Usage of LMT-defined
test programs

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1   Introduction

LMT has provided in the past examples of test programs for various ambits (ECE, SAE, CN, …), however, without the claim to be complete.

After harmonisation and simplification of lighting regulations (SLR) within the UNECE framework, most ECE lighting regulations have been consolidated in UN regulations R148, R149 and R150. This was done in two steps, with step 1 leading to the original series 00 of amendments and after step 2, to the series 01 of amendments. As of February of 2024, SLR is still active and further supplements or series of amendments are to be expected.

Due to many customers requesting test programs covering the new regulations, i.e. R148, R149 and R150, LMT has decided to offer them as part of the LIMES 2000 update service. Like in the past, LMT does not claim them to be complete, but will close the gaps as soon as possible.

2   Activation

In order to activate usage of the new regulatory test programs for the 00 and 01 series of amendments of R148, R149 and R150, upgrade files are made available. In the past, upgrade files were used to activate new hardware or special software features. In a similar way, they are now used as well for the software update service or the usage of test program databases.

2.1   LIMES Upgrade

New functionality with LIMES 2000 is made available via a LIMES upgrade file (extension .lmk). Such files are provided by LMT and must be accessible from the PC on which LIMES 2000 is installed.

LIMES 2000 upgrading can be done from local hard drives, CD-ROMs, memory flash drives, or remote network drives. Upgrading can only performed by users with the corresponding rights, e.g. as *Masters* or *SuperUsers*.

Before upgrading make sure that all open files are saved because the upgrade requires a re-start of LIMES. To start the LIMES upgrade,

– use the main menu Options/Program, then the tab Upgrade (left below).

– After clicking on Select, a file-open dialogue with the Windows file explorer is launched (right below).
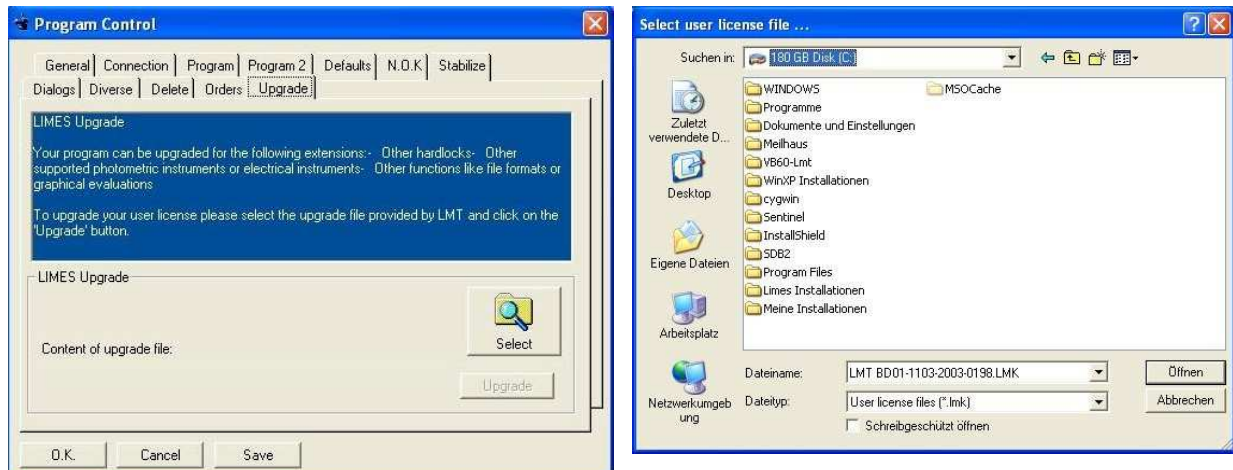
Choose the appropriate file and click on the button Upgrade to start upgrading. Typically, the upgrade process takes only a couple of seconds.

If the upgrade was possible, the list of newly installed functionality or devices is shown in the display field (left below).

If the upgrade is not possible or denied, a message is shown in the display area (right below). This can be due to all functions to be upgraded are already available, or you do not have the proper rights for upgrading.
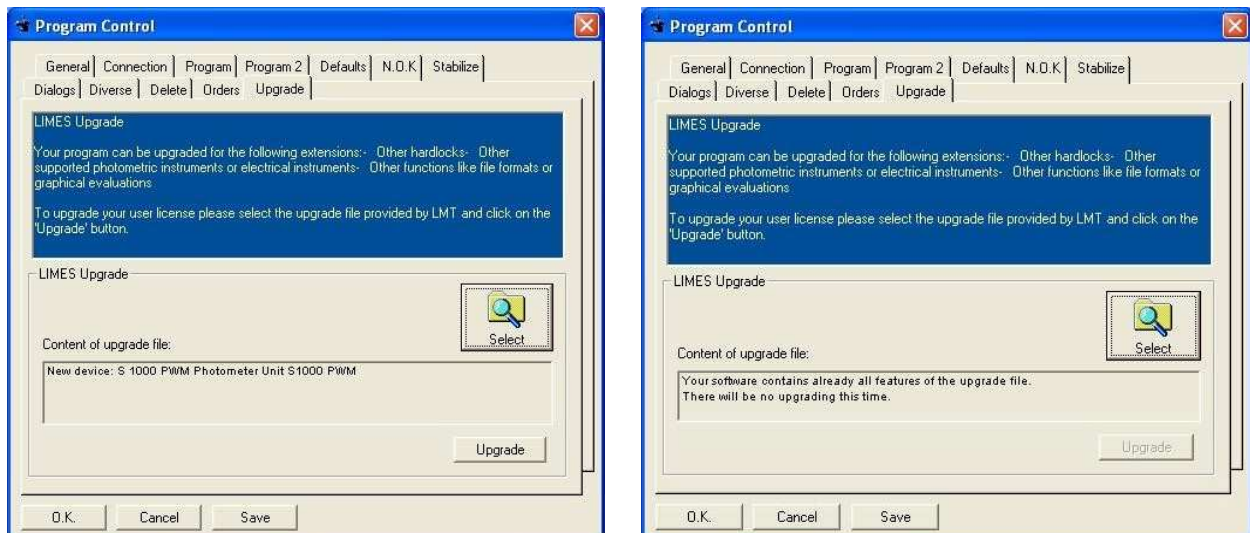
After successful upgrading, it is necessary to shut down and re-start LIMES.

In case of a license extension or activation of test program databases, no further actions are necessary.

If new hardware was added to the configuration, i.e. to the user database (.udb), the new hardware needs to be activated.

This can be done within the LIMES 2000 main menu via Options/Hardware. Please refer to the LMT application note "LIMES Software Upgrade with LIMES Modules".

2.2   Opening an encrypted program database

Licensed databases are compressed files which have been encrypted. However, they are opened in a similar way like databases which are freely accessible.
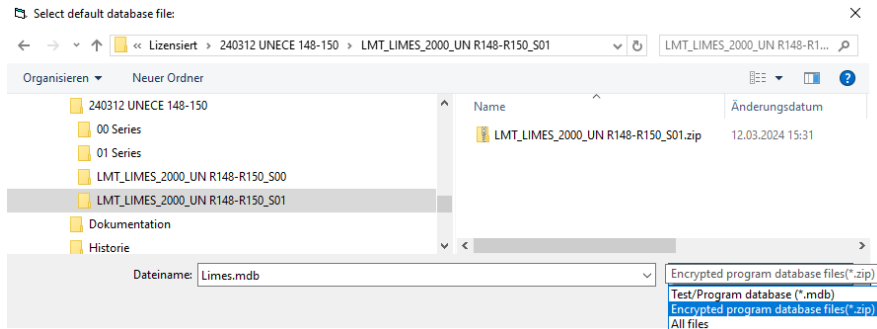
Use the Program open menu entry or simply press the corresponding icon to select a database.

A dialogue window opens in which the folder to the new database must be specified.
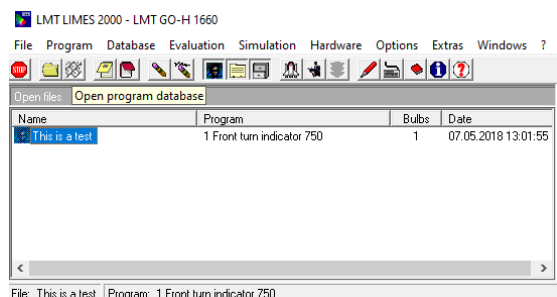
Choose tile type encrypted database(*.zip) to select the correct database type.

Once the encrypted database file has been selected, it is available in the database list (see right hand-side). The blue colour indicates that database attributes are read-only, i.e. programs inside cannot be accidently changed.

Choose the database and pick the required measurement program (left picture below).

Group filter may be chosen to select reduce the selection to the required application, for instance passing beam like in the picture on the right-hand side below.
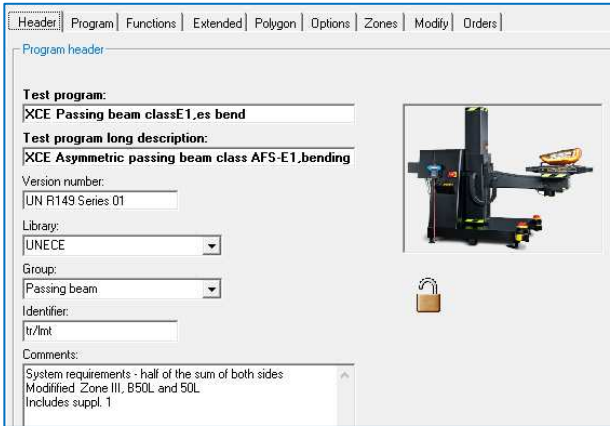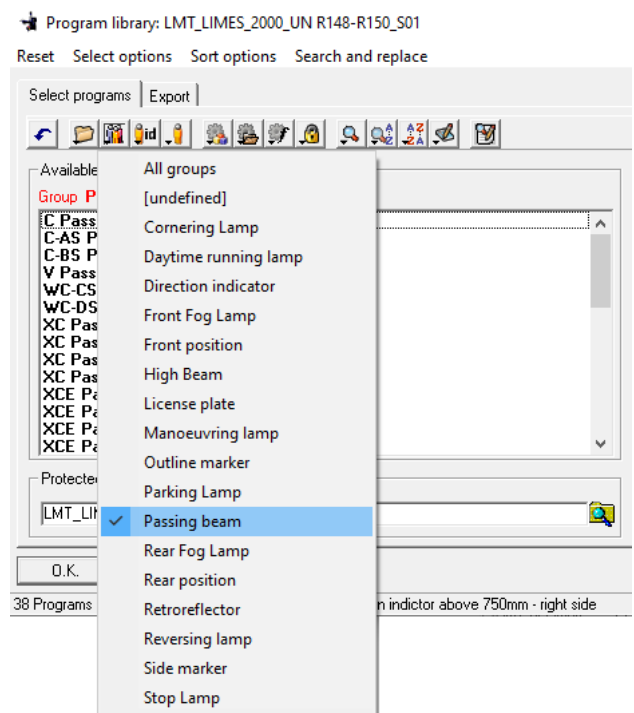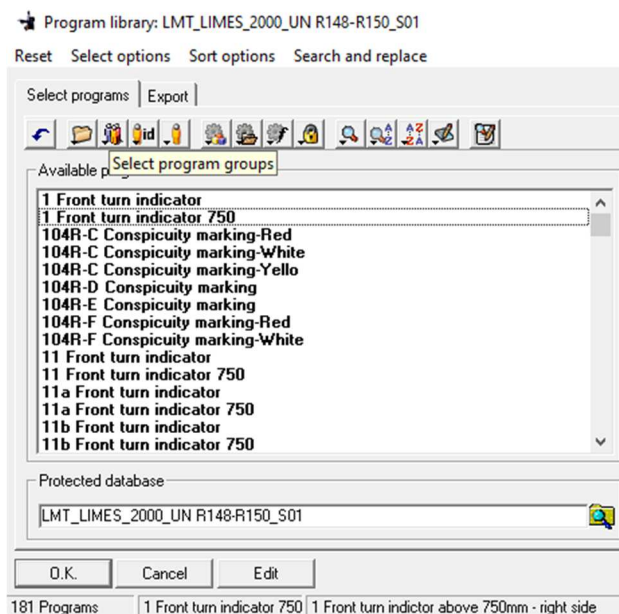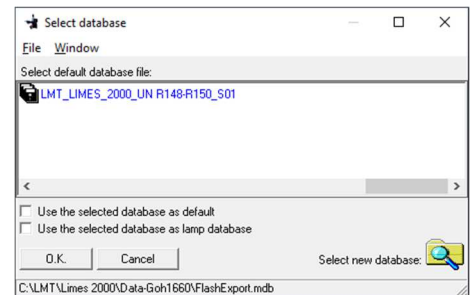
3 Nomenclature

This chapter explains the nomenclature of test program naming and description.

It shall support the user to choose the correct test program when setting up a measurement for the device under test (DUT).

The screen shot on the right-hand side shows as an example the meta-data of a typical test program. The individual entries are described below in more detail.

- The name of test program starts with the individual symbol identifying the lighting function as given in the corresponding regulation for which type approval shall be tested.
  Examples are for instance XCE, F3, RL, S1, IIIB, etc.
- The long description of the test program contains detailed information about the specific class of the device under test.
- The version number describes the specific regulation(s) including its series of amendments.
- The library specifies the individual ambit, e.g. UNECE
- Group contains the description of the lighting function, e.g. passing beam
- Identifier names the maker or origin of the test program
- Comments contain addition information of the specific test program, for instance the supplements that have been considered.

4 Keywords

4.1 Road illumination devices

Several passing beam classes, driving beam classes and front fog lamps may be approved as Matched Pairs (MP). A component declared as part of a matched pair may have reduced limits in some requirements, for instance in 50L. In this case, the corresponding test programs have the keyword MP in the description, at least in the long version and the program is intended for testing a contributor of a matched pair.

In case MP is not mentioned, the test program is intended to test a System for which the requirements are usually expressed as *"half of the sum of both sides"*. This calculation may be executed within Limes 2000 using the AFS evaluation.

Devices contributing to an AFS system (classes X…, Y…) are already by definition defined as a matched pair, however, in this case, reduced requirements are usually given for "each *side*" (ES). Consequently, the corresponding test programs have the keyword ES in their description.

4.2 Light signalling devices

Most light signalling devices are all regulated be the same photometric grid. Only the min and max values change depending on the lighting function.

Version: 2020-12-22

Usage of LMT-defined
test programs

LMT®

Page **5** of **7**

LMT LICHTMESSTECHNIK GMBH BERLIN

However, visibility requirements differ in dependence of the mounting height (H-plane below or above 750mm) and mounting position (front/rear or left/right side of the vehicle). The latter influences the inboard and outboard angles, which define visibility.

The following rules apply:

- All test programs are written for the right-hand side of the vehicle.
  If the device is mounted on the left-hand side, this must be specified in the test data of the measurement to mirror the program. See chapter 5.3 below for details.
- If mounting height is not explicitly specified, the program is written for devices with the H-plane below 750 mm.
- If 750 mm is mentioned in the program name or in the long description, the program applies for devices which are mounted with the H-plane above 750 mm.
- If 2100 mm is mentioned in the program name or in the long description, the program applies for devices which are mounted with the H-plane above 2100 mm.

5   Symmetry

In order to reduce the number of test programs, mirror options have implemented into Limes 2000. However, in the past only the angular definition of horizontal scans was mirrored. With Limes 2000 revision 1305 all other measurement commands, e.g. points, vertical scans and zones are properly mirrored.

In addition, re-aim is executed at the mirrored point and visual aiming may be mirrored, if this is properly configured in the description of the test measurement.
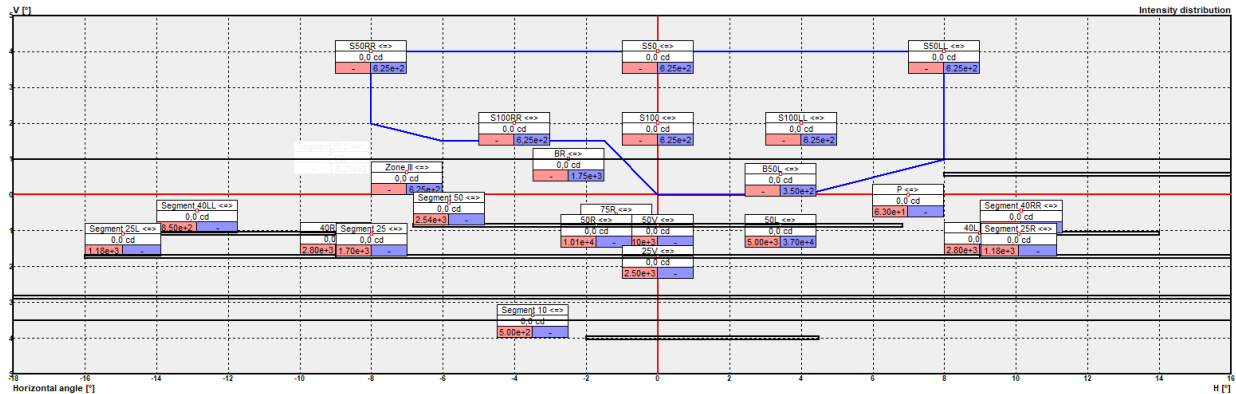
5.1   Road illumination devices (RID)

All test programs for front lighting are written for right-hand (RH) traffic only. In order to avoid writing test programs explicitly for left hand traffic, lighting functions with an asymmetric illumination pattern, e.g. asymmetric passing beams, may be mirrored by Limes 2000. for left-hand traffic

In this case, in the data tab, left-hand traffic must be checked and in addition, the operator must actively choose the program to be mirrored (see screenshot on the right-hand side).
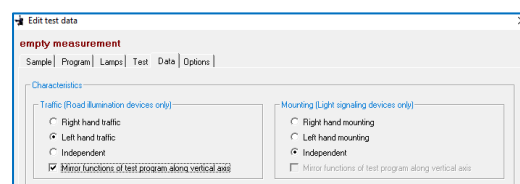
If this option is chosen, Limes 2000 will mirror all point positions, lines scans, zones, and polygons along the vertical axis. In the example below it is demonstrated, how a test program written for a class C passing beam is mirrored for left hand traffic.

Version: 2020-12-22

Usage of LMT-defined
test programs

LMT®

LMT LICHTMESSTECHNIK GMBH BERLIN

Page **6** of **7**

At the end of all command descriptions, the icon ⇔, is added to inform the user, that the horizontal angles have been inverted. For instance, the point 75R below is now located at the position of 75L and described as 75R <=>.

In the header of the test report, the word (mirrored) is attached to the end of the test program name, and all command descriptions will be extended at the end with ⇔.

5.2 Symmetric patterns

Lighting functions like for instance front fog lamps, have been defined in in the past purely symmetric, but the requirements have been relaxed for matched pairs (YF3), thus leading again to asymmetric features, for instance regarding lines 6 and 7. Therefore, mirroring of test programs has been introduced as well with regard to the mounting position of devices, which allows to define test programs only for the right side of the car (see chapter 5.3 below).

The example in the picture below shows the test program of a front fog lamp being part of a matched pair, which is mounted on the left side of the car. i.e. lines 6 and 7 are measured from 10° outboard to 5° inboard only.
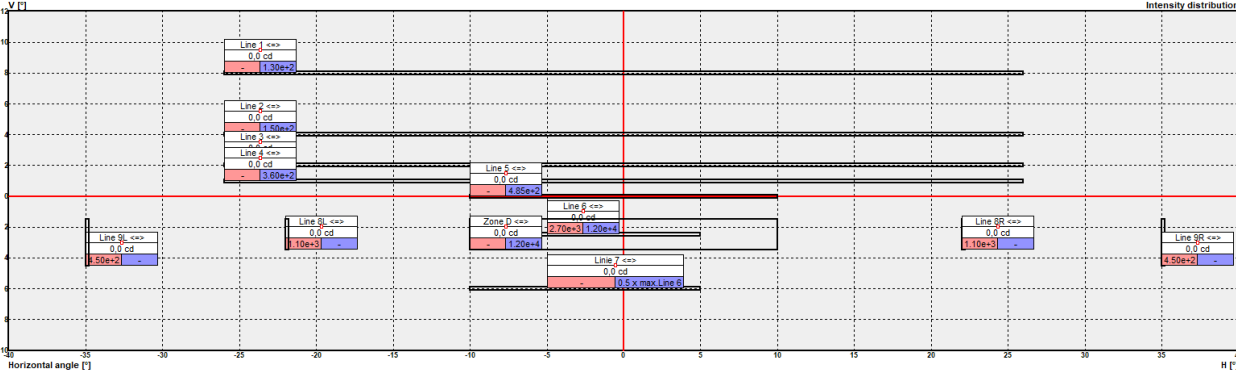

5.3 Light signalling devices (LSD)

Although the photometric grid of light signalling devices is based on a symmetric pattern, the angles for testing photometric visibility are defined with regard to outbound and inbound directions, thus leading again to asymmetric features. This does not apply to requirements for singular devices, e.g. in the case of category L vehicles (two-wheelers) unless they are marked as patched pairs (category starting with Y…).

Therefore, all test programs for light signalling devices have been defined for right side mounting. The option to mirror is given in a similar manner than for road illumination devices.

If a device is intended to be mounted on the left side of the vehicle, the data tab in the test data must be used again to mirror the test program along the V-plane (see screenshot above).
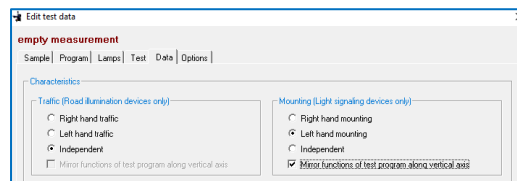
The example below shows the program grid of a front turn indicator with the H-plane less than 750 mm above the ground. It was initially defined for mounting on the right-hand side but has now been mirrored for devices to be mounted on the left-hand side of the vehicle.
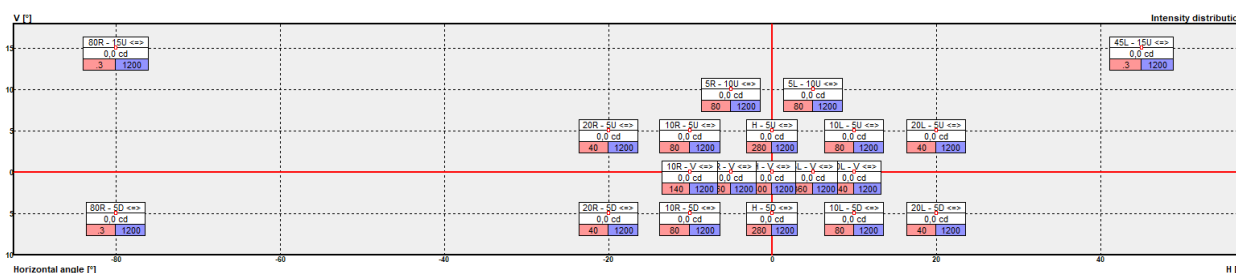
6   Disclaimer

The test programs provided by LMT have been set up based on the latest version of the corresponding UN regulations (as of 02/2024 this is suppl. 1 of the 01 series of amendments).

However, although the test programs have been scripted to the best of our knowledge, the regulatory framework always offers room for interpretation. In addition, typing errors are usually unavoidable.

Therefore, end users are always obligated to check the consistency of the test programs. LMT will correct obvious errors as soon as possible, but cannot be made responsible for any harm, which may be due to typing errors or which are created based on wrong applications of the test programs as provided by LMT.