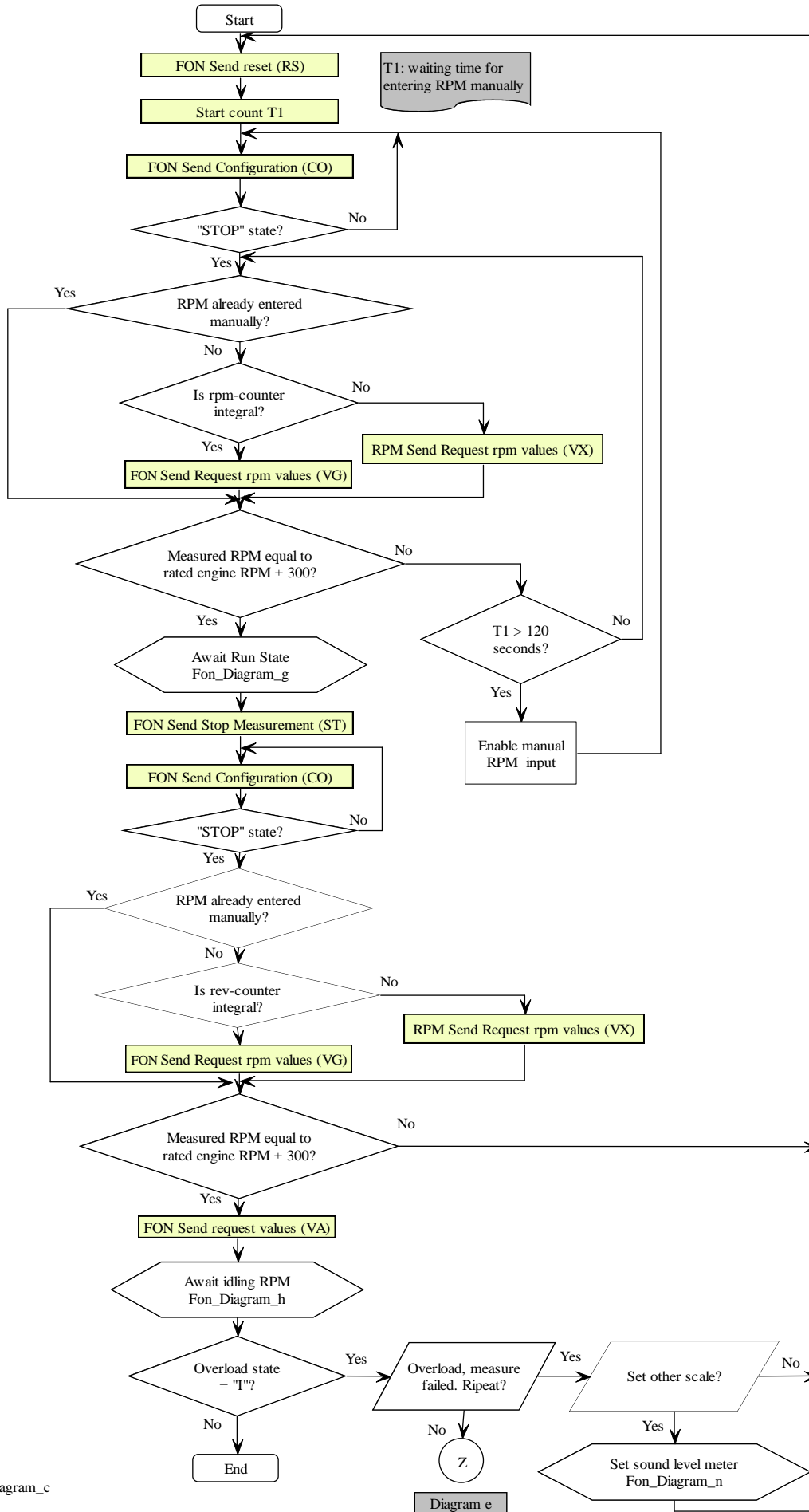
Note that with regard to diagram f), the data received must be checked following an IC command, with particular reference to the expiry date of the periodic rev counter check.



Fon_Diagram_a

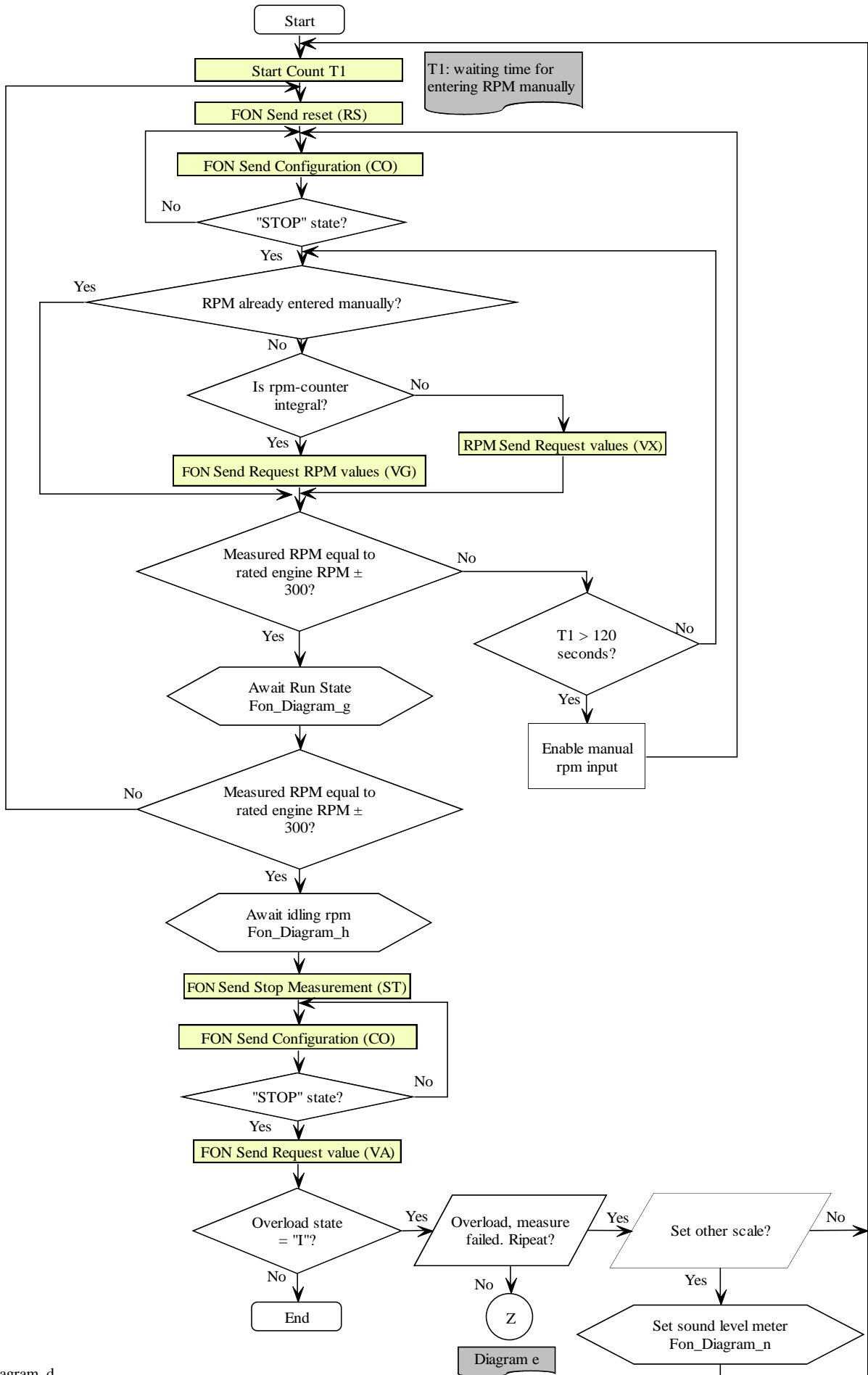


Fon_Diagram_b

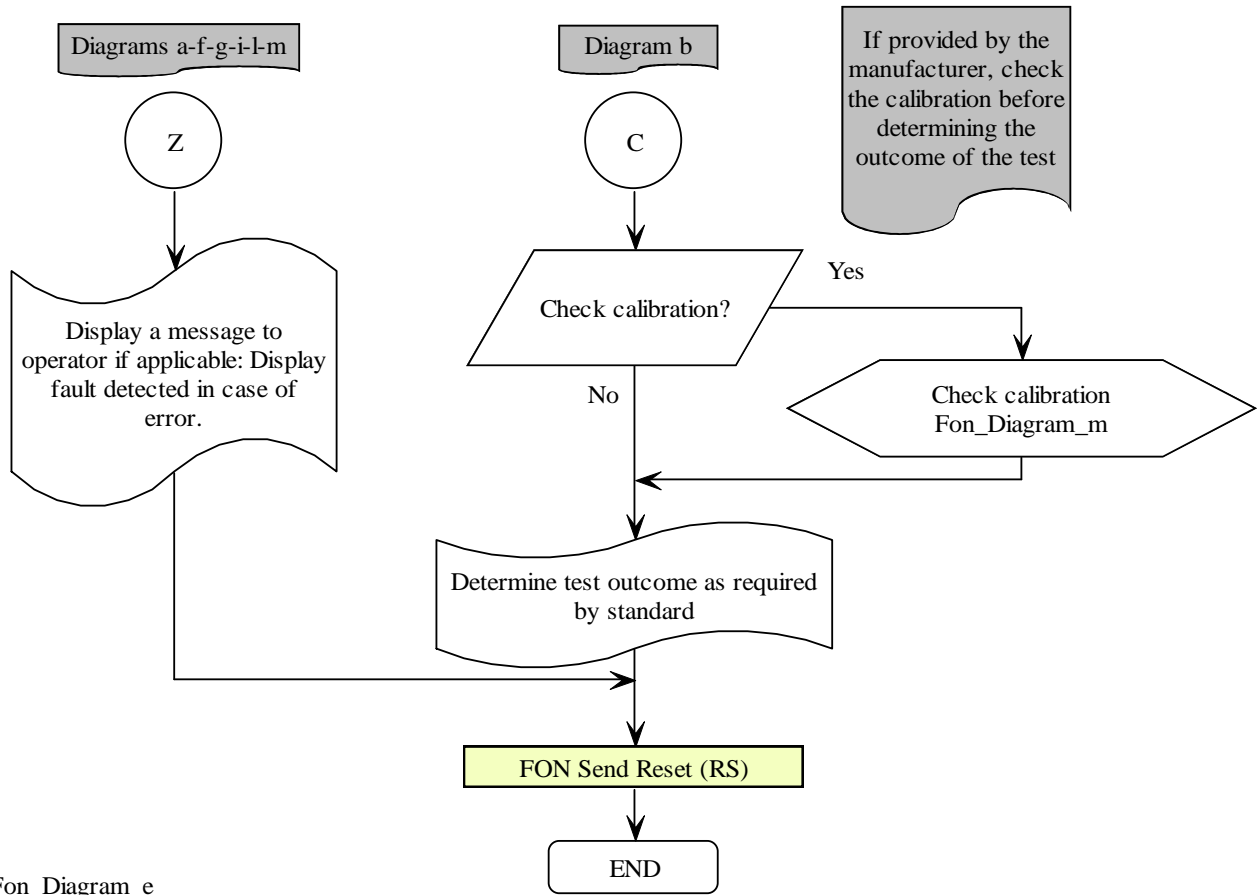


Fon_Diagram_c

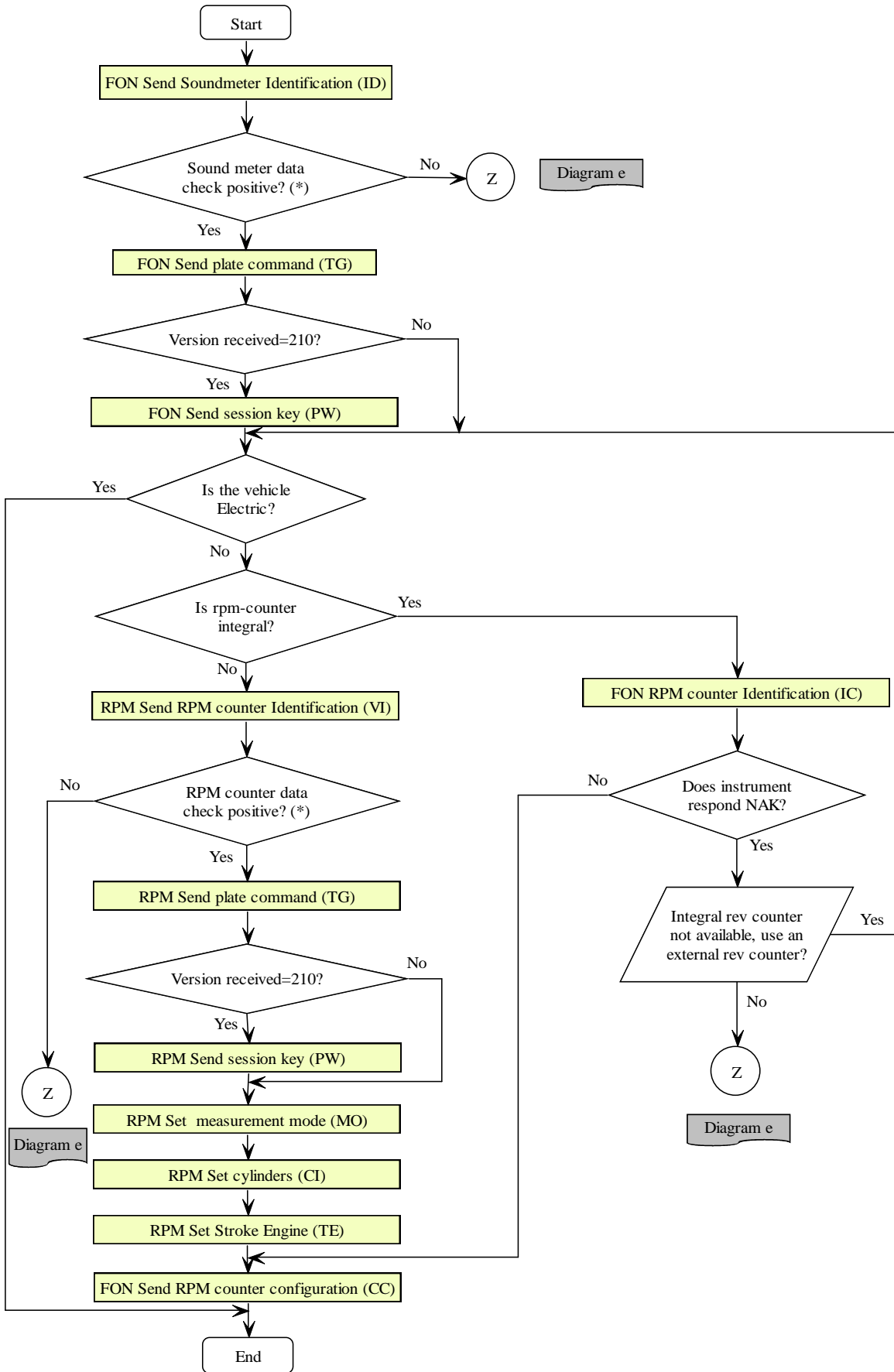
Diagram e



Fon_Diagram_d

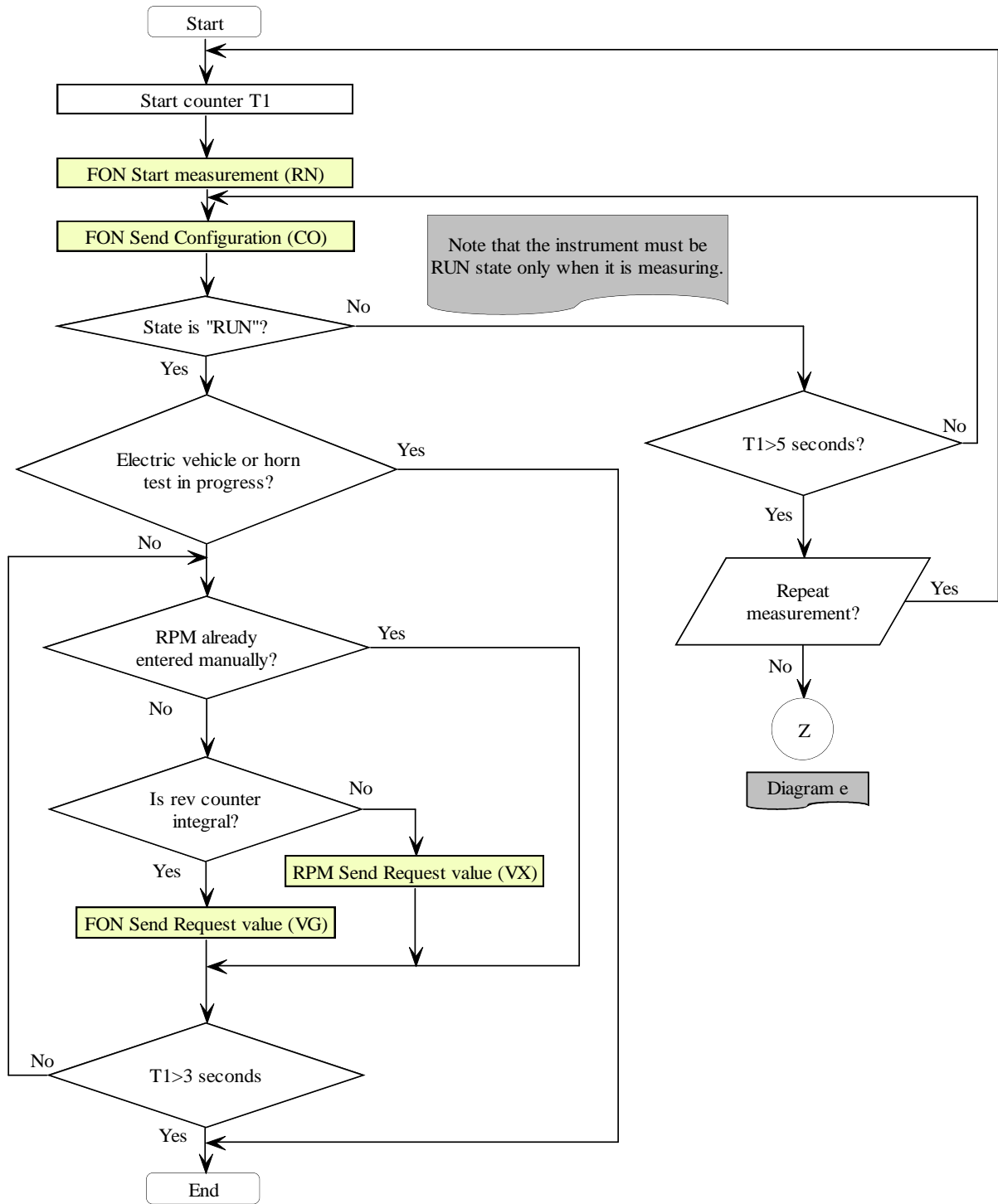


Fon_Diagram_e

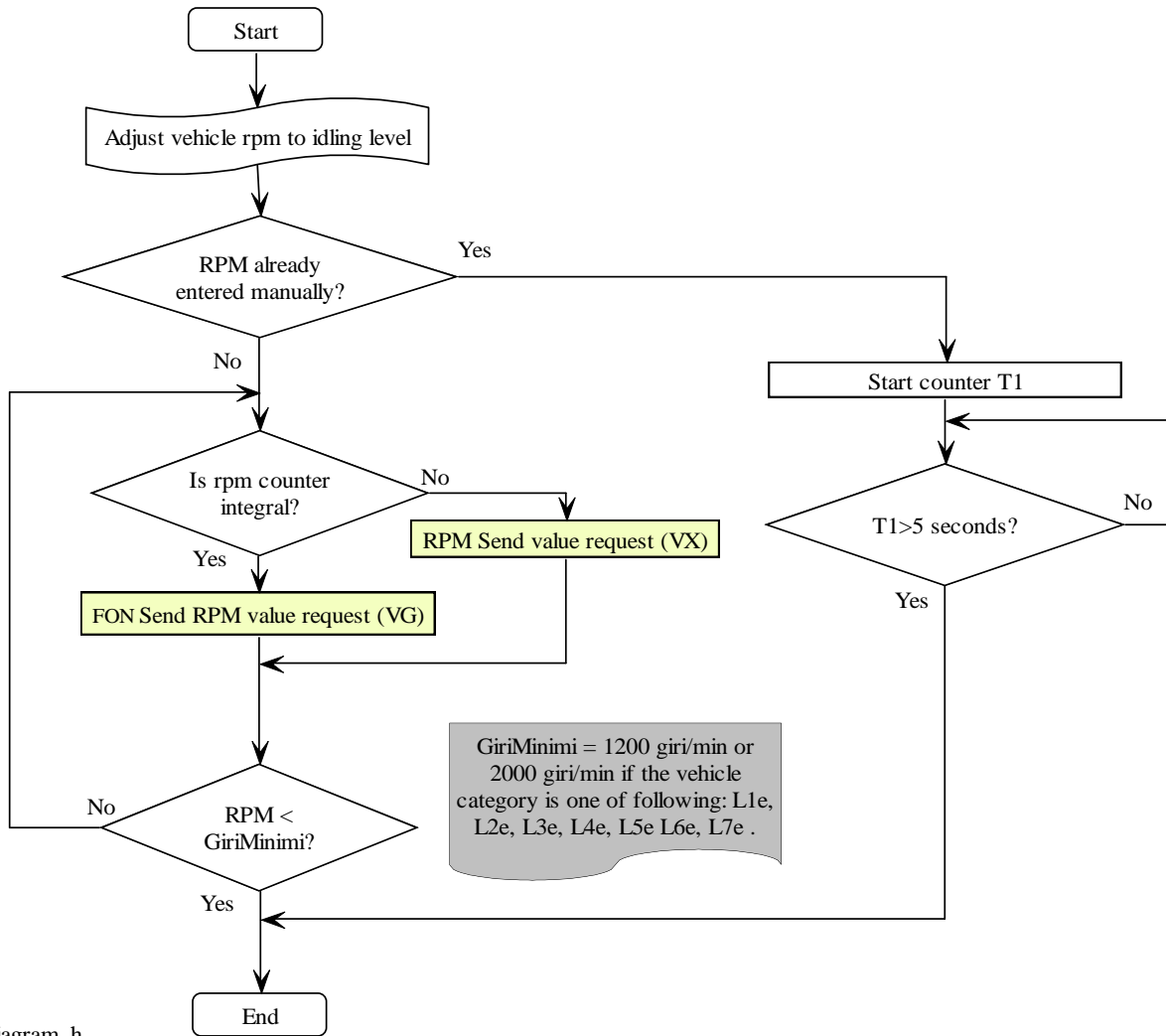


(*) Check whether the MCTCNet protocol version is supported (excluding integral rev counter).
 Check expiry date of periodic check, as specified under 4.3 No 8 of this document.

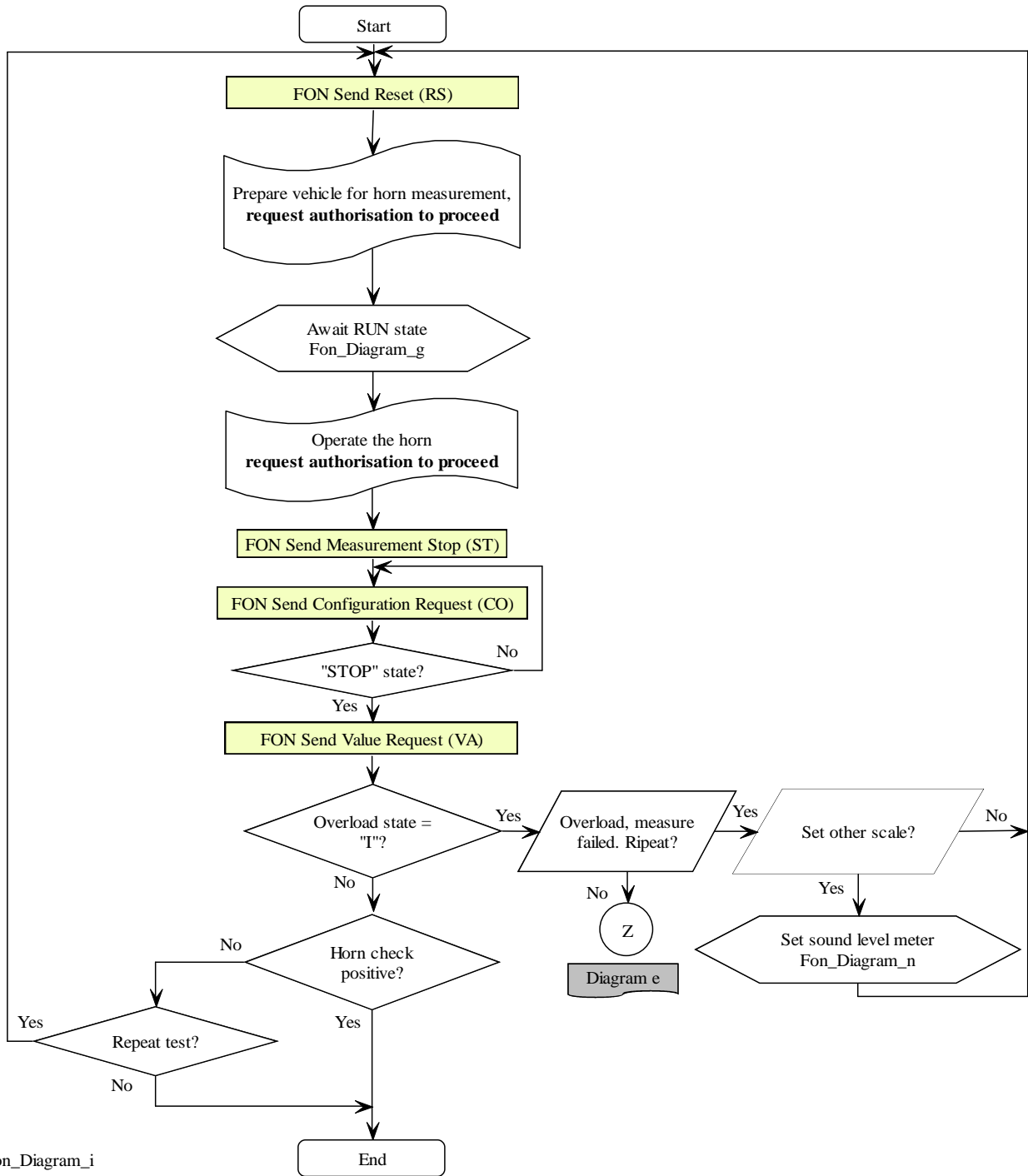
Fon_Diagram_f

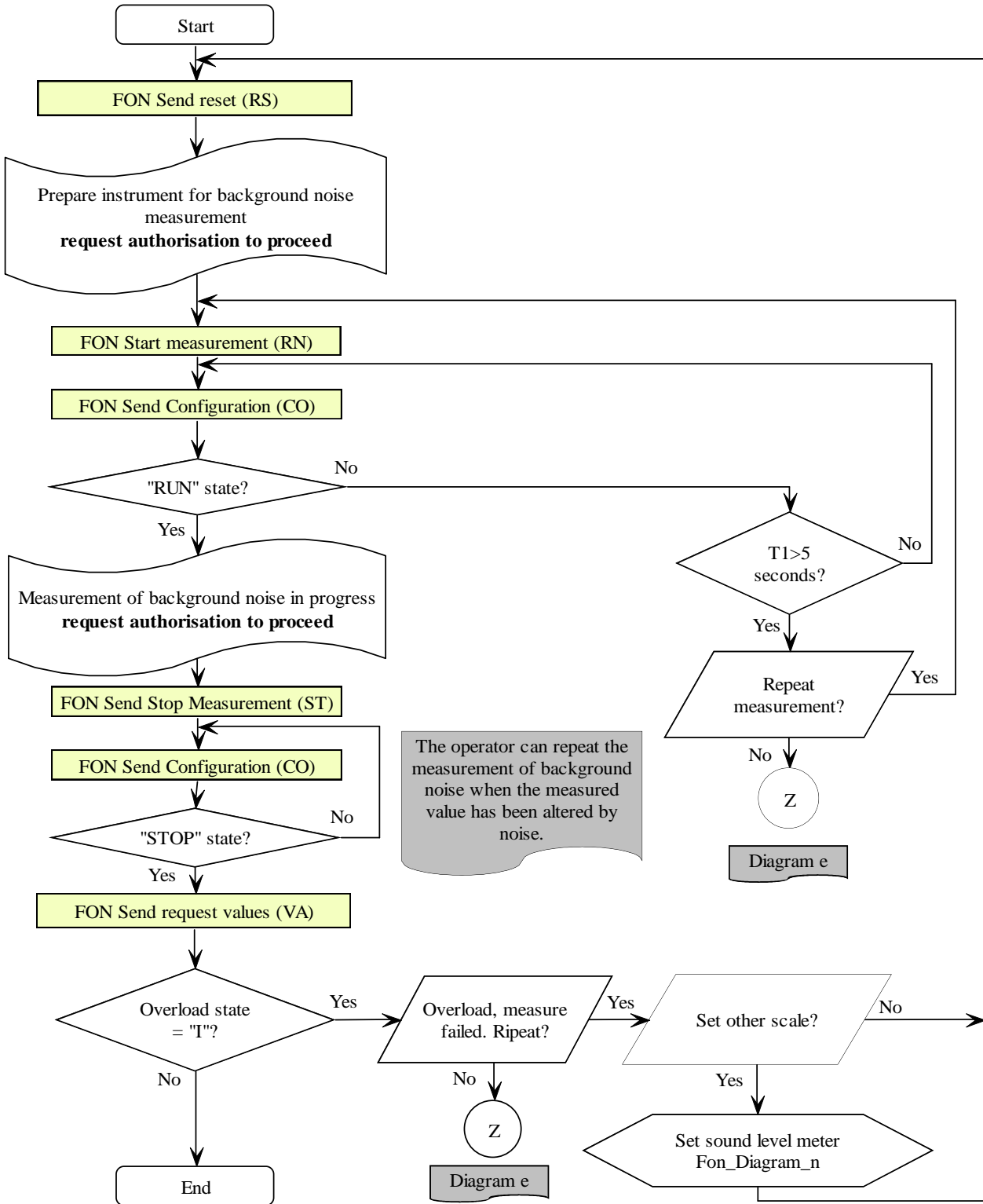


Fon_Diagram_g

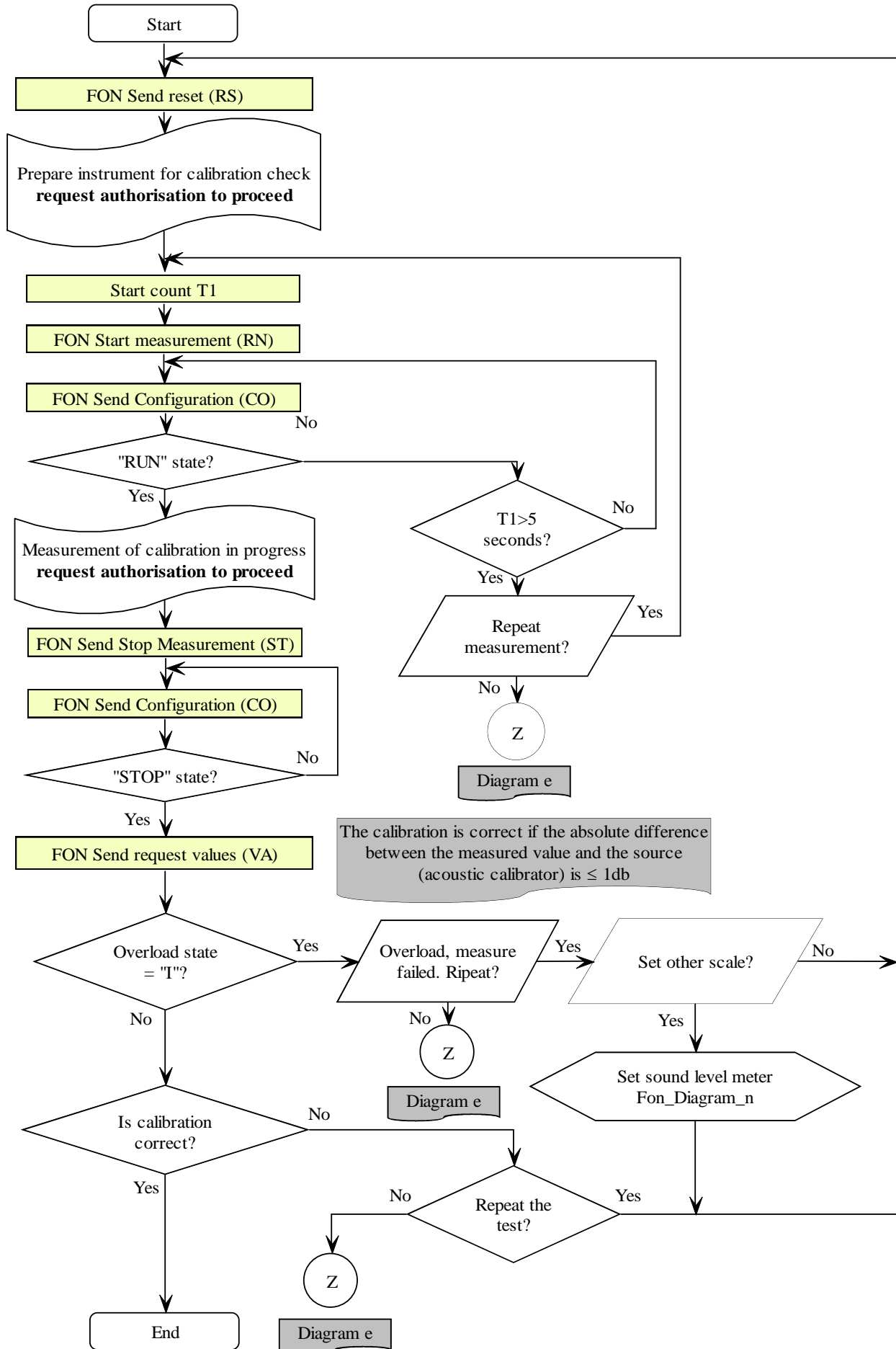


Fon_Diagram_h

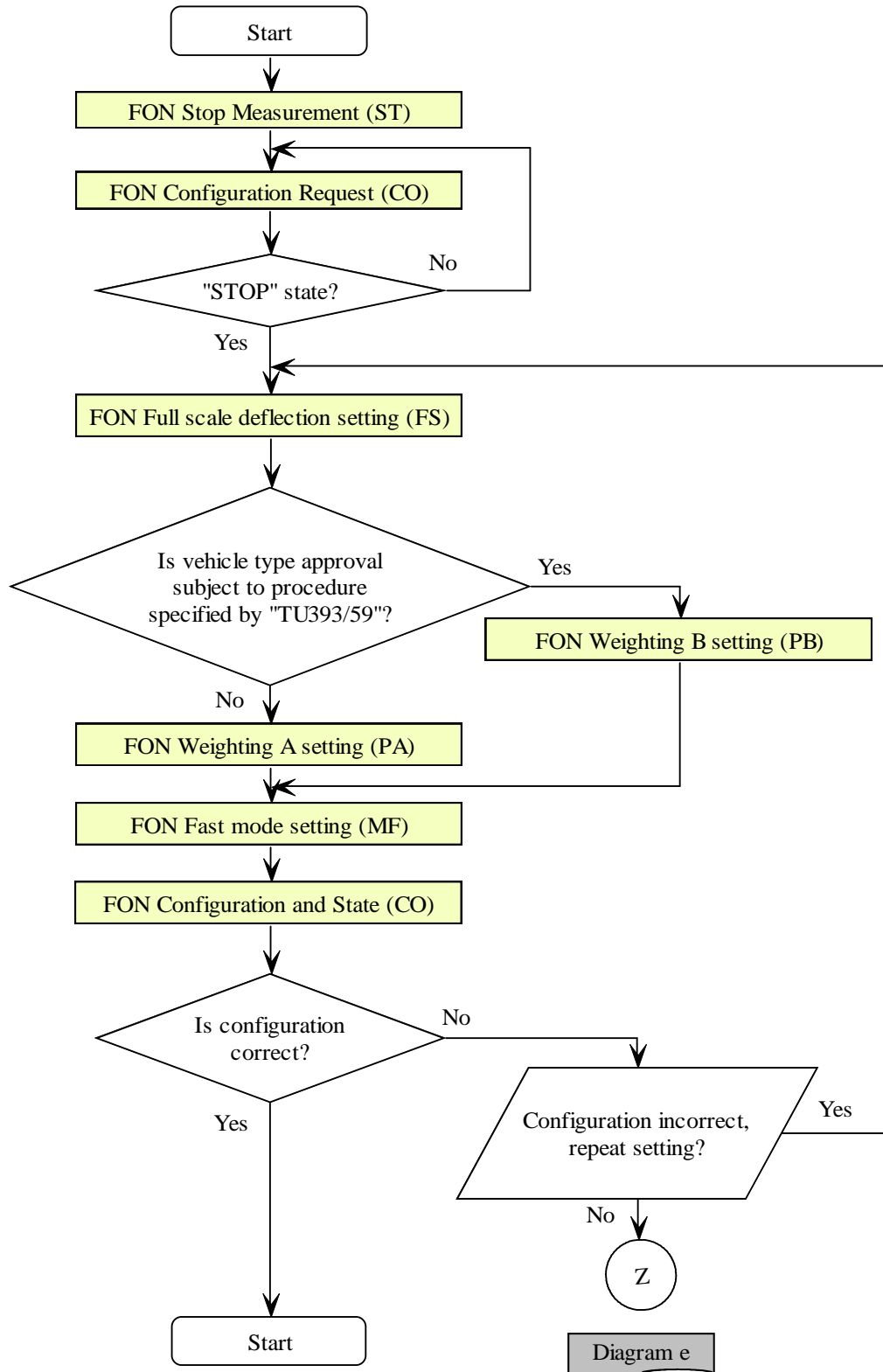




Fon_Diagram_1



Fon_Diagram_m



Fon_Diagram_n

5.1.3.6 PCStazione ↔ HEADLIGHT TEST command and response

The commands and responses exchanged between PCStazione and the Headlight tester are listed below.

The protocol sessions start with a question sent from the PCStazione and are ended by the headlight tester when a response is sent.

The commands are as follows:

- Device identification data request
- Send test identification data
- RUN status selection
- STOP status selection
- RESET status selection
- Measured value request

5.1.3.6.1 Device identification data request

Command: “**ID**entification” (49 Hex 44 Hex)

Question:

STX	FAR	$\begin{matrix} E \\ T \\ B \end{matrix}$	Add	$\begin{matrix} E \\ T \\ B \end{matrix}$	ID	CRC-H	CRC-L	ETX
-----	-----	---	-----	---	----	-------	-------	-----

Where:

Field	Description
FAR	Question to Headlight test device
Add	Numerical device address
ID	Device identification data request command

Response:

STX	FAR	$\begin{matrix} E \\ T \\ B \end{matrix}$	Add	$\begin{matrix} E \\ T \\ B \end{matrix}$	ID	$\begin{matrix} E \\ T \\ B \end{matrix}$	Mar	$\begin{matrix} E \\ T \\ B \end{matrix}$	Mod	$\begin{matrix} E \\ T \\ B \end{matrix}$	NumOm	$\begin{matrix} E \\ T \\ B \end{matrix}$	NumSer	$\begin{matrix} E \\ T \\ B \end{matrix}$	DataSca
$\begin{matrix} E \\ T \\ B \end{matrix}$	NumVer	$\begin{matrix} E \\ T \\ B \end{matrix}$	VerMCTCNet	CRC-H	CRC-L	ETX									

Where:

Field	Description	E.g. Format
FAR	Response from headlight test device	
Add	Numerical device address	
ID	Response to “ ID entificazione” command	
Mar	Make	
Mod	Model	
NumOm	Type approval number	
NumSer	Serial number	
DataSca	Due date of periodic check	“ggmmaaaa”
NumVer	Software version number	
VerMCTCNet	MCTCNet version number	“100”

5.1.3.6.2 Send test identification data

Command: "TarGa" (54 Hex 47 Hex)

Question:

STX	FAR	E T B	Add	E T B	TG	E T B	Licence plate	E T B	VIN no.	E T B	Reception date	E T B	Category	CRC-H	CRC-L	ETX
------------	-----	----------------------	-----	----------------------	----	----------------------	------------------	----------------------	------------	----------------------	-------------------	----------------------	----------	--------------	--------------	------------

Where:

Field	Description	E.g. Format
FAR	Question to Headlight test device	
Add	Numerical address referring to device	
TG	Command to send license plate, VIN number and test reception date	
License plate	Licence plate of vehicle being tested	
VIN no.	VIN No of vehicle being tested	
DataAccettazione	Reception date of vehicle being tested	
Category	International category of vehicle being tested	May assume one of the Categorie Internazionali constants defined in the MCTC.INI file

Response:

STX	FAR	E T B	Add	E T B	TG	E T B	Key ID	E T B	Key date	E T B	NumOm	E T B	Hash	CRC-H	CRC-L	ETX
------------	-----	----------------------	-----	----------------------	----	----------------------	-----------	----------------------	-------------	----------------------	-------	----------------------	------	--------------	--------------	------------

Where:

Field	Description	E.g. Format
FAR	Response from headlight test device	
Add	Numerical device address	
TG	Response to "TarGa" command	
IdChiave	Public key registration numerical identification	00000
DataChiave	Public key registration date in the form "ggmmaaaa"	01012000
NumOm	Type approval number	
Hash	String of 40 hexadecimal characters (160 bits expressed as hexadecimal figures). Hash is represented by SHA-1 of the message obtained by linking the strings for the device secret seed, licence plate, VIN No, reception date and category of the vehicle	

5.1.3.6.3 RUN status selection

Command: “**RuN**” (52 Hex 4E Hex)

Question:

STX	FAR	E T B	Add	E T B	RN	E T B	Headlig ht	E T B	Side	CRC-H	CRC-L	ETX
-----	-----	-------------	-----	-------------	----	-------------	---------------	-------------	------	-------	-------	-----

Where:

Field	Description	E.g. Format
FAR	Question to Headlight test device	
Add	Numerical device address	
RN	“ RuN ” selection command	
Headlight	Headlight under examination	Possible states: “ANAB” “ABB”
Side	Side of headlight under examination	Possible states: “SX” “DX”

Response:

STX	FAR	E T B	Add	E T B	RN	CRC-H	CRC-L	ETX
-----	-----	-------------	-----	-------------	----	-------	-------	-----

Where:

Field	Description
FAR	Response from headlight test device
Add	Numerical device address
RN	Response to “ RuN ” command

5.1.3.6.4 STOP status selection

Command: “STop” (53 Hex 54 Hex)

Question:

STX	FAR	E T B	Add	E T B	ST	CRC-H	CRC-L	ETX
-----	-----	-------------	-----	-------------	----	-------	-------	-----

Where:

Field	Description
FAR	Question to Headlight test device
Add	Numerical device address
ST	“STop” selection command

Response:

STX	FAR	E T B	Add	E T B	ST	CRC-H	CRC-L	ETX
-----	-----	-------------	-----	-------------	----	-------	-------	-----

Where:

Field	Description
FAR	Response from headlight test device
Add	Numerical device address
ST	Respond to “STop” command

5.1.3.6.5 RESET status selection

The “ReSet” causes the sound meter to reset all the previously stored data. After resetting, its status must change from “RESET” to “STOP” to allow the device to accept the RUN command to begin a new test.

Command: “ReSet” (52 Hex 53 Hex)

Question:

STX	FAR	E T B	Add	E T B	RS	CRC-H	CRC-L	ETX
-----	-----	-------------	-----	-------------	----	-------	-------	-----

Where:

Field	Description
FAR	Question to headlight tester device
Add	Numerical device address
RS	“ ReSet ” selection command

Response:

STX	FAR	E T B	Add	E T B	RS	CRC-H	CRC-L	ETX
-----	-----	-------------	-----	-------------	----	-------	-------	-----

Where:

Field	Description
FAR	Response from headlight test device
Add	Numerical device address
RS	Response to “ ReSet ” command

5.1.3.6.6 Measured value request

This command allows two options according to whether the measuring data is available or not.

Command: "VAlori" (56 Hex 41 Hex)

Question:

STX	FAR	ETB	Add	ETB	VA	CRC-H	CRC-L	ETX
-----	-----	-----	-----	-----	----	-------	-------	-----

Where:

Field	Description
FAR	Question to Headlight test device
Add	Numerical device address
VA	Command request "VAlori"

Possible responses:

- Data not available

STX	FAR	ETB	Add	ETB	VA	ETB	Vector IV	ETB	Status (@)	ETB	CRC-32 (@)	CRC-H	CRC-L	ETX
-----	-----	-----	-----	-----	----	-----	-----------	-----	------------	-----	------------	-------	-------	-----

Where:

Field	Description	E.g. Format
FAR	Response from headlight test device	
Add	Numerical device address	
VA	Reponse to "VAlori" command	
VettoreIV	Initialisation vector IV, for RC4 encryption	"15AF7B"
Stato (@)	Instrument status	Possible states: "RUN" = measurement in progress "STOP" = ready for test "RESET" = data reset stage
CRC-32 (@)	Checksum CRC-32 on encrypted data (@)	"23D19B3F"

- Data available

STX	FAR	ETB	Add	ETB	VA	ETB	Vector IV	ETB	Status (@)	ETB	Side (@)	ETB	Vert (@)	ETB	Horiz (@)	ETB	IllumLux (@)
-----	-----	-----	-----	-----	----	-----	-----------	-----	------------	-----	----------	-----	----------	-----	-----------	-----	--------------

ETB	Type (@)	ETB	CRC-32 (@)	CRC-H	CRC-L	ETX
-----	----------	-----	------------	-------	-------	-----

Where:

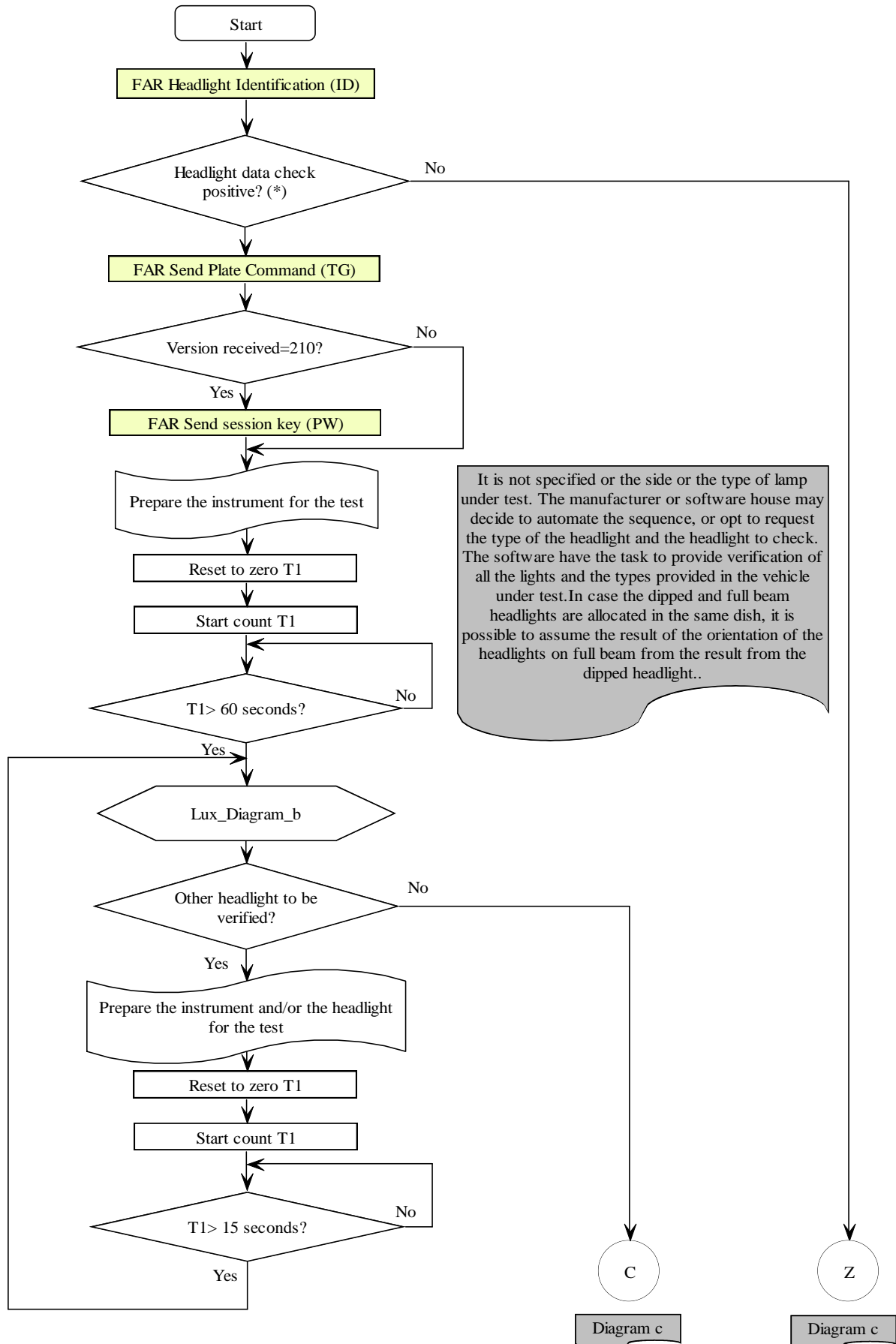
Field	Description	E.g. Format
FAR	Response from headlight alignment device	
Add	Numerical device address	
VA	Response to “VALori” command	
VettoreIV	Initialisation vector IV, for RC4 encryption	“15AF7B”
Stato (@)	Instrument status	Possible states: “ANAB” “ABB”
Side (@)	Side of headlight under examination	Possible states: “SX” “DX”
Vert (@)	Vertical alignment	Possible states: “R” = regular “I” = irregular (can be input manually by placing “#” before the value input, e.g. “#R”)
Horiz (@)	Horizontal alignment	Possible states: “R” = regular “I” = irregular (can be input manually by placing “#” before the value input, e.g. “#R”)
IllumLux (@)	Value measured in lux	“000000”
Type (@)	Headlight type	Possible values: “A” = asymmetric “S” = symmetrical
CRC-32 (@)	Checksum CRC-32 on encrypted data (@)	“23D19B3F”

5.1.3.6.7 Headlight tester flow diagram

The headlight test should be carried out in accordance with the specifications shown in the following flow diagram, which replace those given in 2344-404 of 06 October 2003.

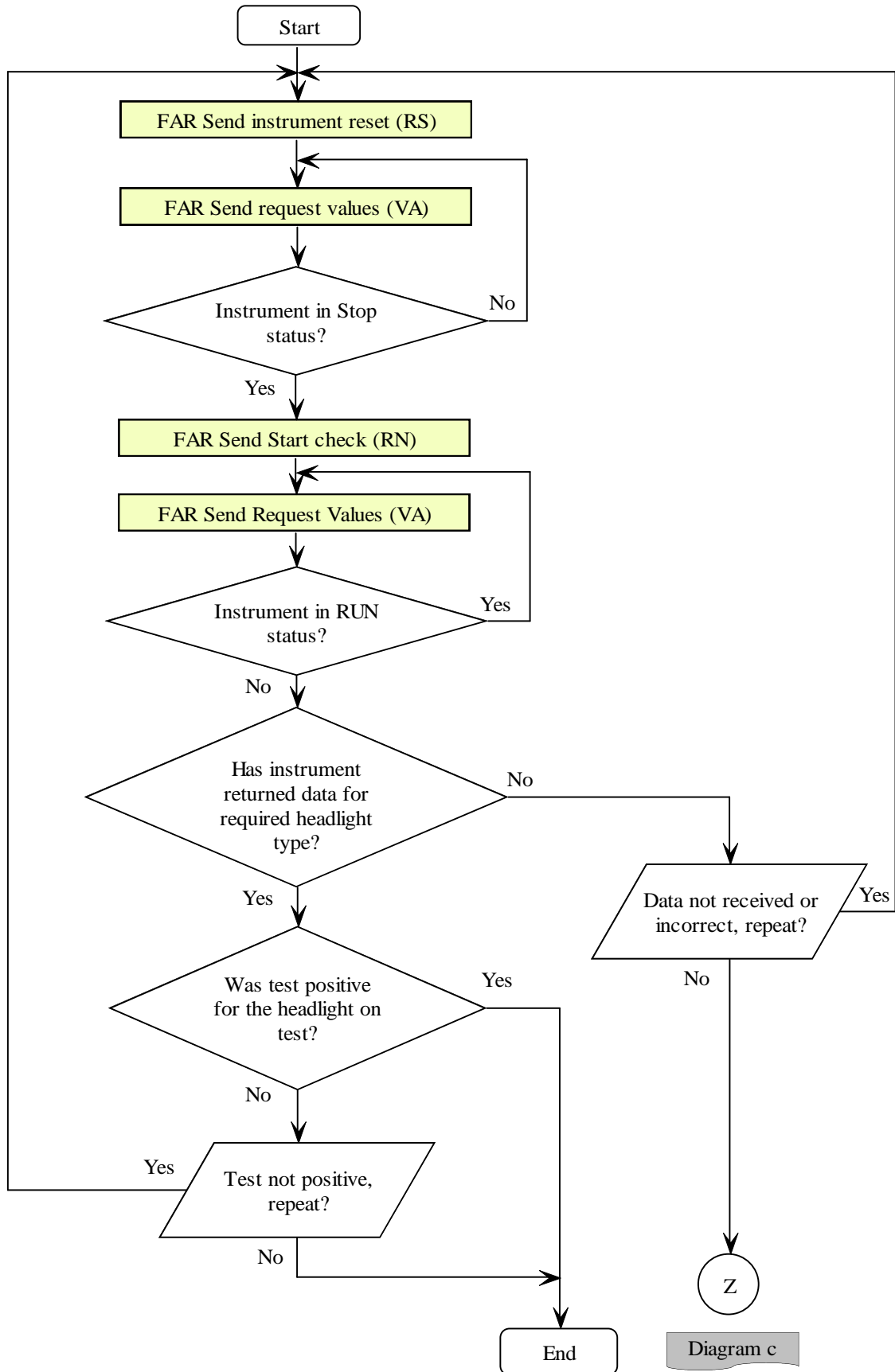
These must be implemented by all software managing the instruments involved, whether they are type-approved for DIR, RETE or RS Senza Esito.

A STOP command at any point of the diagram causes the test to terminate.

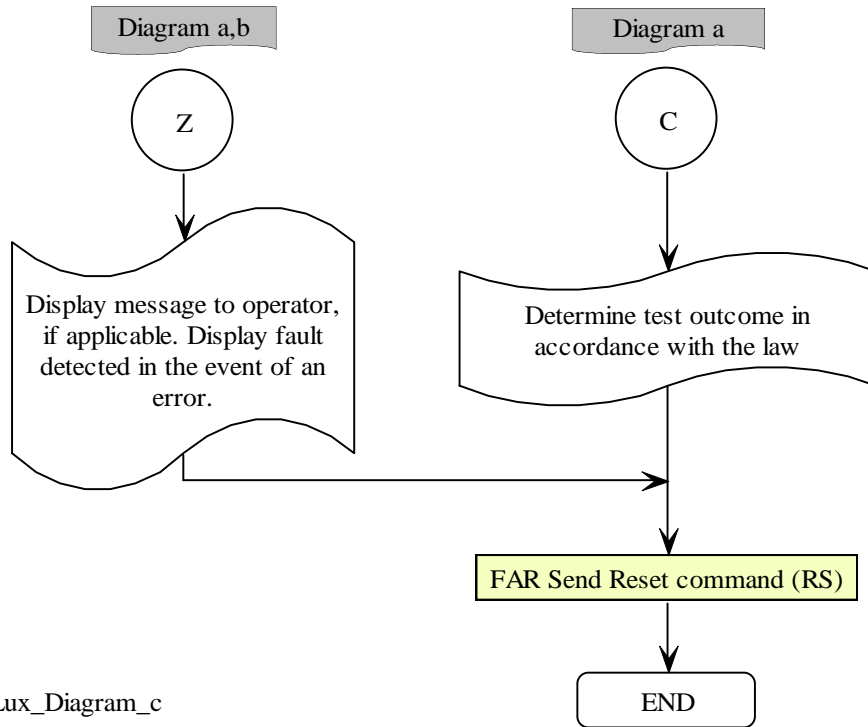


(*) Check if the MCTCNet protocol version is supported.
 Check the expiration date of the periodic examination, as provided in paragraph 8 of section 4.3.

Lux_Diagram_a



Lux_Diagram_b



Lux_Diagram_c

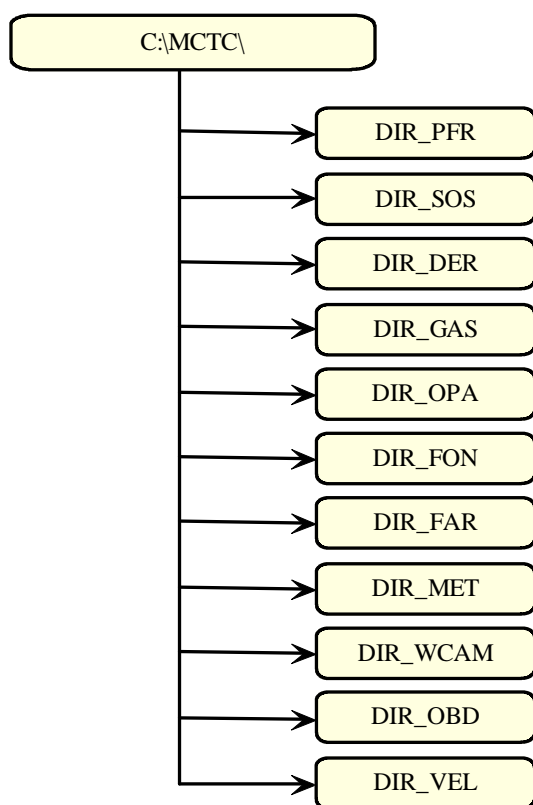
5.1.4 Notes on connection with 'senza elaborazione esito' devices

If devices are approved to work with more than one system (e.g. gas analyser), the value of field **NumOm** in the response to the **TG** (TarGa) command must refer to the device type approval for the vehicle currently being tested. For example, in the case of a gas analyser type approved for both cars and motor vehicles, the field **NumOm** must contain type approval for the motor vehicle device only if the vehicle category passed through the **TarGa** command is compatible with motor vehicles. Conversely, it must contain the type approval for the car device only if the vehicle category passed is compatible with cars.

5.2 Device connected with “Dir” protocol

In the event of a “Dir” connection (dedicated hardware and/or software) where physical and logical communication management is established by the device manufacturer, it is necessary to define a data exchange method that is independent of the conditions (hardware and/or software) typically imposed by a connection of this type. This purpose, the manufacturer is bound to provide a software module that may be installed in the PCStazione (see Figure D) in order to allow the exchange of data between these software responsible for coordinating test measurement stages, installed in the PCStazione, and the specific device connected via a “Dir” connection.

In order to synchronize the exchange of information in this case too, as with the “PCPrenotazione ⇔ PCStazione”, a main folder and a sub-folder are defined for each device (see Figura C) created in “PCStazione”. These folders and sub-folders are shared (not via the network) between “SW PCStazione” and the software module provided by the manufacturer. Data is therefore exchanged between the two software modules by means of “AAnnnnnn.XXX” files (see § 4) where “XXX” may be: ACC, AC2, PFR, SOS, DER, GAS, FON, FAR, CLK, FOT and OBD, according to the communication stage and the type of device.



Structure PCStazione

Figura C – Folder and sub-folder set-up created on PCStazione.

Synchronisation for the exchange of information between “SW PCStazione \Leftrightarrow Apparecchiatura”, by means of the “AAnnnnnn.XXX” file, in a “Dir” connection may be summarised (see Figure D) by the following steps (which constitute a DIR interface approach, the file extensions must be appropriate to the MCTCNet version currently in use):

- 1) Once the “SW PCStazione” has established that a particular device, at one of the test stages, is connected in “Dir” mode, it puts the “AAnnnnnn.ACC” file in the DIR_XXX folder;
- 2) After checking for the presence of the file “AAnnnnnn.ACC” file in the DIR_XXX folder, the “Modulo SW Apparecchiatura XXX” software acquires the data it contains;
- 3) The “Modulo SW Apparecchiatura XXX” manages the interface with the device, in order to acquire the measurement data; The manufacturer must guarantee that the values communicated to the software module have effectively been sent by the device. The software module must not allow the test to be carried out if it is not connected to the specific device. This is also applicable for devices in RETE mode (except for brake testing). It should be noted that the application of this requirement necessarily means that the identification data, at least serial number and expiry date, of the device must be stored on board the hardware accredited as compliant and consistent with the accompanying metrology handbook.
- 4) The “Modulo SW Apparecchiatura xxx” generates the “AAnnnnnn.XXX” file with the same conventions as the “INI” file for the type of device (e.g. Brake test = AAnnnnnn.PFR), and deletes the “AAnnnnnn.ACC” file;
- 5) “SW PCStazione” waits for the “AAnnnnnn.ACC” file to be deleted from the DIR_XXX folder and then moves the “AAnnnnnn.XXX” file from the DIR_XXX folder to the ESITO folder of PCPrenotazione. Note that the file produced by the DIR must not be deleted from PCStazione under any circumstances but only moved to the ESITO folder, or replaced if the technical manager decides to repeat the test.

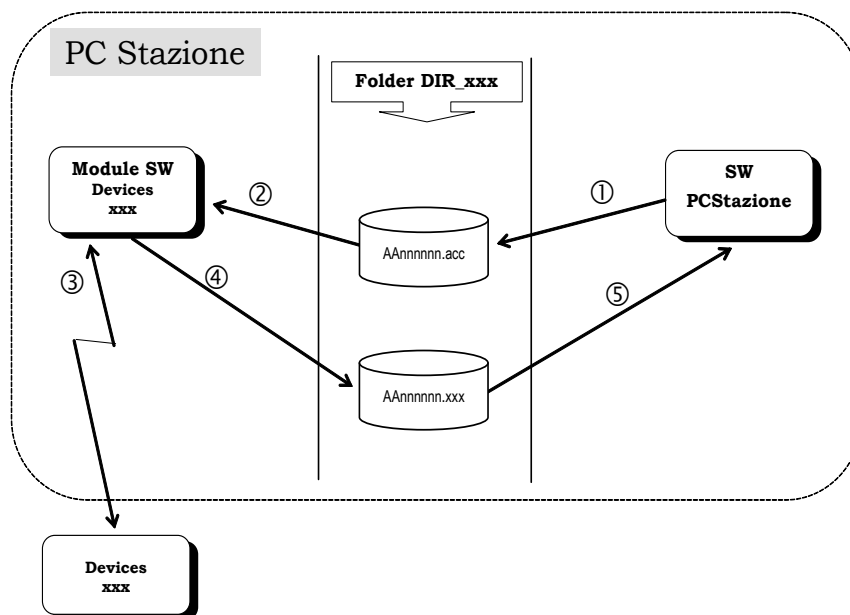


Figure D – Synchronicity diagram of the “AAnnnnnn.xxx” file for the case of “Dir” type connections
N.B.

Ensuring that the “Modulo SW Apparecchiatura xxx” puts the “AAnnnnnn.XXX” file in the DIR_XXX folder and not directly in the ESITO folder guarantees that synchronism is managed between “SW PCStazione” and “PCPrenotazione”. For example, if measurement test “AAnnnnnn.XXX” is the last to

be carried out, “PCPrenotazione” would interpret test completion at the same time as “SW PCStazione” and not allow the latter the option to carry out further operations necessary for test coordination.

6. Appendices

6.1 Appendix A : MCTCNet connection diagram

Entry into force of the “MCTCNet” protocol provides for connection of the various devices within the test line.

The various devices may be connected in different ways, in accordance with the requirements of the MCTCNet protocol.

It is therefore obligatory for a “schema di collegamento” (connection set-up) to be drawn up for each line in accordance with instructions in annex 1, which provides a list of equipment in use and an associated connection diagram.

Server/client workstation may be “SERVER” or “CLIENT”. Only one “SERVER” workstation must be present. Any other licenses must be configured as “CLIENT” workstations.

Line No must be entered only if the test centre uses line management, otherwise it may be left blank (see 4.3 – 15).

Configuration type may be “RETE”, “DIR”, “RS Senza Esito”.

Brake type approval type may be “Autoveicoli”, “Autoveicoli e motoveicoli 3/4 ruote”, “Motoveicoli 2 ruote”, “Motoveicoli 2/3/4 ruote”, “Autoveicoli e motoveicoli 2/3/4 ruote”. In the event of dual type approval, both types must be entered in the relevant field. E.g.:

Brake test bench						
Manufacturer	Product name	Type approval	Serial number	Software version	Configuration type	Brake type approval type
ROSSI srl	PVR1	OM00001/Net OM00002/Net	1234	3.23.2	RETE	Cars and 3/4 wheeled motor vehicles

Gas Type Approval Type may be “Autoveicoli”, “Motoveicoli”, “Autoveicoli or Motoveicoli”

Rev counter type may be “Integrato Analizzatore” “Integrato Opacimetro” “Integrato Fonometro” “Esterno”.

Speed test type may be “2 ruote” “3/4 ruote” “2/3/4 Ruote”

Each “schema di collegamento” must be submitted with the metrology booklets to the Provincial DDT Office, which will sign them off and return them to the Test Centre. All documentation must be submitted in duplicate.

The “schema di collegamento” must be kept by the Test Centre.

Whenever a device is permanently replaced on the line, the Test Centre is obliged to draw up a new “schema di collegamento” that must again be submitted in duplicate to the Provincial DDT Office for approval.

Each manufacturer is obliged to enter the MCTCNet configuration and connection type for which the device is approved in the Metrology Register.

Together with the connection diagram, must be submitted to the competent Vehicle Licensing Office (UMC):

- Procedure allowing license plate recognition without using clk file synchronism;
- one or more photos for each brake test bench in the centre with associated demarcation lines in accordance with the RT system application method. Each photo must clearly show the demarcation lines to their full extent and any wording shown in paragraph 1.1 of this document.
- Complete certificate of RT system technical datasheet.
- User manual, if required, for application necessary to display SAV, REV or FOT and IMM files, which it must be possible to use in electronic form, including by means of the same application.

- A procedure that allows on-screen search and display (via PCPrenotazione software) of all vehicles registered prior to 1964 must also be submitted.

The test centre must then redraft the updated set-up and diagram using the new symbols as soon as PCPrenotazione only has been updated. The set-up and diagram must then be updated whenever any device and/or software in use at the company is amended or updated.

Annex 1

TEST LINE MCTCNet CONNECTION SET-UP

Enter test centre data
Enter a list of Technical Managers

DEVICES IN USE

PCPrenotazione

Manufacturer	Product name	Approval No	Date Approval	Software version	Licence No	Server/Client Workstation

PCStazione

Manufacturer	Product name	Approval No	Date Approval	Software version	Licence No	Line No

Brake test bench

Manufacturer	Product name	Type approval	Serial number	Software version	Configuration type	Brake type approval type

Gas analyser

Manufacturer	Product name	Type approval	Serial number	Software version	Configuration type	Gas approval type

Opacimeter

Manufacturer	Product name	Type approval	Serial number	Software version	Configuration type

Sound level meter

Manufacturer	Product name	Type approval	Serial number	Software version	Configuration type

Headlight test

Manufacturer	Product name	Type approval	Serial number	Software version	Configuration type

Tachometer

Manufacturer	Product name	Type approval	Serial number	Software version	Rev counter type

Speed test

Manufacturer	Product name	Type approval	Serial number	Software version	Type of speed tester

Scantool

Manufacturer	Product name	Type approval	Serial number	Software version	Configuration type

License Plate Recognition System (RT)

Manufacturer	Product name	Approval No	Serial number	Software version	Configuration type

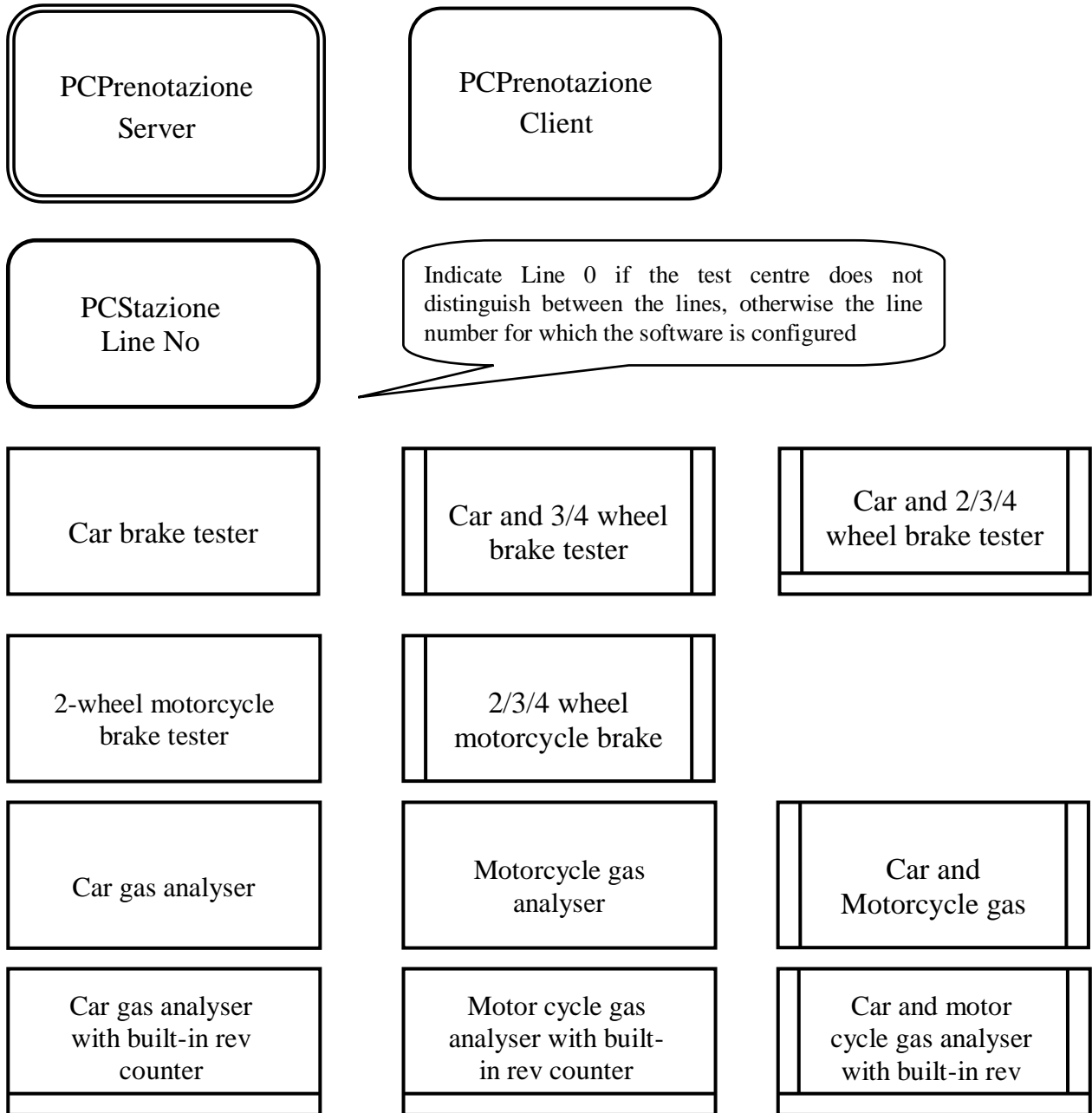
Decelerometer

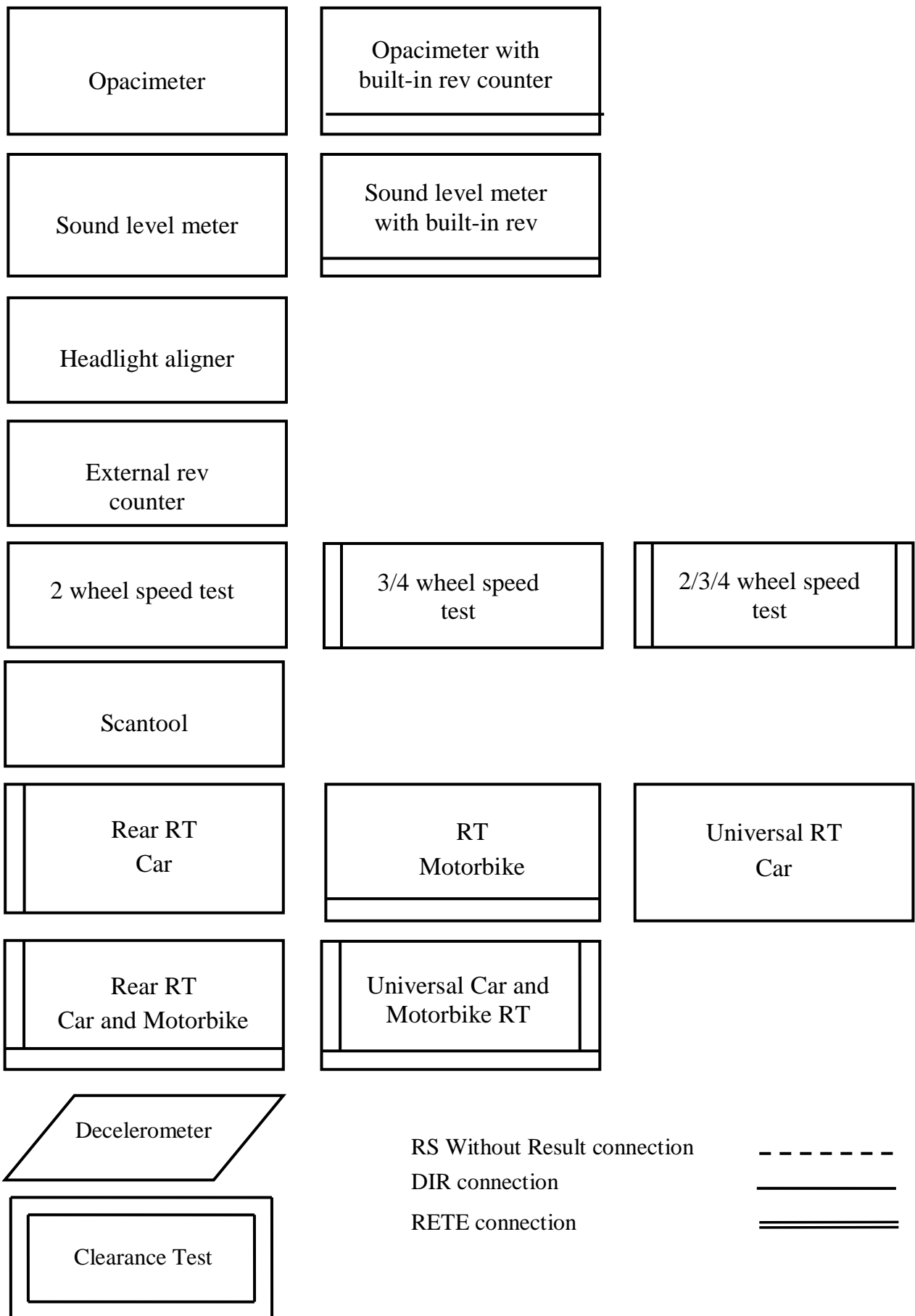
Manufacturer	Product name	Type approval	Serial number	Software version

Clearance Test

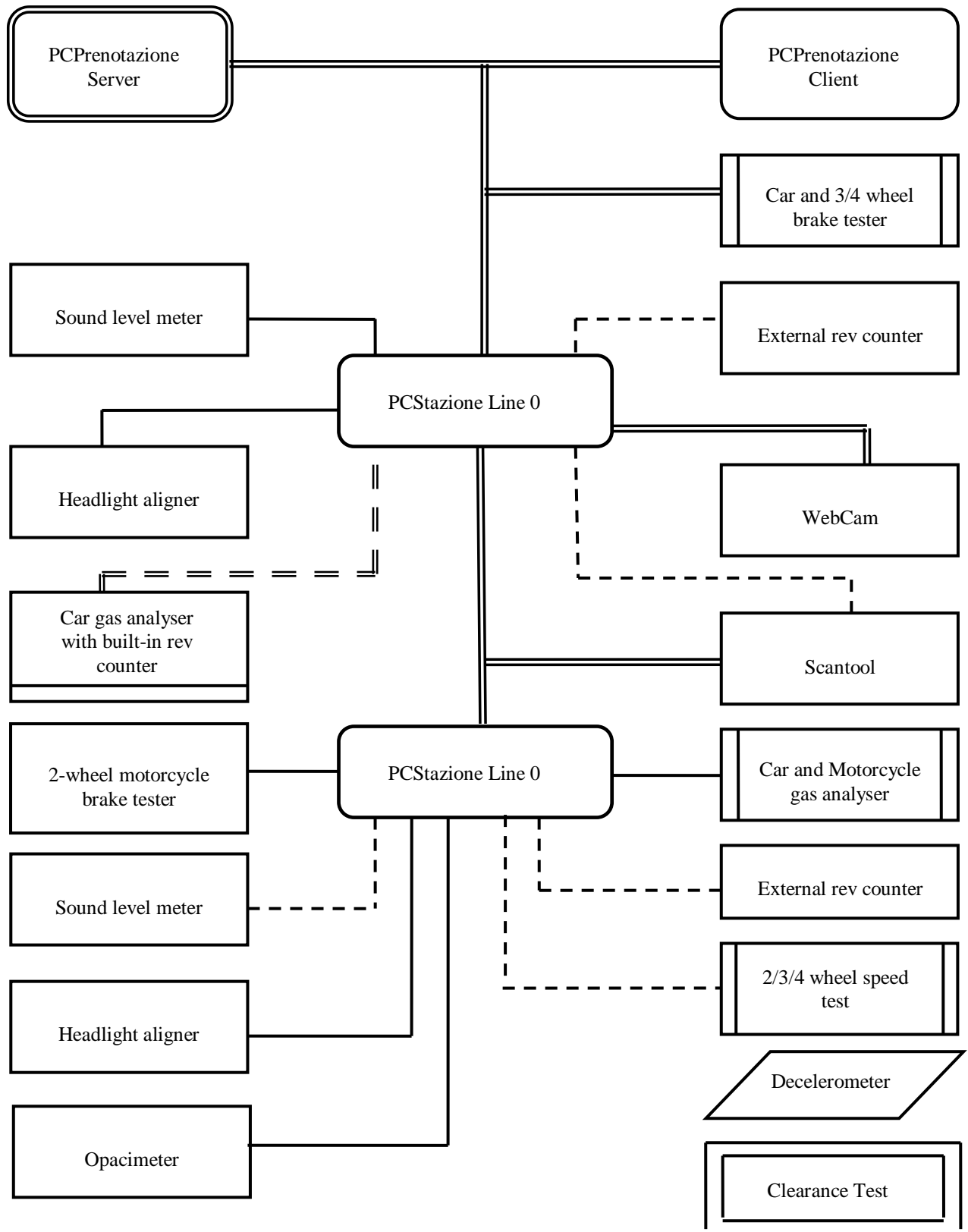
Manufacturer	Product name	Type approval	Serial number

Symbols to be used when illustrating the “schema di collegamento MCTCNet per linea di revisione”





Example of device connection diagram



MCTCNet operational technical specifications provide for checking, testing and compatibility of the MCTC NET PROTOCOL with DEVICES to be type-approved.

MCTCNet operational technical specifications provide for the certification of software used to automate the operational stages of testing (PCStazione and PCPrenotazione).

Any software manufacturer may apply to certify their software products for performance of PCStazione and PCPrenotazione operations.

The PCStazione must be a PC separate from other PCs (e.g. from the PC used by the brake meter) and is responsible for connecting devices at data transmission level (if they are not networked with PCPrenotazione) and PCPrenotazione.

The software installed in PCStazione must be able to manage all connection types envisaged by the MCTCNet protocol (Rete, Dir, RS); all envisaged protocols are therefore checked during certification tests.

The software installed on PCStazione must:

- not allow modification of obligatory measurement data for which manual input is not an option;
- automatically enter the control symbol “(simbolo # “cancellotto”)” in the file for data that require manual input; in this case, a window must open automatically for the operator to enter the reason for the manual entry

Devices must be equipped with a password hierarchy (at least 2 levels plus the user level), the first to allow the manufacturer to carry out required operations (maximum hierarchical level) and the second to be made known to the Administration during type approval to allow device calibration.

6.2 Appendix B : SHA 1

This is the most widely used algorithm in the SHA family and is used in numerous applications and protocols, including TSL and SSL, PGP, SSH, S/MIME and IPsec. Like any hash algorithm, SHA produces a message digest, or “impronta del messaggio”, of fixed length from a message of variable length. A hash algorithm is secure because the function is not reversible (it is not possible to return to the original message simply by knowing this data) and two different messages must never give the same digest (collision).

SHA-1 generates a 160 bit-long digest (or hash) from a message of maximum length $2^{64} - 1$ bit. The generation involves 80 passes and uses the operations +, and, or, xor, rotl (rotate left). SHA-1 uses blocks of 512 bit and specifies filler rules for shorter messages. Implementation of SHA-1 and fill methods:

Notes: All variables are unsigned 32 bits and wrap modulo 2^{32} when calculating

Initialize variables:

h0 = 0x67452301

h1 = 0xEFCDAB89

h2 = 0x98BADCFE

h3 = 0x10325476

h4 = 0xC3D2E1F0

Pre-processing:

append the bit '1' to the message

append k bits '0', where k is the minimum number ≥ 0 such that the resulting message length (in *bits*) is congruent to 448 (mod 512)

append length of message (before pre-processing), in *bits*, as 64-bit big-endian integer

Process the message in successive 512-bit chunks:

break message into 512-bit chunks

for each chunk

break chunk into sixteen 32-bit big-endian words $w[i]$, $0 \leq i \leq 15$

Extend the sixteen 32-bit words into eighty 32-bit words:

for i **from** 16 to 79

$w[i] = (w[i-3] \text{ xor } w[i-8] \text{ xor } w[i-14] \text{ xor } w[i-16]) \text{ '1'}$

Initialize hash value for this chunk:

a = h0

b = h1

c = h2

d = h3

e = h4

Main loop:

for i from 0 to 79

if $0 \leq i \leq 19$ then

f = (b and c) or ((not b) and d)

k = 0x5A827999

else if $20 \leq i \leq 39$

f = b xor c xor d

k = 0x6ED9EBA1

else if $40 \leq i \leq 59$

f = (b and c) or (b and d) or (c and d)

k = 0x8F1BBCDC

else if $60 \leq i \leq 79$

f = b xor c xor d

k = 0xCA62C1D6

temp = (a **leftrotate** 5) + f + e + k + w[i]

e = d

d = c

c = b **leftrotate** 30

b = a

a = temp

Add this chunk's hash to result so far:

h0 = h0 + a

h1 = h1 + b

h2 = h2 + c

h3 = h3 + d

h4 = h4 + e

Produce the final hash value (big-endian):

digest = hash = h0 **append** h1 **append** h2 **append** h3 **append** h4

6.3 Appendix C : RC4

Known also as ARC4 or ARCFOUR, this is a fast and simple symmetric key encryption algorithm with low computational load, used in commonly used protocols such as SSL (Internet traffic protection) and WEP (wireless traffic protection in accordance with IEEE Standard 802.11b).

RC4 is a function that generates a pseudorandom sequence (keystream) from a 1 to 256 byte long key that is used to encrypt and decrypt a data flow by means of XOR (exclusive OR).

Where:

K	key
P	plaintext data flow
C	encrypted data flow
\oplus	XOR operator

Encryption:

$$C = P \oplus RC4(K)$$

Decryption:

$$P = C \oplus RC4(K)$$

RC4 maintains the following as status information:

- a 256 byte vector: $S[256]$
- two counters: i, j

The key K is only used during the status initialisation stage.

At each pass, status vector S contains a different permutation of values from 0 to 255.

At each pass, a keystream byte is generated taking one of the elements of status vector S , whose elements are permuted.

6.3.1 RC4 encryption methodology

At present, a 128 bit key made up of a secret 104 bit part that is different for each communication session and a 24 bit variable that is different for each message is secure.

The initial vector is more than large enough, allowing the generation of $2^{24} = 16777216$ different keystreams (and hence of the coding of the same number of messages) within the same communication session.

The transmitter and receiver share a 104 bit secret key K .

- A checksum is calculated on the message to be transferred (payload).
- The *payload* and *checksum* are encrypted with RC4, by concatenating a 24 bit initialisation vector IV and K . IV is chosen by the transmitter and inserted in plain text in the package. It should never be repeated within the same communication session.
- The recipient extracts IV , deciphers the *payload* and the *checksum*, and checks the integrity of the *payload* verifying the *checksum*.

6.3.2 Transmission

Let M be the message to be transferred (*payload*).

The transmitter calculates the *checksum*: $CRC(M)$.

Where:

\parallel concatenation operator

The *plaintext* is:

$$P = M \parallel CRC(M)$$

The transmitter concatenates IV with K and generates the encrypted package:

$$C = P \oplus RC4(IV \parallel K)$$

then sends it jointly with IV .

6.3.3 Reception

The recipient extracts IV and deciphers the *plaintext*:

$$P = C \oplus RC4(IV \parallel K)$$

It then extracts the message M and the *checksum* $CRC(M)$ from P ; if the *checksum* verification is positive, it accepts the message.

In brief, the RC4 encryption uses a 128 bit key made up of the secret key (104 bit) and an initialisation vector (24 bit) transmitted in plain form.

The transmitter:

- calculates the message checksum and concatenates it with the message;
- concatenates the initial vector (always different) to secret key RC4 to obtain the coding key;
- codes the package made up of the message and checksum;
- transmits the initial vector and coded message.

The recipient:

- extracts the initial vector and concatenates it with the secret key to obtain the package decoding key;
- extracts message and checksum;
- if the checksum verification is positive, it accepts the message.

6.3.4 Example of C-ANSI source code for RC4 encryption:

```
#include <stdio.h>
#include <string.h>
#include <stdlib.h>

void rc4_init(unsigned char *key, unsigned int key_length);
unsigned char rc4_output(void);
int main(void);

unsigned char S[256];
```

```
unsigned int i, j;

/* RC4 secret key, 104 bit */
const unsigned char RC4_secret_key[] = {"RC4_chiave104"};

/* Initialization vector, 24 bit */
unsigned char IV[3];

/* KSA (key-scheduling algorithm) */
void rc4_init(unsigned char *key, unsigned int key_length) {
    for (i = 0; i < 256; i++)
        S[i] = i;

    for (i = j = 0; i < 256; i++) {
        unsigned char temp;

        j = (j + key[i % key_length] + S[i]) & 255;
        temp = S[i];
        S[i] = S[j];
        S[j] = temp;
    }

    i = j = 0;
}

/* PRGA (pseudo-random generation algorithm) */
unsigned char rc4_output() {
    unsigned char temp;
    i = (i + 1) & 255;
    j = (j + S[i]) & 255;

    temp = S[i];
    S[i] = S[j];
    S[j] = temp;

    return S[(S[i] + S[j]) & 255];
}

/* Program output

Plain text:          Test message
Crypted text (hex): A70ECE6EDB9FB3B376EB4471
Back to plain text: Test message

*/
int main() {
    unsigned char plain_text[32];
    unsigned char crypted_text[32];
    unsigned char key[16];

    int count;
    for (count=0; count <3; count++)
        IV[count] = (unsigned char) (rand()%256);

    /* Concatenation of IV and secret key */
    memcpy(key, IV, 3);
    memcpy(key+3, RC4_secret_key, 13);

    /* RC4 crypt */
    rc4_init(key, 16);
}
```

```
strcpy((char *)plain_text, "Test message");
printf("Plain text:      %s\n", (char *)plain_text);

printf("Crypted text (hex): ");
for (count = 0; count < strlen((char *)plain_text); count++)
{  crypted_text[count] = plain_text[count] ^ rc4_output();
   printf("%02X", crypted_text[count]);
}
printf("\n");

/* RC4 decrypt */
rc4_init(key, 16);

printf("Back to plain text: ");
for (count = 0; count < strlen((char *)plain_text); count++)
{  plain_text[count] = crypted_text[count] ^ rc4_output();
   printf("%c", plain_text[count]);
}
printf("\n");

getchar();

return 0;
}
```

6.4 Appendix D Connection of devices ‘con and senza elaborazione esito’ in MCTCNet version 2.1.0

This appendix introduces a protection mechanism, to be applied to serial communications, that is higher than version 2.00, through the use of RSA 1024 encryption.

Implementation involves modifying the TarGa (TG) command and adding a new PassWord (PW) command. The instrument must not use the TG command to supply the hash that will be used to obtain the session key used to encrypt the next communication via RC4 but must provide the requester with parameters for reconstructing its own RSA public key (module and exponent) in addition to the normal key validity parameters. “The PCStazione and host instrument (e.g. GAS analyser or Opacimeter), if applicable, will then use this public key to encrypt the fixed 104 bit part of the RC4 session key they generate themselves (i.e. different for each session) and communicate it to the slave instrument via the appropriate PW command. If the slave instrument is the true holder of the RSA public key communicated previously, it will be able to decrypt the fixed part of the RC4 session key received using its own private RSA key. Once both parties are aware of the fixed part of the session key, they will use this as for the RC4 encryption to be used for the communication of variable data.” The remaining mechanism for the management of communication with instruments and the structure of the remaining messages will remain unchanged compared to protocol version 2.00. Data denoted as encrypted (highlighted by means of a @) in version 2.00 will remain encrypted by the same methodology in version 2.10.

6.4.1 Send test identification data

Command: "TarGa" (54 Hex 47 Hex)

Question:

STX	Type	ETB	Add	ETB	TG	ETB	License plate	ETB	VIN no.	ETB	Reception date	ETB	Category	CRC-H	CRC-L	ETX
-----	------	-----	-----	-----	----	-----	---------------	-----	---------	-----	----------------	-----	----------	-------	-------	-----

Where:

Field	Description	E.g. Format
Type	Response from device of the required type (e.g. "GAS")	
Add	Numerical address referring to device	
TG	Command to send license plate, VIN number and test reception date	
License plate	License plate of vehicle being tested	
VIN no.	VIN No of vehicle being tested	
DataAccettazione	Reception date of vehicle being tested	
Category	International category of vehicle being tested	May assume one of the CategorieInternazionali constants defined in the MCTC.INI file

Response:

STX	Type	ETB	Add	ETB	TG	ETB	Key ID	ETB	Key date	ETB	NumOm	ETB	Key Module	ETB	Key Exponent	CRC-L	CRC-L	ETX
-----	------	-----	-----	-----	----	-----	--------	-----	----------	-----	-------	-----	------------	-----	--------------	-------	-------	-----

Where:

Field	Description	E.g. Format
Type	Response from device of the type indicated (e.g. "GAS")	
Add	Numerical device address	
TG	Response to "TarGa" command	
IdChiave	Public key registration numerical identification	00000
DataChiave	Public key registration date in the form "ggmmaaaa"	01012000
NumOm	Type approval number (if the gas analyser is type approved also for motorbikes, the field must contain the type approval number for the vehicle currently being tested)	
ModuloChiave	Instrument public key module coded in Base64.	
EsponenteChiave	Exponent of instrument public key coded in Base64.	

6.4.2 Send session key

The device can respond to the PW only after decrypting of the message received from PCStazione (or from the Master interfaced with the device). For the PW command only, the time-out planned for the RS connection is set at 45 seconds.

Command: "PassWord" (50 Hex 57 Hex)

Question:

STX	Type	ETB	Add	ETB	PW	ETB	Password	CRC-H	CRC-L	ETX
-----	------	-----	-----	-----	----	-----	----------	-------	-------	-----

Where:

Field	Description	E.g. Format
Type	Response from device of the required type (e.g. "GAS")	
Add	Numerical address referring to device	
PW	Send session key command	
Password	fixed part of the RC4 session key encrypted using the public key received by the instrument via the response to the TarGa command and coded in Base64	

Response:

STX	Type	ETB	Add	ETB	PW	CRC-L	CRC-L	ETX
-----	------	-----	-----	-----	----	-------	-------	-----

Where:

Field	Description	E.g. Format
Type	Response from device of the required type (e.g. "GAS")	
Add	Numerical device address	
PW	Command performed	

6.5 Appendix E: Base64 coding

Base 64 is a positional numbering system that uses 64 symbols. It is mainly used to code binary data in e-mails in order to convert data into ASCII format. The algorithm that carries out the conversion subdivides the data to be decoded into groups of 6 bits, which can contain values from 0 to 63. Each possible value is converted into a ASCII character according to the following table.

Value	ASCII	Value	ASCII	Value	ASCII	Value	ASCII
0	A	16	Q	32	g	48	w
1	B	17	R	33	h	49	x
2	C	18	S	34	i	50	y
3	D	19	T	35	j	51	z
4	E	20	U	36	k	52	0
5	F	21	V	37	l	53	1
6	G	22	W	38	m	54	2
7	H	23	X	39	n	55	3
8	I	24	Y	40	o	56	4
9	J	25	Z	41	p	57	5
10	K	26	a	42	q	58	6
11	L	27	b	43	r	59	7
12	M	28	c	44	s	60	8
13	N	29	d	45	t	61	9
14	O	30	e	46	u	62	+
15	P	31	f	47	v	63	/

The algorithm brings about a 33% increase in data size because each group of 3 bytes is converted into 4 characters. If the bits are not multiples of 6, nul bits (equal to 0) are inserted and a '=' symbol is added at the end for each missing bit pair (0 to 2 pairs at most).

A possible conversion routine:

```
union conv
{
    unsigned int l;
    struct bytes
    {
        char b1;
        char b2;
        char b3;
        char b4;
    } b;
};

char convert (char c)
{
    if (c == 63)
        return 47;
    else if (c == 62)
        return 43;
    else if (c >= 52)
        return c - 4;
    else if (c >= 26)
        return c + 71;
    else
        return c + 65;
}

unsigned int toBase64(char b1, char b2, char b3)
{
    conv src, dest;
    src.b.b1 = b3;
    src.b.b2 = b2;
    src.b.b3 = b1;
    src.b.b4 = 0;
    //conv.l == b4 b3 b2 b1
    dest.b.b1 = convert(src.b.b1 & 0x3f);
    src.l = src.l » 6;
    dest.b.b2 = convert(src.b.b1 & 0x3f);
    src.l = src.l » 6;
    dest.b.b3 = convert(src.b.b1 & 0x3f);
    src.l = src.l » 6;
    dest.b.b4 = convert(src.b.b1 & 0x3f);

    return dest.l;
}
```