

# Instruction manual of lite version of the program "Multilingual local instrumental system of transportation optimization, version 1.6" (LVP MLIS TO 1.6)

## Installing LVP MLIS TO 1.6

1. Copy to a separate folder of your computer disk space a set of files of LVP MLIS TO 1.6.
2. Check the composition of this set, which should include the following files:
  - boot file **Lite\_MLIS\_TO.exe** of the program;
  - boot file **GLS.exe** of the utility program of version 1.0 under the name "**Генератор языковых оболочек (ГЯО 1.0)** (Generator of language shells (GLS 1.0))", which allows to create language shells for LVP MLIS TO 1.6 interface;
  - contents of the folder **Data** — data files with extension "dat" for several already solved demonstration tasks, next to which will be placed data files for tasks to be solved by the user;

### *Note*

The installation set of LVP MLIS TO 1.6 includes *ten* demonstration tasks, not available for removal, which are presented in two options: *Russian* ("DEMR11", "DEMR12", "DEMR13", "DEMR21", "DEMR22", "DEMR23", "DEMR24", "DEMR31", "DEMR32", "DEMR33") and *English* ("DEME11", "DEME12", "DEME13", "DEME21", "DEME22", "DEME23", "DEME24", "DEMR31", "DEMR32", "DEMR33"). Input and output data of these tasks you can look through on the screen, as well as bring out to Excel-files or print.

- contents of the folder **Dbrn** — files of databases of roads networks (DBRNs), which are of the following five types: 1) system-defined ordinary (sys1), not available for editing by the user and without information about houses of the city; 2) system-defined extended (sys2), not available for editing by the user and with the information about houses; 3) user-defined ordinary (use1), available for editing by the user and without the information about houses; 4) user-defined extended (use2), available for editing by the user and with the information about houses; 5) client additions to the system-defined ones (cli2), not available for editing by the user and containing only streets names and houses numbers. A file of DBRN of any type has the following name: **<three-digit digital database code><four-digit code of database type>\_dbrn\_<three-digit code of language of the current program shell .dat;**

### **Note**

The main purpose of DBRN of the type of client addition to a system-defined extended one is to remotely solve tasks on transportation optimization using the multinational network instrumentation system (MNIS) TO 1.6, in which the initial DBRN of the system-defined extended type is not available for network users. It is located on the server containing the remote optimization module of MNIS (without it, such tasks could not be solved). In LVP MLIS TO 1.6, client additions can also be used when the one local LVP MLIS user has only a client addition, while the other has the initial DBRN of the system-defined extended type. In this case, the preparation of the input data of tasks and viewing the results of their solution is done on a computer of first such user, and their solving — on a computer of second user.

### **Note**

The installation set of LVP MLIS TO 1.6 includes files of five test DBRNs of various types: 1) a small database of the user-defined ordinary type (a file **001use1....dat**), 2) a large database of the user-defined ordinary type (a file **002use1....dat**), 3) a small database of the user-defined extended type (a file **003use2....dat**), 4) a small database of the system-defined extended type (a file **333sys2....dat**) and 5) a small database of the type of a client addition to a system-defined extended one (a file **333cli2....dat**). The small databases were created from the Russian-language roads network map containing 20 streets, 100 nodes and 360 transit sections (a file **KCД\_use001\_rus.pdf**), and the large one — from the Russian-language map, containing 460 streets, 2116 nodes and 8280 transit sections (a file **KCД\_use002\_rus.pdf**), *see below*. All of them are presented in two options: *Russian* and *English*. Available for work is such group of these files which language is the same as the program interface language you have selected.

- contents of the folder **Documents of DBRN developer**:
  - files in the subfolder **rus**:
    - **KCД\_use001\_rus.pdf** and **KCД\_use002\_rus.pdf** — Russian-language maps of roads networks, on the basis of which were created five test DBRNs of various typed (*see above*), attached to the installation set of the program;
  - files in the subfolder **eng**: absent;
- contents of the folder **Excel documents** — files of table format Excel (with extension ".xls"), which, depending on their purpose, are distributed over the following two subfolders:
  - **Databases** — contains in nested folders **Rus** and **Eng** the files of databases of roads networks;
  - **Tasks** — contains in nested folders **Rus** and **Eng** the files of input and output data of any existing tasks, as well as files of output data of solved tasks;

### **Note**

The installation set of LVP MLIS TO 1.6 includes Excel-files with input data of four test databases of roads networks (folder **Database**), as well as with input data of ten demonstration tasks (folder **Tasks**) in Russian and English options. These files you can not only view or edit in Microsoft Excel, but import to LVP MLIS when creating new DBRNs and tasks.

- contents of the folder **Shells** — files of language shells for the current program interface;

### *Note*

The installation set of LVP MLIS TO 1.6 includes two files of shells for Russian and English languages: **Shell (TO 1.6).rus** and **Shell (TO 1.6).eng**.

- contents of the folder **Solving** — in this initially empty folder temporarily are placed data files for the tasks which are in the stage of solving;
  - contents of the folder **System**:
    - **info** — a text file containing three main parameters of the used computer: processor type, clock rate and the volume of operative memory;;
    - **Languages.txt** — a text file containing a list of possible language shells for the interface of this program;
    - **Programs.txt** — a text file containing names of those programs (including this one), for which may be created language shells by using the utility program ГЯО 1.0 (GLS 1.0);
    - **protocol.pro** — file of a protocol of tasks, being solved by the user, which holds general information about all existing tasks and their current state;
  - contents of the folder **User documents**:
    - files of three Russian-language documents in the subfolder **rus**:
      - **Инструкция по эксплуатации ГЯО 1.0.pdf**;
      - **Инструкция по эксплуатации ОБП МЛИС ОТП 1.6.pdf**;
      - **Технические характеристики МЛИС-МСИС ОТП 1.6.pdf**;
    - files of three English-language documents in the subfolder **eng**:
      - **Instruction manual of GLS 1.0.pdf**;
      - **Instruction manual of LVP MLIS TO 1.6.pdf** — file of this manual;
      - **Technical characteristics of MLIS-MNIS TO 1.6.pdf**.
3. For ease of launching the program LVP MLIS TO 1.6, create a shortcut for its file **Lite\_MLIS\_TO.exe**, and place it on the desktop of your computer.

## Run the program in operation

1. Click on the boot file **Lite\_MLIS\_TO.exe** of the program or on its label. At that happens the following:
  - in the absence in the folder **Shells** of any language shells files appears on the screen a warning message that the work in the program LVP MLIS TO 1.6 for this reason is impossible and it emergency closes;

- in the presence in this folder of only one language shell file is launched the program, which interface is presented by the language of this shell;
  - in the presence there of two or more files of language shells happens transition to the next instruction item.
2. On the screen opens the window of the program LVP MLIS TO 1.6 without any records of its interface, and in its center appears a small dialog under the name **Selection of program interface language**. From the drop-down list of this dialog select desired language of program interface and click the button **OK**. At that, the dialog closes and in the program window, which becomes available to work, appear necessary records in language that you just selected. In the same language will be output any text entries in all dialogs of the program, as well as all information provided in it.

## Operations with tasks

### Creating a new task with unique parameters

If input parameters of a new task of transportation optimization will differ significantly from similar parameters of any existing task, do the following:

1. Choose the command **Input of tasks**⇒**Input of a new task**, opening the dialog **Input of task data (step 1)**, wherein do the following:
  - enter a six-digit cipher of the new task, which may include Latin characters and digits (first field of the dialog);
  - enter a name of this task (second field);
  - choose the required database of roads network (drop-down list).

#### *Note*

The further order of setting parameters of the task depends on the type of the selected DBRN. There are two possible options for subsequent setting of the parameters, each of which is realized when the corresponding condition is fulfilled (*see below*).

### Condition of choosing DBRN of system-defined or user-defined ordinary type (a key phrase in the database name — "sys1" or "use1")

2. Click in the current dialog the button **Forth**, passing to the dialog **Input of task data (step 2 of 5)**, in which specify the following parameters:
  - number of target points (TPs), between which a transport vehicle (TV) will move (first field);
  - a number of the initial target point for TV (second field);
  - if necessary, a number of the final target point for TV (third field);
  - units of measurement for cost (drop-down list);
  - fine for 1 km of TV running (fourth field);

- fine for 1 hour of TV stay in transit (fifth field);
  - speed of driving up of TV to TP or of driving off from it (sixth field);
  - possible mode of allowability of refusals in servicing TPs (first-top group of 2 switches);
  - possible time factor when servicing TPs (second group of 2 switches);
  - possible factor of TV holding capacity or cargo capacity (third group of 3 switches);
  - option of specifying the order of passing by TV via some TPs (fourth group of 4 switches);
  - when choosing a factor of TV holding capacity or cargo capacity:
    - a value of TV holding/cargo capacity (seventh field);
    - a possible mode of TV return to the initial TP to get the remaining cargos (fifth group of 2 switches);
  - when choosing the option 3 of setting the order of the TV passing (by assigning priorities of passing via TPs) — number of such priorities (bottom field).
3. Click in the current dialog the button **Forth**, passing to the dialog **Input of task data (step 3 of 5)**, wherein set the first group of parameters of the target points, which include:
- TP address:
    - street type shortly (first drop-down list and second field of the table);
    - street name (second drop-down list and third field of the table);
    - house number, which may be absent (fourth field of the table);
  - in the absence a factor of TV holding capacity or cargo capacity — duration of TP servicing (fifth field of the table);
  - in the presence of the above factor:
    - time of loading your cargo in TP (fifth field of the table);
    - time of unload your cargo (sixth field of the table);
  - fine for 1 hour wait of servicing TP (seventh field of the table);
  - when choosing the option 1 of setting the order of passing by TV via some TPs — number of a TP, passable next after a current TP (eighth field of the table);
  - when choosing the option 2 of setting the above order: number of a TP, passable after a current TP (eighth field of the table);
  - when choosing the option 3 of setting the above order — priority of passing via TP (eighth field of the table).
4. Click in the current dialog the button **Forth**. At that happens the following:

- If you have previously chosen the mode of allowability of refusals in servicing and/or the time factor when servicing TPs, then will open the first additional dialog **Input of task data (step 3a of 5)**. Specify in it the following parameters for each TP:
  - a sign of allowability of a refusal in its servicing (a key <SpaceBar> and third field of the table);
  - if there is a factor of holding/cargo capacity: volume or weight of a cargo for TP (fourth field of the table);
  - income from servicing TP (fifth field of the table);
  - lower and upper thresholds of the time window on its servicing TP (sixth and seventh fields of the table);
  - threshold of number of being serviced TPs, including the initial one (three switches and two fields below the table);
  - duration of increment (bottom field of the dialog).

After that, press the button **Forth**, going to the next dialog.

- If at least for one target point that you have specified has not been indicated a number of its house or this TP is located on the transit section (TS) with non-standard numbering of houses (*see a command **Help** ⇒ **Notations and explanations***), then will open the second additional dialog **Input of task data (step 3b of 5)**. Choose in it those TSs on which should be the indicated TPs (ninth field of the table), after press the button **Forth**, passing to the dialog **Input of task data (step 4 of 5)** (*see below*).
  - Specify in the above dialog the second group of parameters for the target points, which include:
    - length of the section between the beginning of the current transit segment or the beginning of the corresponding reverse transit section (RTS) and TP (second-right field of the table);
    - speed of moving TV on the section (first-right field of the table).
5. Click in the current dialog the button **Forth**, passing to the dialog **Input of task data (step 5 of 5)**, wherein set the third group of parameters of the target points, which include:
- length of the section between a TP and transition points from it (second-right field of the table);
  - speed of moving TV on this section (first-right field of the table);
6. Click in the current dialog the button **Forth**, passing to the dialog **Input of the task data**. Look through in it the main input data of the task and if you are not satisfied by them, then using the button **Back** go to the desired previous dialog and make there necessary correction of the tasks input data. Otherwise, do one of two things:

- at selected by default the switch **later** (it is at the bottom right) click the button **Ready**, causing the program to form two files in the folder **Data**: a common file of the task (**to\_<six-digit task cipher>.dat**) and its input file (**to\_<task cipher>\_in.dat**).
- select the switch **at once** (bottom left) and click the button **Ready**, causing this task to be solved at once without using stipulated for this aim the next commands: **Control**⇒**Work with a task protocol** and **Solving of tasks**⇒**Execution of optimization**.

**Condition of choosing DBRN of system-defined or user-defined extended type, or of a type of client addition to system extended one (a key phrase in the database name — "sys2", "use2" or "cli2")**

2. Click in the current dialog the button **Forth**, passing to the dialog **Input of task data (step 2 of 3)**, in which specify the following parameters:
  - number of target points, between which a transport vehicle will move (first field);
  - a number of the initial target point for TV (second field);
  - if necessary, a number of the final target point for TV (third field);
  - units of measurement for cost (drop-down list);
  - fine for 1 km of TV running (fourth field);
  - fine for 1 hour of TV stay in transit (fifth field);
  - speed of driving up of TV to TP or of driving off from it (sixth field);
  - possible mode of allowability of refusals in servicing TPs (first-top group of 2 switches);
  - possible time factor when servicing TPs (second group of 2 switches);
  - possible factor of TV holding capacity or cargo capacity (third group of 3 switches);
  - option of specifying the order of passing by TV via some TPs (fourth group of 4 switches);
  - when choosing a factor of TV holding capacity or cargo capacity:
    - a value of TV holding/cargo capacity (seventh field);
    - a possible mode of TV return to the initial TP to get the remaining cargos (fifth group of 2 switches);
  - when choosing the option 3 of setting the order of the TV passing (by assigning priorities of passing via TPs) — number of such priorities (bottom field).
3. Click in the current dialog the button **Forth**, passing to the dialog **Input of task data (step 3 of 3)**, wherein set the first group of parameters of the target points, which include:
  - TP address:

- street type shortly (first drop-down list and second field of the table);
  - street name (second drop-down list and third field of the table);
  - house number, which may be absent (third drop-down list and fourth field of the table);
- in the absence a factor of TV holding capacity or cargo capacity — duration of TP servicing (fifth field of the table);
  - in the presence of the above factor:
    - time of loading your cargo in TP (fifth field of the table);
    - time of unload your cargo (sixth field of the table);
  - fine for 1 hour wait of servicing TP (seventh field of the table);
  - when choosing the option 1 of setting the order of passing by TV via some TPs — number of a TP, passable next after a current TP (eighth field of the table);
  - when choosing the option 2 of setting the above order: number of a TP, passable after a current TP (eighth field of the table);
  - when choosing the option 3 of setting the above order — priority of passing via TP (eighth field of the table).
4. Click in the current dialog the button **Forth**. At that happens the following:
- If you have previously chosen the mode of allowability of refusals in servicing and/or the time factor when servicing TPs, then will open the first additional dialog **Input of task data (step 3a of 3)**. Specify in it the following parameters for each TP:
    - a sign of allowability of a refusal in its servicing (a key <SpaceBar> and third field of the table);
    - if there is a factor of holding/cargo capacity: volume or weight of a cargo for TP (fourth field of the table);
    - income from servicing TP (fifth field of the table);
    - lower and upper thresholds of the time window on its servicing TP (sixth and seventh fields of the table);
    - threshold of number of being serviced TPs, including the initial one (three switches and two fields below the table);
    - duration of increment (bottom field of the dialog).
- After that, press the button **Forth**, going to the next dialog.
- Look through in the above dialog the main input data of the task and if you are not satisfied by them, then using the button **Back** go to the desired previous dialog and make there necessary correction of the tasks input data. Otherwise, do one of two things:

- at selected by default the switch **later** (it is at the bottom right) click the button **Ready**, causing the program to form two files in the folder **Data**: a common file of the task (**to\_<six-digit task cipher>.dat**) and its input file (**to\_<task cipher>\_in.dat**).
- select the switch **at once** (bottom left) and click the button **Ready**, causing this task to be solved at once without using stipulated for this aim the next commands: **Control⇒Work with a task protocol** and **Solving of tasks⇒Execution of optimization**.

## Creating a new task with repetitive parameters

If the input parameters of the new task will be almost the same as in some existing task, do the following:

1. Choose the command **Input of tasks⇒Input of a new task by data import**, opening the dialog **Input of task data (step 1)**, wherein do the following:
  - enter a six-digit cipher of the new task (first field of the dialog);
  - enter a name of this task (second field);
  - select format of a being imported file which contains input data of another task: own format of the program (left switch **DAT** at the bottom) or standard format Excel (right switch **XLS** at the bottom);

### *Note*

Mode of import into a new task of input data of another task, been stored in Excel-file, was introduced due to the fact that the program has a mode of export input data of existing tasks into files of Excel type (command **Export of task data to Excel-table** of menu **Output of tasks**).

- when selecting the switch **DAT** do the following:
    - select in the second drop-down list the existing task, input data of which should be copied to the current task;
    - click the button **Import**, at that in the first drop-down list will display appears a name of the DBRN being used in this existing task;
  - when selecting the switch **XLS** do the following:
    - click the button **Import the Excel-file**;
    - in the opened dialog **Open** select on the disk the required file (with extension ".xls"), and click on the button of the same name.
  - if you need, select a different DBRN than the one used in the imported existing task (first list).
2. Moving with the button **Forth** from the current dialog to a next one, look through in all dialogs the input data of a current task and make necessary changes in them (*see above Sec. "Creating a new task with unique parameters"*).

3. Click the button **Ready** in the last dialog. At that, in the folder **Data** will be created two files of the task: general and input ones.

## Correction of task input data

This operation can be performed in two ways:

- during the operation to create a new task (*see above*);
- by using the command **Input of tasks**⇒**Correction of input data of unsolved task**, that is available for use to such unsolved tasks, which input files have not been copied to the folder **Solving** for their solution (selection of a task to correct its input is made in the dialog **List of correctable tasks**, which opens on the screen when executing this command).

## Uploading a file with input data of a new task

After creating a new task, you need to copy its input file (with input data of the task) to the folder **Solving** for its subsequent solution (*see below*). This operation is executed in the following order:

### *Note*

After completing the operation in question concerning to some unsolved task you can not correct its input data.

1. Choose the command **Control**⇒**Work with a task protocol**, opening the dialog **Protocol of tasks**.
2. Select in the dialog upper list the required task, for which the operation in question was not fulfilled (this is indicated by the record "A stage of data input" in line "Task state" of the protocol table).
3. Click the button **Upload the file of task input data**, which in this case becomes unlocked. At that happens the following:
  - in the folder **Solving** appears a duplicate of the input file of current task;
  - in line "Task state" of the protocol table appears record "Waiting for solution";
  - the button **Upload the file of task input data** becomes locked.

## Solving tasks

Operation of solving tasks, which input files are placed in the folder **Solving**, is performed in the following order:

1. Choose the command **Solving of tasks**⇒**Execution of optimization**, opening the dialog **Optimization module of MLIS TO 1.6**.
2. Set the required mode of processing: *batch* (for solving all group of tasks) or *individual* (for solving only one task), and then click the button **Next**.

3. When working in batch mode, do the following:
  - if necessary, adjust specified parameters of optimization, and then click the button **Next**;
  - click the button **START** at the bottom, resulting in a process of successive solving the tasks of this group, when a name of this button changes to **WORK**;
  - after this button again be called **START**, which indicates the completion of solving the entire group of tasks, close the dialog **Optimization module of MLIS TO 1.6** by clicking the button **EXIT** (bottom right).
4. When working in individual mode, do the following:
  - type in the dialog field a six-digit cipher of a solvable task and click the button **Next**;
  - if necessary, adjust the parameters of optimization scheme, and then click the button **Next**;
  - click the button **START** at the bottom, resulting in a process of solving selected task, when a name of this button changes to **WORK**;
  - after this button again be called **START**, which indicates the completion of solving the current task, close the dialog **Optimization module of MLIS TO 1.6** (button **EXIT**).

## Connecting a file with task solving results

After performing the operation of solving the tasks you should transfer files with the result of their solution (**to\_<task cipher>\_out.dat**) from the folder **Solving** to the folder **Data**. This operation performs in the following order:

### *Note*

After performing this operation concerning some solved task it is impossible its repeated processing. That may be required, in particular, in case of absence of its successful solution due to wrong choice of values of the optimization schemes parameters.

1. Choose the command **Control⇒Work with a task protocol**, opening the dialog **Protocol of tasks**.
2. Select in the upper dialog list the required task, which input file was copied to the folder **Solving** (this is indicated by the record "Waiting for solution" in line "Task state" of the protocol table).
3. Click the button **Load the file of task solving results**, which in this case becomes unlocked. At that happens the following:
  - input file of the current task is removed from the folder **Solving**, and its output file is moved from this folder to the folder **Data**;
  - in line "Task state" of the protocol table appears record "Task is solved";
  - the button **Load the file of task solving results** becomes locked.

## Working with a tasks protocol

A protocol of tasks contains general information about existing tasks of transportation optimization, being solved by LVP MLIS TO 1.6 (these data are stored in the file **protocol.pro** placed in the folder **System**). On the screen displays in tabular form such part of the protocol, which refers to a user-selected task. It contains the following formation:

- cipher and name of this task;
- current state of the task, which can be one of three: "A stage of data input", "Waiting for solution" or "Task is solved";
- dates and times of occurrence for the four different event.

Transition to the mode of work with a tasks protocol is performed by the command **Control⇒Work with a task protocol**, which opens the dialog **Protocol of tasks**. In this dialog, the following operations can be performed:

- viewing general information about the existing tasks;
- upload the input file a new task, that contains its input data (*see above*);
- connecting the output file of the task containing the results of its solution (*see above*);
- removal of those tasks that are no longer necessary for the user (button **Delete the task**).

## Output of task input data

Input data for any existing task of transportation optimization may be brought out to the screen, Excel-file and print. This operation is performed in the following order:

1. Choose the command **Output of tasks⇒Viewing input data of any task**.
2. In the opened dialog **List of all tasks** select the desired task and click the button **OK**. At that, the current dialog is closed and opens the window **Viewing input data of the task "<task name>"** with tabular input data of the task chosen by you, which can be looked through.
3. To bring out these data to a new Excel document, choose the command **Export of task data to Excel-table** of menu **Output of tasks**, to print them — the command **Print the task data** of the same menu.

## Output of task solving results

Output data for any solved task of transportation optimization may be brought out to screen, Excel-file and print. This operation is performed in the following order:

1. Choose the command **Output of tasks ⇒Viewing output data of solved task**.
2. In the opened dialog **List of solved tasks** select the required task and click the button **OK**, closing this dialog. At that, opens the window **Viewing solution result of the task "<task name>"** with tabular output data of the task, which can be viewed.

3. To bring out these data to a new Excel document, choose the command **Export of task data to Excel-table** of menu **Output of tasks**, to print them — the command **Printing the task data** of the same menu.

## Operations with databases of roads networks

### Creating a new DBRN with unique parameters

If in no existing database of roads network was used that map of roads network, on the basis of which a new DBRN will be created, perform the following actions:

1. Choose the command **Work with databases of roads networks**⇒**Creating a new DBRN**, opening the dialog **Creating a database of roads network (step 1 of 6)**, wherein do the following:
  - enter a three-digit digital code of the new DBRN (first field of the dialog);
  - specify a kind of the DBRN of user-defined type: ordinary or extended (two switches);
  - enter a name of this DBRN (second field).
2. Click in the current dialog the button **Forth**, passing to the dialog **Creating a database of roads network (step 2 of 6)**, in which specify the following parameters:
  - average speed of moving the transport vehicle along the roads network (top field of the dialog);
  - a list of possible types of streets, each element of which includes the following two parameters:
    - street type fully (second field of the table);
    - street type shortly (third field of the table).
3. Click in the current dialog the button **Forth**, passing to the dialog **Creating a database of roads network (step 3 of 6)**, wherein form a list of all types of streets being sequentially selected using the drop-down list and the two switches at the top. For each required street type, set the following parameters:
  - this type shortly (key <SpaceBar> and second field of the table);
  - street name (third field of the table);
  - for a DBRN of extended type — number of houses with street address (fourth field of the table).
4. Click in the current dialog the button **Forth**, passing to the dialog **Creating a database of roads network (step 4 of 6)**, wherein specify parameters of the transit sections of the road network (TS RN), which include:
  - TS name:
    - street type shortly (first drop-down list and second field of the table);

- street name (second drop-down list and third field of the table);
- house number (for DBRN of ordinary type) or number on a house plate (for database of extended type) at TS start (fourth field);
- the same at TS end (fifth field);
- for DBRN of ordinary type — a sign of non-standard house numbering (sixth field);
- TS coordinates:
  - number of the initial node of TS (seventh field);
  - number of the final node of TS (eighth field);
- TS parameters:
  - TS length (ninth field);
  - speed of passing TS (tenth field);
  - if necessary, a sign of TS temporary unavailability (eleventh field).

**Note**

Each entry in the table refers to a specific transit section of the roads network, the number of which is indicated in its first field. The program provides the possibility to add and delete entries of the table, as well as to copy contents of its separate cells through the Windows clipboard.

5. Click in the current dialog the button **Forth**, passing to the dialog **Creating a database of roads network (step 5 of 6)**, wherein specify the parameters of RN routing. These parameters include up to 10 node numbers wherein is possible transition from the end of each TS, as well as the directions of the corresponding transitions specified with the <SpaceBar> key.
6. Click in the current dialog the button **Forth**, passing to the dialog **Creating a database of roads network (step 6 of 6)**. Specify in this dialog, if necessary, parameters of availability of TS RN objects, which include:
  - a sign of unavailability of previous objects of the current TS to this object;
  - a sign of unavailability of all objects of the corresponding RTS to this object.
7. Click in the current dialog the button **Forth**, passing to the dialog **Creating a database of roads network**. Look through in it the main input data of the DBRN and if you are not satisfied by them, then using the button **Back** go to the desired previous dialog and make there necessary correction of the DBRN input data. Otherwise, press the button **Ready**, as a result of which the program will form in the folder **Dbrn** the file of DBRN of the user-defined type with the following name: <database code><use1 or use2>\_dbrn\_<code of the program language>.dat (ordinary or extended).

## Creating a new DBRN with repetitive parameters

If a new database of roads network will be based on the same map of roads network as some existing DBRN, follow these steps:

1. Choose the command **Work with databases of roads networks**⇒**Creating a new DBRN by data import**, opening the dialog **Creating a database of roads network (step 1 of 6)**, wherein do the following:
  - enter a three-digit digital code of the new DBRN (first field of the dialog);
  - specify a kind of the DBRN of user-defined type: ordinary or extended (two switches)
  - enter a name of this DBRN (second field).
  - select format of a being imported file of DBRN: own format of the program (left switch **DAT**) or standard format Excel (right switch **XLS**);

### *Note*

Mode of import into a new DBRN of contents of another DBRN, been stored in Excel-file, was introduced due to the fact that the program has a mode of export contents of existing DBRN into files of Excel type (command **Export of DBRN to Excel-table** of menu **Work with databases of roads networks**). In both these modes, the work is allowed only with DBRN having system-defined and user-defined types. At that, the extended varieties of such databases are stored in two Excel files, and not in one. The second one (with the additional "#" symbol in the name) contains information about the houses.

- when selecting the switch **DAT** do the following:
    - select in the first drop-down list the existing DBRN, contents of which should be copied to the current database;
    - click the button **Import**;
  - when selecting the switch **XLS** do the following:
    - click the button **Import the Excel-file**;
    - in the opened dialog **Open** select on the disk the required DBRN file (with extension 'xls'), and click the button of the same name.
2. Moving with the button **Forth** from the current dialog to a next one, look through in all five dialogs the data of a current DBRN and make necessary changes in them (*see above Sec. "Creating a new DBRN with unique parameters"*).
  3. Click the button **Ready** in the last dialog, whereby in the folder **Dbrn** will be created a file of the new DBRN of the user-defined type and the given language.

## Correction of DBRN input data

This operation can be run in two ways:

- in the process of performing the operation on creating a new DBRN (*see above*);

- with the command **Work with databases of roads networks⇒DBRN correction** (choice of DBRN for its correction is made in the dialog **List of correctable databases of roads networks**, which opens on the screen when executing this command).

### *Note*

The program LVP MLIS TO 1.6 allows to create and correct DBRNs of only use-defined types (ordinary and extended). This is due to the fact that for system-defined DBRNs is provided centralized development with the purpose of their subsequent mass distribution. As for databases of the type of client additions to system-defined extended ones, their correction is not provided, but creation is possible (*see below*).

## **Output of DBRN contents**

Contents of the selected DBRN can be brought out on the screen and in the Excel-file. In the first case is used the command **Viewing of DBRN** of menu **Work with databases of roads networks**, and in the second — the command **Export of DBRN to Excel-table** of the same menu. At that, the output on the screen is provided for any existing DBRN (with possible filtering its contents on a given key phrase), and in the Excel-file — only for a database of system-defined or user-defined type (export of a client addition is not provided here).

## **Creating a client addition to the DBRN of a system-defined extended type**

This operation is performed using the command **Work with databases of roads networks⇒Creating a client addition to system-defined DBRN**. When it is executed, a dialog opens with a list of existing databases of system-defined extended type, wherein you must select the database you need and click the button **OK**. As a result, a client addition file will be formed.

## **Removing DBRN**

Deleting any DBRN can be performed using the command **Deletion of DBRN** of menu **Work with databases of roads networks**.