

MH Corbin HDM Software
User's Manual
Version 9.2.8

PUBLISHED BY
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Visit our Internet pages at <http://www.mhcorbin.com/>

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1 Introduction

Welcome to MH Corbin HDM. This software is designed to be used with NC97, NC100, NC200 and NC300 portable traffic counters. HDM is used to:

- Program traffic counters to conduct traffic studies
- Read study results from traffic counters
- Analyze traffic study results
- Display traffic study results as reports and graphs
- Organize and manage traffic studies

1.1 System Requirements

- O/S (both 32 and 64 bit): Windows XP, Vista, 7, 8
- Processor: 900+ MHz
- Memory: Minimum 128MB
- Disk Space: 100 MB of free disk space for program installation. Additional space will be required for storing traffic studies.

1.2 Upgrading Software

When upgrading software, always back up existing catalogs (MDB files) containing your studies. New version of the software may need to make changes to the data files created by previous versions of the application. This can present a problem if you decide to go back to previous software version.

When upgrading or reinstalling HDM always uninstall your existing version before installing the new one.

NOTE: HDM 9 data files are **not** compatible with HDM 8 data files.

1.3 Scope

This manual describes functionality of the HDM software. Windows or PC specific functions such as setting the default printer, file management, using mapped drives are not addressed in this manual.

2 Getting Started

2.1 The Traffic Study Cycle

The traffic study cycle consists of a few steps that have to be taken to successfully conduct the traffic study. Those steps are:

- Charging the traffic counter.
- Using HDM software to program the study (see Device -> Program Study menu item below).
- Placing the counter on the roadway and letting it conduct the study.
- Using HDM software to read study data (see Device -> Read Study menu item below).
- Using HDM software to view/analyze study data using HDM reports.

2.2 MH Corbin Portable Traffic Counter Battery Life

When trying to communicate to the MH Corbin portable traffic counter it's very important to have the device with the sufficiently charged battery. Please connect the device to the charging cable and then to the mains power and charge it for a few hours before attempting to read the study. When programming the device it's very important to have the device fully charged. The charging cable for the NC300/200/100 devices provides LED (light emitting diode) feedback about charging status. When charging these type of counters make sure that the battery charger LED stays **Red** for sufficient amount of time. The **Green** LED simply means that the device is no longer accepting the electrical charge.

2.3 The HDM Application

HDM can be launched by clicking on its icon in the Windows Programs list (Start -> All Programs -> MH Corbin -> HDM). HDM main application window (see figure below) consists of application menu, Catalogs and Studies area and the status bar.

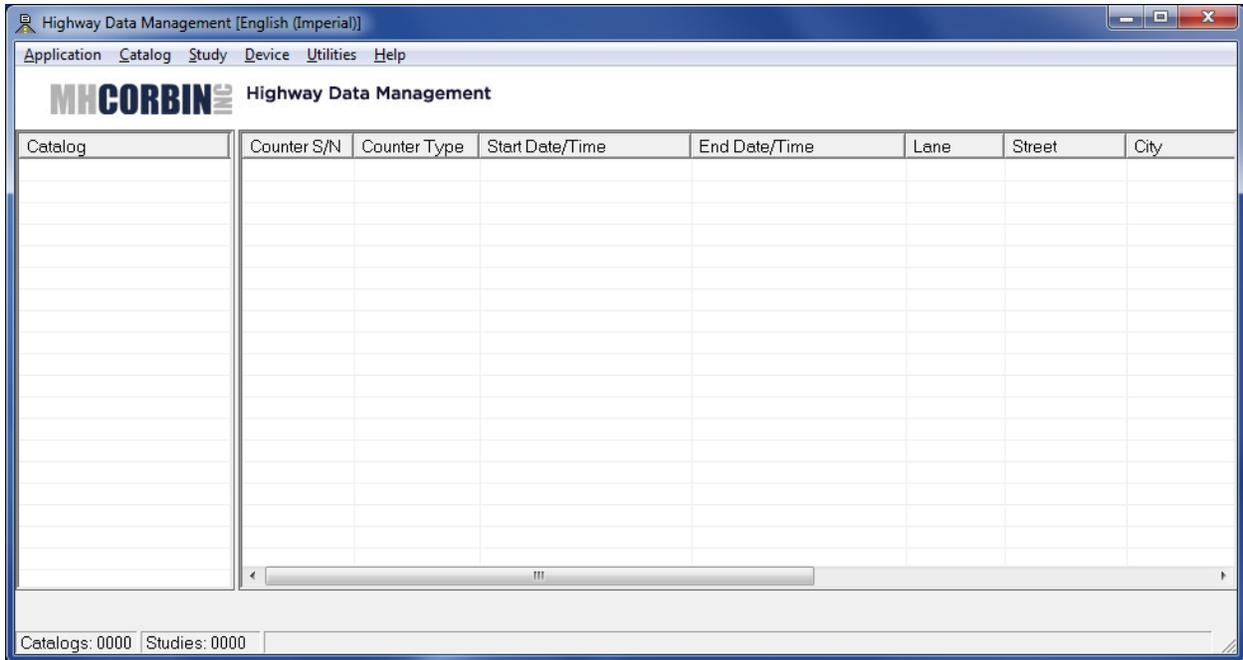


Figure 1: The HDM Main Window

The application's main menu contains the following entries: Application, Catalog, Study, Device, Utilities and Help. The Catalog and Study submenus can also be invoked as popup menus when user right-clicks in the Catalogs or Studies windows. Menu items in these menus get enabled or disabled depending on the contents and selection status in those windows.

Below the application's main menu there is Catalogs and Studies area. The window on the left hand side is called the Catalogs window. This window lists any currently opened catalogs (MDB database files) that contain roadway studies. The window on the right hand side is called the Studies window. This window lists all the studies contained within the selected catalog(s).

NOTE: You may have a number of catalogs listed in the Catalogs window but only the studies contained in the selected catalog(s) will be displayed in the Studies window.

The columns in Catalogs and Studies windows can be resized by dragging vertical dividers between column headers and repositioned (Studies window only) by dragging and dropping column header. The Catalogs and Studies windows can also be resized by dragging the vertical divider that is located between them. The positions of the vertical divider as well as column sizes and positions are saved to HDM configuration file (HDM.ini) between application sessions.

TIP: If you don't want to see certain fields in the Studies windows, move them to the right side of the window or size them down to nothing.

Catalog	Counter S/N	Counter Type	Start Date/Time	End Date/Time	Lane	Street	City
Sample.mdb	4113	NC97	Jul/29/1998 12:00:00 AM	Jul/30/1998 12:00:00 AM	Westbou...	U.S. Route 40	Centerville
	4689	NC97	Jul/29/1998 12:00:00 AM	Jul/30/1998 12:00:00 AM	Driving	U.S. Route 40	Grindstone
	857	NC200	Sep/16/2006 11:30:00 AM	Sep/16/2006 01:30:00 PM	Driving	U.S. Route 1...	Uniontown
	1101	NC200	Sep/14/2006 03:00:00 PM	Sep/14/2006 04:00:00 PM	Driving	U.S. Route 1...	Uniontown
	1134	NC200	Sep/15/2006 07:00:00 PM	Sep/16/2006 07:00:00 AM	Driving	Eds Diner	Uniontown
	120109	NC200	Jan/09/2006 02:30:00 PM	Jan/09/2006 03:30:00 PM	Driving	Route 70	Uniontown
	109	NC200	Jan/09/2006 02:30:00 PM	Jan/09/2006 03:30:00 PM	Driving	Route 70	Uniontown
	109	NC200	Jan/09/2006 02:30:00 PM	Jan/09/2006 03:30:00 PM	Driving	Route 70	Uniontown
	1673	NC200	Feb/03/2007 12:00:00 AM	Feb/09/2007 12:00:00 AM	West	Dunbar Road	Dunbar
	1831	NC200	Jan/28/2007 12:00:00 AM	Feb/01/2007 12:00:00 AM	East	Dunbar Road	Dunbar

Catalogs: 0001 | Studies: 0010

Figure 2: Catalogs and Studies

Figure above shows opened Sample catalog that comes with HDM. In order to open a catalog please select Catalog -> Open menu item, then navigate to the catalog (MDB) file and hit Open button. HDM Open Catalog dialog allows to open multiple selected catalogs as well. Every time some catalog is opened it will be added to the bottom of the catalogs list in the Catalogs window.

When traffic study is read from the traffic counter it is placed into the selected catalog. If multiple catalogs are selected the Device -> Read menu item will be disabled. The catalog is not limited to studies from a single traffic counter type. As can be seen in figure above the Sample catalog contains studies conducted by NC97 and NC200 portable traffic counters.

The list of studies in the Studies window can be sorted alphabetically by any column. In order to do so click on the specific column header. Clicking the same header second time reverses sort order.

When selected study is double-clicked (or Study -> View Reports/Graphs menu item is chosen) the reports/graphs window is displayed with the first report generated.

NOTE: The View Reports/Graphs menu item is disabled whenever multiple studies are selected.

The HDM status bar located at the very bottom of the main application window displays the number of opened catalogs (in this case 1) and the number of studies contained within the selected catalog(s) (in this case 10).

2.4 Configuration

HDM has a number of configuration pages that can be accessed via Application -> Properties menu. The most important of them are Communications and Localization.

The Communications page allows users to configure serial port settings for accessing portable traffic counters (see figure below).

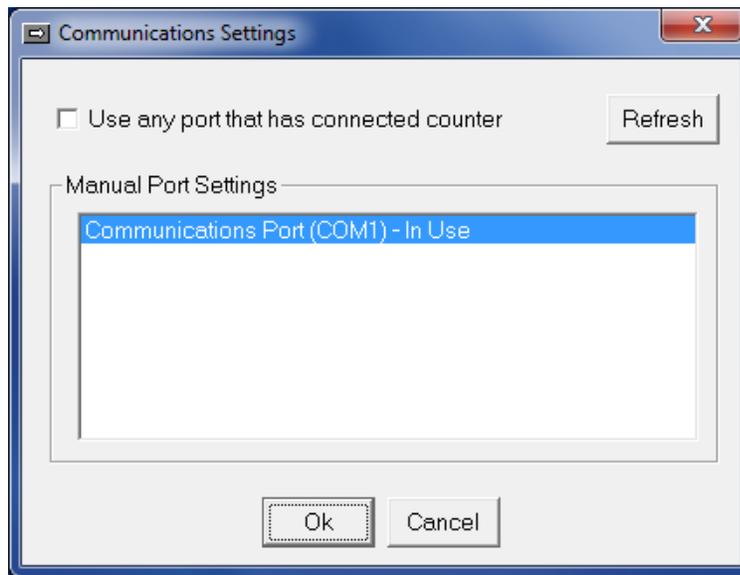


Figure 3: Communications Settings Window

The Manual Port Settings list always displays all available serial ports. This list is static and is populated only when the page gets opened. It can be refreshed by pressing the Refresh button which is handy whenever USB interface cable is used (if connected while the Communications page is open). Selecting an entry in this lists tells HDM to use it to communicate to traffic counters.

The “Use any port that has connected counter” checkbox tells HDM to perform automatic serial port lookup when instructed to read or program a counter. If this checkbox is checked HDM will try opening every serial port available on the system and detecting connected traffic counter. If connected counter is found the serial port number is noted and used in further communication attempts.

For more details on Communications Settings window please see Reference Guide section.

The Localization Settings window allows users to select specific locale settings such as the Language file, Measurement units, Date and Time formats, etc. (see figure below).

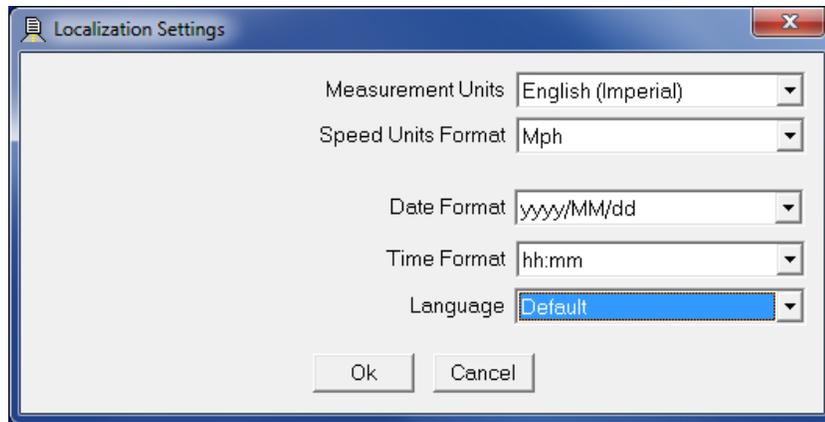


Figure 4: Localization Settings Window

Although internally HDM uses English/Imperial measurement units it can display data in either English/Imperial or Metric measurement units. If Metric measurement units are selected the conversion is applied to all speed, length and temperature fields within HDM application. The Speed Units Format controls how Metric speed units are labeled: either Kph or Kmh.

The Date and Time Format fields control how dates and times are display across the HDM application. For more information on the formatting strings please see the Reference Guide section.

The Language dropdown allows choosing a specific HDM language file that contains labels for all HDM user interface (UI) elements. For more information on HDM language files see the Reference Guide section.

2.5 Connecting MH Corbin Portable Traffic Counter

Before you can use HDM to manage your traffic counter, you must connect portable traffic counter to the computer. The NC300, NC200/100 portable traffic counters use either serial or USB interface cable. The NC97 devices use serial cable with the IP-10 adaptor. Both serial interface cables can be connected to the USB port using M.H. Corbin approved USB-to-Serial adaptor.

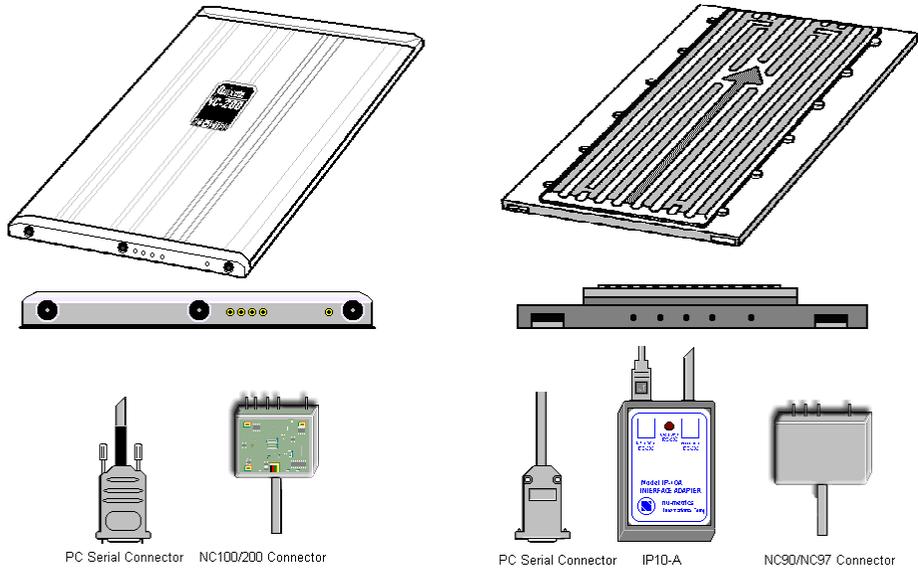


Figure 5: MH Corbin Traffic Counters and Connectors

When the connection between the computer and the NC300/200/100 device is established user can observe flashing green and red LEDs (Light Emitting Diodes) inside of the interface cable housing. The NC97 interface cable does not have this functionality but red LED of the IP-10 adaptor is a good indicator that HDM is attempting to “talk” to the counter.

NOTE: When using USB data cable please make sure to install data cable driver. It can either be downloaded from MH Corbin website (<http://www.mhcorbin.com>) or found in the Drivers subdirectory in HDM program folder once the application is installed.

2.6 Displaying Study Data

HDM allows to view traffic study data in 10 different reports and 5 different graphs:

REPORTS	GRAPHS
Date/Time/Volume/Average Speed/Temperature	Speed/Volume
Date/Time/Volume/Average Headway	Time/Volume
Time/Class	Gap/Time
Time/Speed	Vehicle Percentage
Class/Volume	Class/Volume
Average Speed by Class	
Summary	
[Raw] Volume	
[Raw] Class	
Environmental	

Table 1: Reports and Graphs

As was mentioned before reports and graphs can be accessed by double-clicking any study or by selecting it and choosing “Study -> View Reports/Graphs” menu item. This brings up the Reports window with the first generated report. Other reports and graphs can be accessed via the menu within the Reports window (see figure below). The Environmental Report gets enabled only if study environmental data is present. That is the case for all NC300 studies that were programmed with HDM v9.2.7 and later.

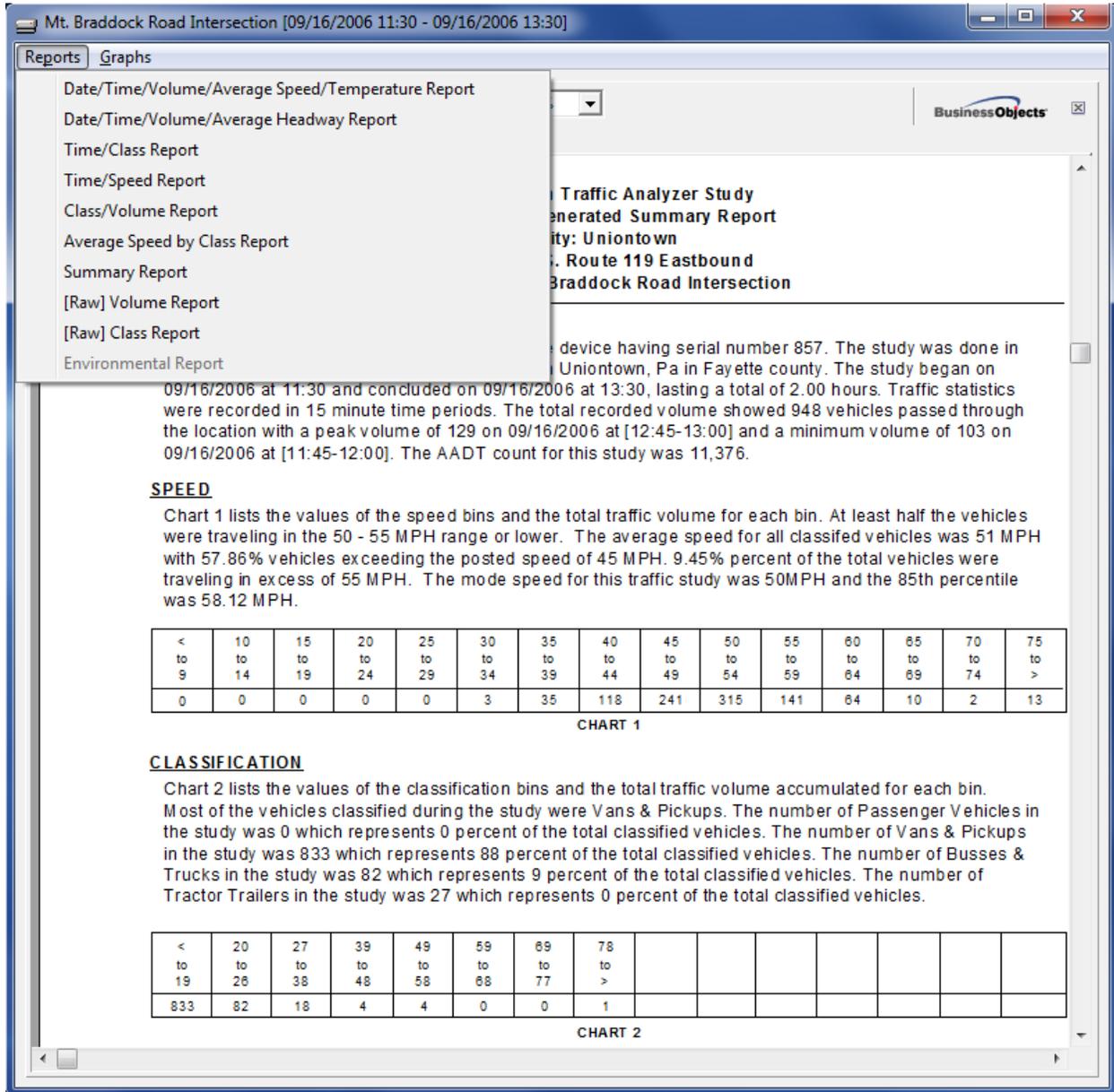


Figure 6: Summary Report

Reports can be either exported to common file formats, such as *.pdf or printed for easy distribution. To do so please click the Export or Print icon (on the top left of the Reports window) and follow the prompts. Placing the mouse cursor over any element (button,

icons, etc.) of the Reports window will display the tooltip with the description of that element.

3 Reference Guide

This section is a detailed reference guide of the HDM software. It includes references of HDM menu, Catalogs window, Studies window and Reports window.

3.1 Menu

This section of user manual follows the order of menu items as they appear in HDM software.

3.1.1 Application Menu

The Application menu contains other menus and menu items that control and deal with application configuration and behavior.

3.1.1.1 Properties Menu

The Properties menu contains other menus and menu items that control and deal with application configuration.

3.1.1.1.1 Vehicle Categories Menu Item

The Vehicle Categories menu item opens up the window (see figure below) that allows to configure 4 classifications of vehicles and the lengths for vehicles of that category.

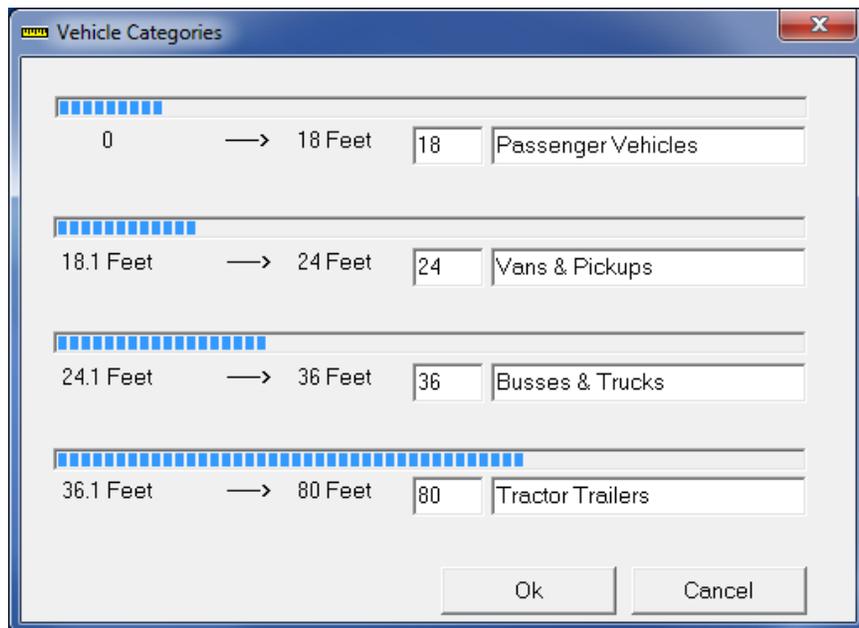


Figure 7: Vehicle Length Properties

As can be seen in figure above the categories are: Passenger Vehicles (0 to 18 feet), Vans and Pickups (19 to 24 feet), Busses and Trucks (25 to 36 feet) and Tractor Trailers (37 to 80 feet).

The user can specify any name for a category. By changing the upper limits of each category, the user can map specific length readings into the classification. User entries are not validated. Users are responsible for ensuring that classification ranges do not overlap.

3.1.1.1.2 *Communications Menu Item*

The Communications menu item opens up the window (see figure below) that allows user choose a specific serial port that will be used to communicate to portable traffic counters.

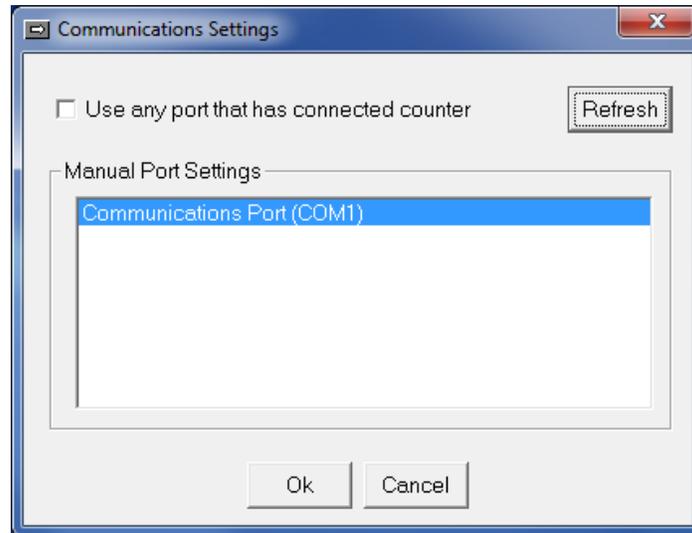


Figure 8: Communications

The Communications Settings window will list all available serial ports on the system. To choose a specific port, please select one from the list. When using USB interface cable it needs to be plugged in to the system to be seen by HDM.

NOTE: If the serial port is present on the system but currently in use by some other application HDM will list that port with the note “In Use” next to the name. Such port can still be selected but it will result in an error when attempted to communicate to the portable traffic counter.

The “Refresh” button allows user to refresh the list of ports. This is useful when the USB interface cable is connected to the system while Communications Settings window is visible.

The “Use any port that has connected counter” check box when checked tells HDM to perform serial port discovery (based on currently connected device) prior to each read/program attempt. The last used (thus selected) port is checked first speeding up discovery procedure. This functionality is very handy when using multiple serial ports to access different counters or when USB interface cable is being used since unplugging and plugging back USB cable sometimes results in the change of serial port.

NOTE: Make sure a traffic counter is connected to the computer before attempting to communicate to it whenever “Use any port that has connected counter” is checked.

3.1.1.1.3 Localization Menu Item

The Localization menu item opens up the window (see figure below) that allows users to specify certain locale settings.

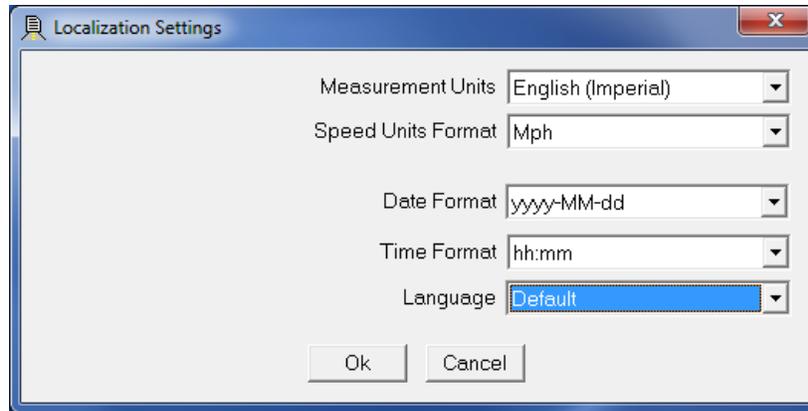


Figure 9: Localization Settings Window

The “Measurement Units” dropdown allows users to specify how speed, length and temperature data is displayed across the HDM application. Internally HDM uses English/Imperial measurement units which is also a default value.

The “Speed Units Format” allows users to choose the speed data label. This label is displayed in some HDM windows and in traffic study reports.

The “Date Format” and “Time Format” fields control how dates and times are display across the HDM application. The formatting strings are comprised of separate fields with their specific meaning:

- **MM** - Display month as a number with a leading zero (01-12).
- **MMM** - Display month as an abbreviation (Jan-Dec).
- **MMMM** - Display month as a full month name (January-December).
- **yy** - Display year as a 2-digit number (00-99).
- **yyyy** - Display year as a 4-digit number (1000-9999).
- **d** - Display day as a number without a leading zero (1-31).
- **dd** - Display day as a number with a leading zero (01-31).

- **h** - Display hours as a number without a leading zero (1-12/23 depending on AM/PM or a/p presence).
- **hh** - Display hours as a number with a leading zero (01-12/23 depending on AM/PM or a/p presence).
- **mm** - Display minutes as a number with a leading zero (01-59).
- **ss** - Display seconds as a number with a leading zero (01-59).
- **AM/PM** - Display time in 12 hour clock.
- **a/p** - Display time in 12 hour clock.

The “Language” dropdown is populated with the contents (files) of the HDM Languages folder and allows users to specify which HDM language file should be used when resolving labels for all HDM user interface (UI) elements. All labels in HDM application are assigned a specific label identifiers. Upon startup HDM application loads selected HDM language file (HLF) and

resolves identifiers to actual strings that are displayed to the user. If selected HLF file cannot be found HDM will display label identifiers.

NOTE: Changing selected language in the Language dropdown will require restarting of HDM application.

3.1.1.1.4 Study Menu Item

The Study menu item opens up the window (see figure below) that allows user to change certain study programming validation parameters and study data retrieval filters.

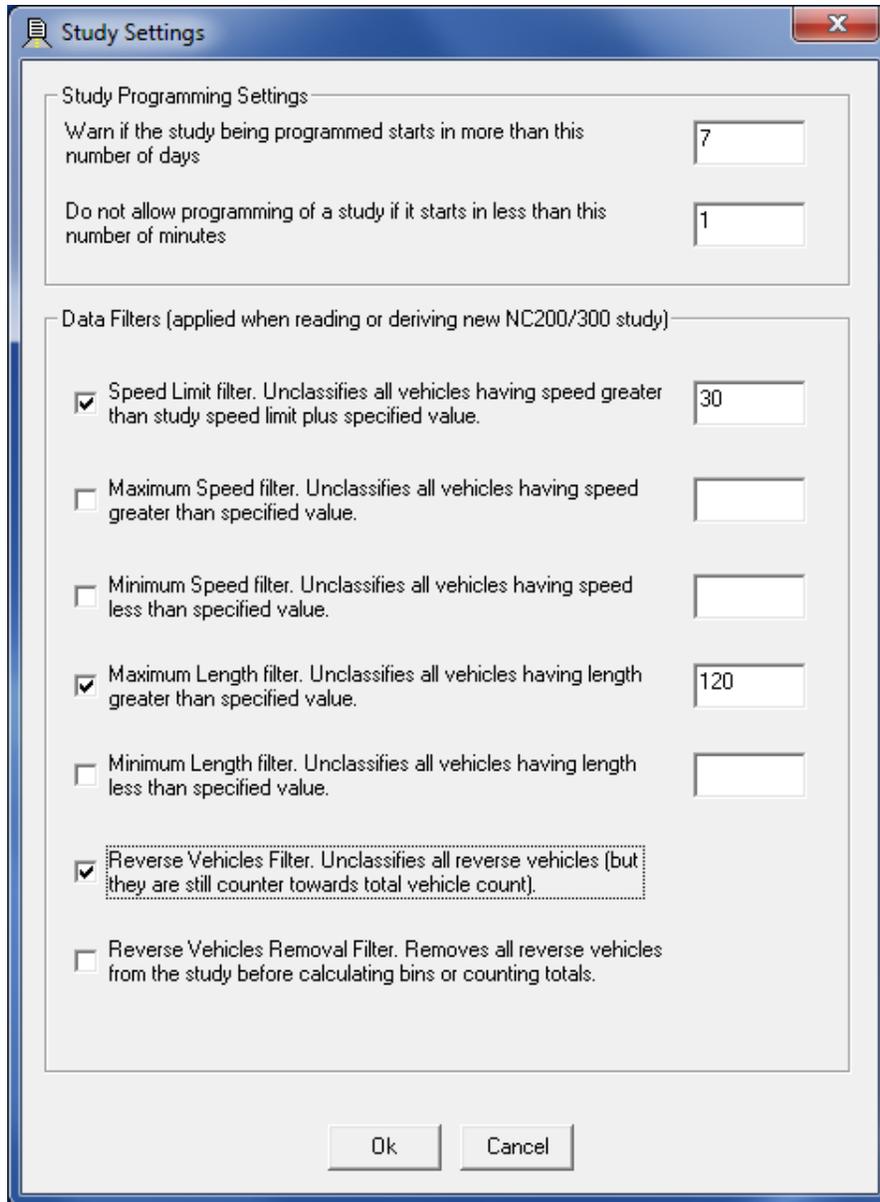


Figure 10: Study Settings Window

The “Warn if the study being programmed starts in more...” field allows users to specify the maximum number of days that the study can be programmed in advance. The value of this field

is used for validation of study start date/time only and if exceeded will result in the warning messages during study programming.

The “Do not allow programming of a study if it starts in less than...” field allows users to specify the minimum number of minutes that the study can be programmed in advance. The value of this field is used for validation of study start date/time only and if the study being programmed violates this value the programming attempt will be stopped with an error message.

The data filters allow users to filter out certain (unwanted) vehicle records. The selected data filters are applied during new study creation process (when reading study from the device or deriving new study) and only for studies that have every vehicle information (studies generated with NC200/300 portable traffic counters). To enable any data filter please check the appropriate checkbox next to the filter name and specify filter specific value (in the picture above only Speed Limit, Maximum Length and Reverse Vehicles filters are enabled). These settings are application-wide and are preserved between HDM sessions. Note that most filters do not remove records but mark them as unclassified (vehicle event detected but speed and length could not be determined). That way vehicle record is not counted towards the bins but it is still counted towards the total number of vehicles for the period and for the study. Currently HDM implements the following data filters:

- Speed Limit filter. This filter unclassifies (sets Advice Code value to 128 thus excluding the record from the bins) sequential records that have speed value greater than posted speed limit value of the study plus the specified filter value. E.g. if the posted speed limit value of the study was set to 55 mph and the specified filter value was set to 30 all vehicles with speed greater than 85 mph will be unclassified.
- Maximum Speed filter. This filter unclassifies (sets Advice Code value to 128 thus excluding the record from the bins) sequential records that have speed value greater than the specified filter value. E.g. if the filter value was set to 100 all vehicles with speed greater than 100 mph will be unclassified.
- Minimum Speed filter. This filter unclassifies (sets Advice Code value to 128 thus excluding the record from the bins) sequential records that have speed value smaller than the specified filter value. E.g. if the filter value was set to 15 all vehicles with speed less than 15 mph will be unclassified.
- Maximum Length filter. This filter unclassifies (sets Advice Code value to 128 thus excluding the record from the bins) sequential records that have length value greater than the specified filter value. E.g. if the filter value was set to 120 all vehicles with length greater than 120 feet will be unclassified.
- Minimum Length filter. This filter unclassifies (sets Advice Code value to 128 thus excluding the record from the bins) sequential records that have length value smaller than the specified filter value. E.g. if the filter value was set to 8 all vehicles with length less than 8 feet will be unclassified.
- Reverse Vehicles filter. This filter unclassifies (sets Advice Code value to 128 thus excluding the record from the bins) sequential reverse vehicle records (those having Advice Code value equal 4).

- Reverse Vehicles Removal filter. This filter removes sequential reverse vehicles (those having Advice Code value equal 4) that way excluding them not only from bins but also from totals.

3.1.1.1.5 Reports Menu Item

The Reports menu item opens up the window (see figure below) that allows users to change settings that apply to reports and graphs and select specific reports and graphs for batch printing.

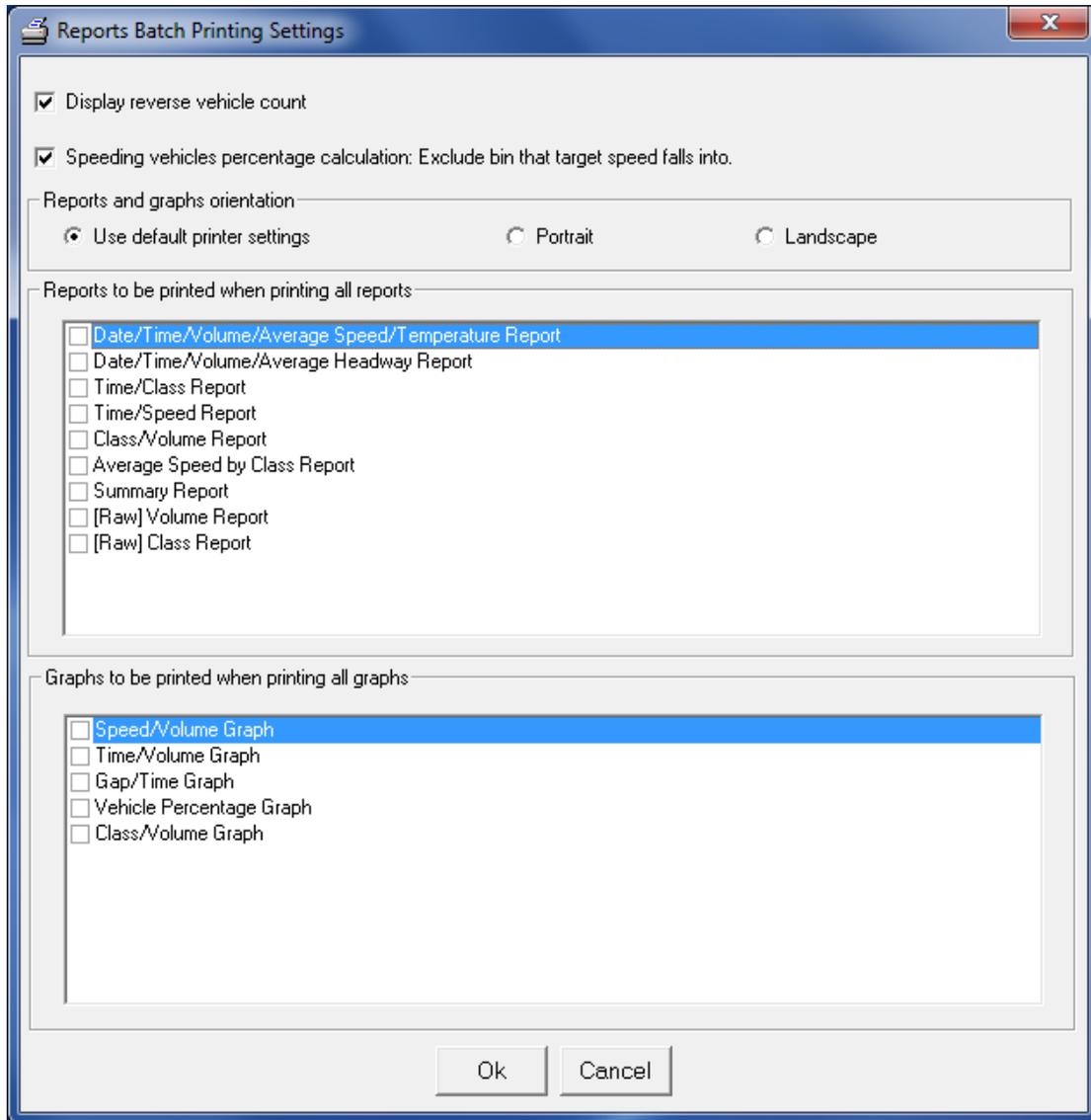


Figure 11: Reports Batch Printing Settings Window

The batch printing of the reports is done by selecting multiple studies and selecting Study -> Batch Print menu item.

The “Display reverse vehicle count” checkbox tells HDM to display reverse vehicle counts when generating traffic study reports.

The “Speeding vehicles percentage calculation...” checkbox changes the way HDM calculates percentages in the summary report. The values that are affected by this setting are percentage of vehicles over the speed limit and percentage of vehicles over the 55 mph. When the checkbox is unchecked the total of the bin that the speed in question fall into is counted towards the total for the percentage. If the checkbox is checked the total of that bin is not counted towards the total for the percentage. For example if the speed bins were set as 0-9, 10-19, 20-29, 30 > and the speed limit was 25 mph the percentage of the vehicles would be calculated using totals of bins 20-29 and 30 > when the checkbox is unchecked and using total of bin 30 > when the checkbox is checked. The percentage of vehicles over 55 mph would be calculated using total of bin 30 > when the checkbox is unchecked and it would be 0 when the checkbox is checked. That’s because if we exclude the bin that 55 mph speed falls into we don’t have any bins left that have vehicles greater than 55 mph and thus the total for the percentage calculation is 0.

“Reports and graphs orientation” section allows user to choose which (portrait or landscape) template will be used for the report. When “Use default printer settings” option is selected HDM will check default printer configuration to determine report orientation. The “Portrait” option tells HDM to use portrait report template and “Landscape” option tells HDM to use landscape report template.

3.1.1.1.6 Fonts Menu Item

The Fonts menu item opens up the window (see figure below) that allows user to select font that will be used across HDM application.

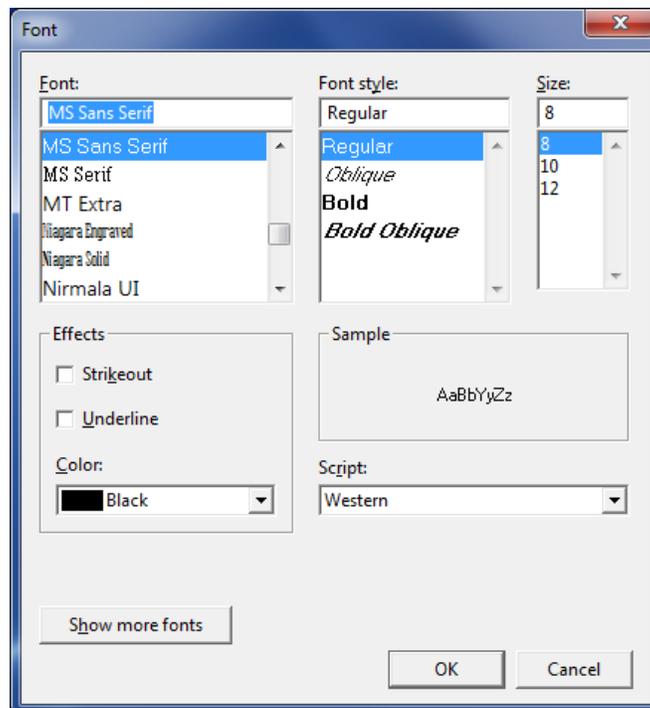


Figure 12: Font Window

NOTE: The font selection does not affect certain HDM user interface (UI) elements such as menus, title bars of windows, standard (e.g. File Open) dialogs, etc.

3.1.1.1.7 Default Bins Menu

The Default Bins submenu items (Speed Bins and Length Bins) open up the window (see figure below) that allows user to configure default speed and length bins.

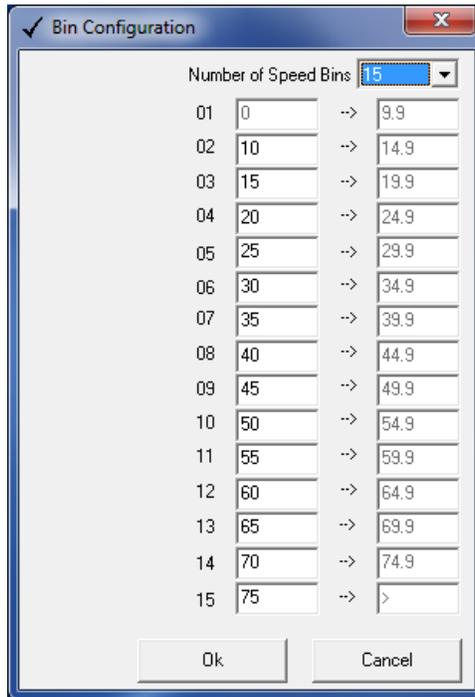


Figure 13: Bins Configuration Window

The default bins settings can be used instead of programmed bins when reading a study from the portable traffic counter. These settings are stored in the HDM configuration (HDM.ini) file.

3.1.1.2 Exit Menu Item

The Exit menu item will close HDM application without any prompts.

3.1.2 Catalog Menu

The Catalog menu contains menu items that deal with functionality related to HDM Catalogs (MDB data files). The Catalog menu can be invoked either from HDM main menu or as a Catalogs Window context menu (by right clicking within the Catalogs Window). The menu items within the Catalog menu are enabled/disabled depending on the contents and the selection status within the Catalogs Window.

3.1.2.1 New Menu Item

The New menu item opens up the window (see figure below) that allows user to create a new HDM catalog (MDB data file).

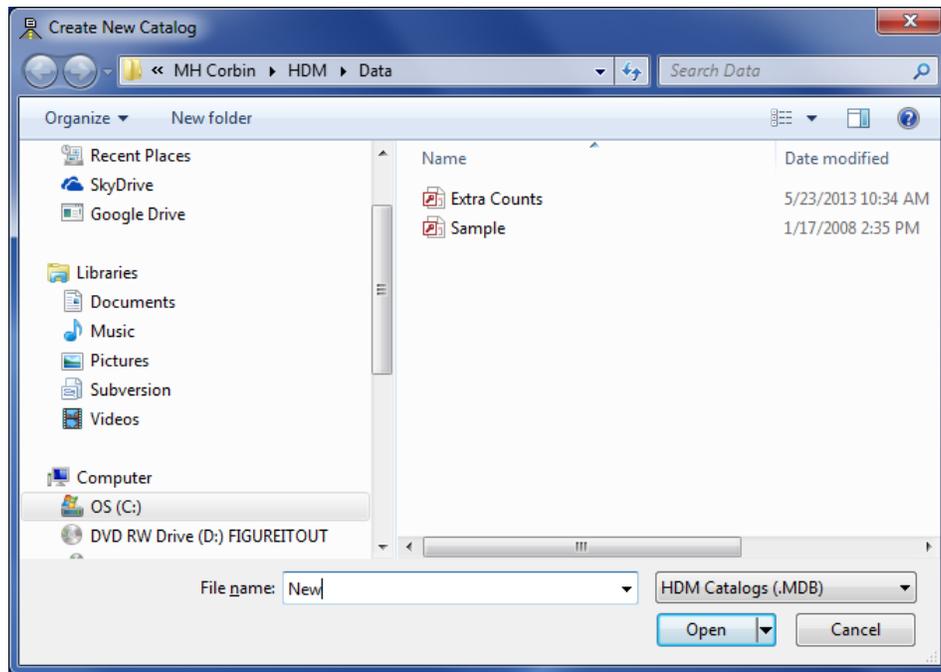


Figure 14: Create New Catalog Window

The default directory for new catalogs is the home directory of the HDM application (HDM program folder). The Create New Catalog window will then save last accessed folder path to HDM configuration file (HDM.ini) and will use it next time the window is opened.

NOTE: Both the Create New Catalog and the Open HDM Catalog(s) windows use the same last accessed folder path value in HDM.ini.

Any valid Windows file name can be entered as the name for the catalog. The Create New Catalog window will create new catalog as MDB data file.

The newly created catalog is automatically opened by HDM and added to the end of the list of catalogs in the Catalogs Window.

3.1.2.2 Open Menu Item

The Open menu item opens up the window (see figure below) that allows user to choose HDM catalog(s) to open.

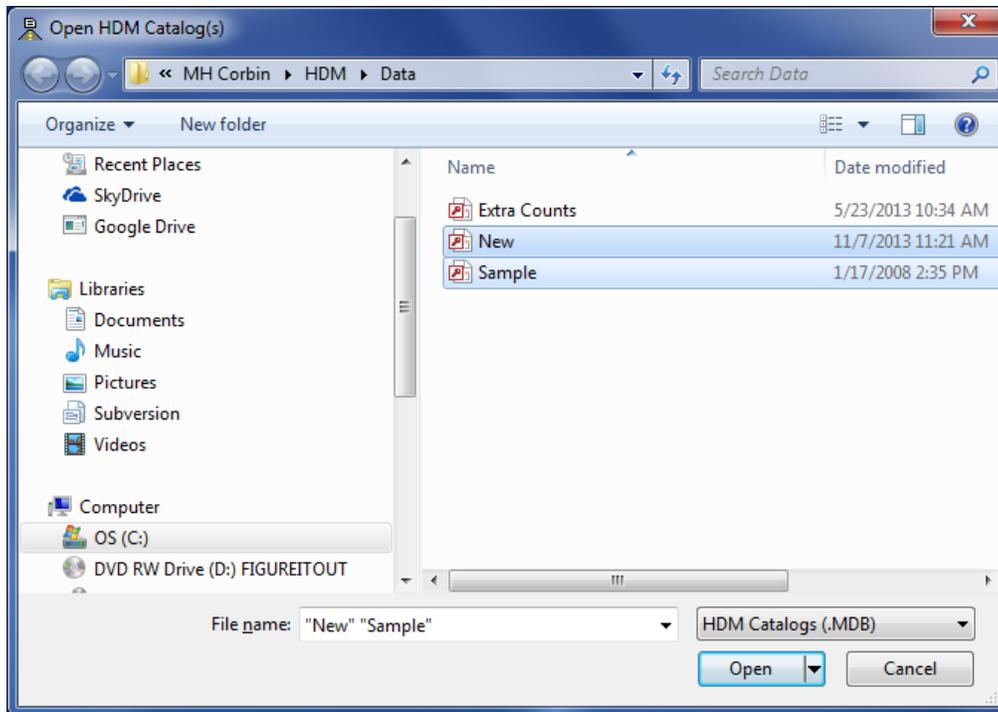


Figure 15: Open HDM Catalog(s) Window

The Open HDM Catalog(s) window lists all HDM catalogs (MDB data files) in a given folder. It allows users to open one or multiple catalogs at once. The Open HDM Catalog(s) window defaults to HDM program folder and once used saves last accessed directory path to HDM configuration file (HDM.ini).

NOTE: Both the Open HDM Catalog(s) and the Create New Catalog windows use the same last accessed folder path value in HDM.ini.

The newly opened catalog(s) are added to the end of the list of catalogs in the Catalogs Window.

3.1.2.3 Close Menu Item

The Close menu item closes all selected catalogs in the Catalogs Window and removes them from the list of opened catalogs.

3.1.2.4 Close All Menu Item

The Close All menu item closes all catalogs in the Catalogs Window and removes them from the list of opened catalogs.

3.1.2.5 Delete Menu item

The Delete menu item closes, removes from the list and **destroys** all selected catalogs in the Catalogs Window.

3.1.2.6 Merge Menu Item

The Merge menu item opens up the window (see figure below) that allows user to merge any selected catalogs from the Catalogs Window into a single catalog.

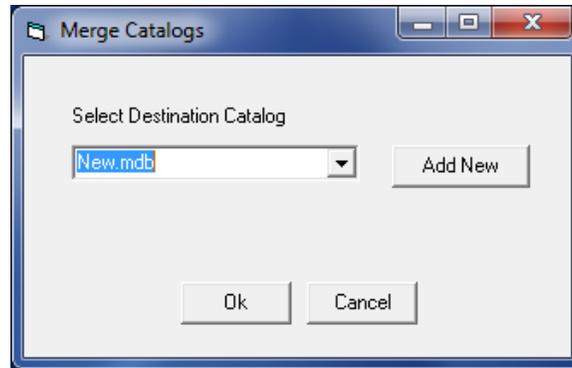


Figure 16: Merge Catalogs Window

When catalogs are merged all studies from the source (selected) catalogs are copied into a destination catalog. The Merge Catalogs Window allows user either to choose already opened HDM catalog (from the Select Destination Catalog dropdown) or to create a new catalog to serve as destination catalog by using “Add New” button. The destination catalog can also be a source catalog in which case all other source (selected) catalogs will be merged to it.

In order to use HDM Catalog Merge functionality please first select any number of catalogs to be merged (source catalogs) in the Catalogs Window and then click on the Catalog -> Merge menu item to bring up the Merge Catalogs Window for selecting destination catalog for merge operation.

If a new destination catalog is selected it is automatically opened and added to the end of the list of opened catalogs in the Catalogs Window.

3.1.2.7 Print Study List Menu Item

The Print Study List menu item opens up the window (see figure below) containing report of all the studies listed in the Studies Window.

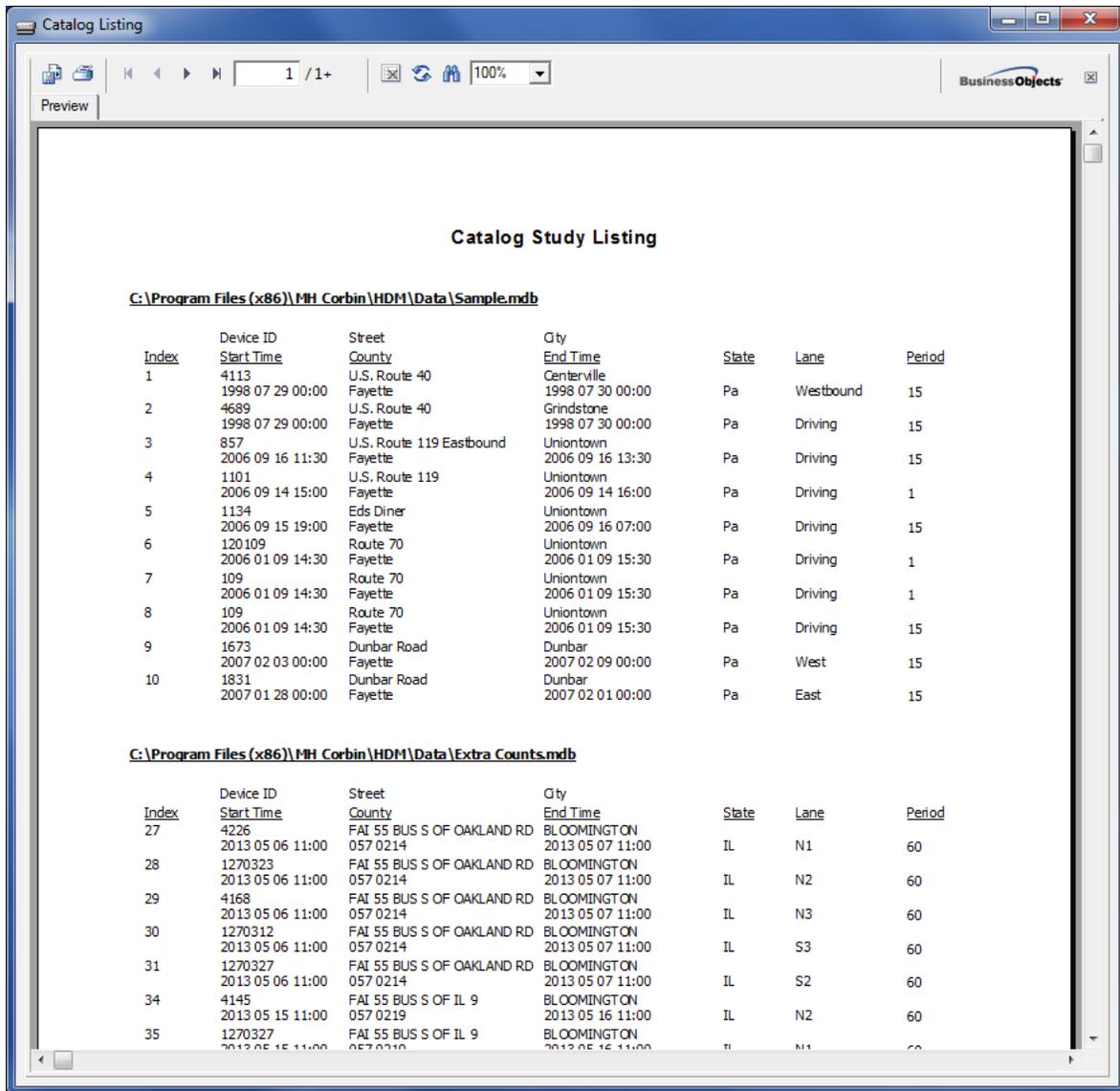


Figure 17: Catalog Listing Window

3.1.2.8 Compact and Repair Menu Item

From time to time HDM catalogs need to be compacted and/or repaired. If you are having problems seeing studies in opened catalogs consider using this menu item. This menu item works exactly as Compact and Repair function in Microsoft Access. Only selected catalog entries in the Catalogs Window will be compacted and repaired.

3.1.3 Study Menu

The Study menu contains menu items that deal with functionality related to traffic studies. The Study menu can be invoked either from HDM main menu or as a Studies Window context menu (by right clicking within the Studies Window). The menu items within the Studies menu are enabled/disabled depending on the contents and the selection status within the Studies Window.

3.1.3.1 View Reports/Graphs Menu Item

The View Reports/Graphs menu item opens up the Reports Window (see figure below) with generated first report for selected single study.

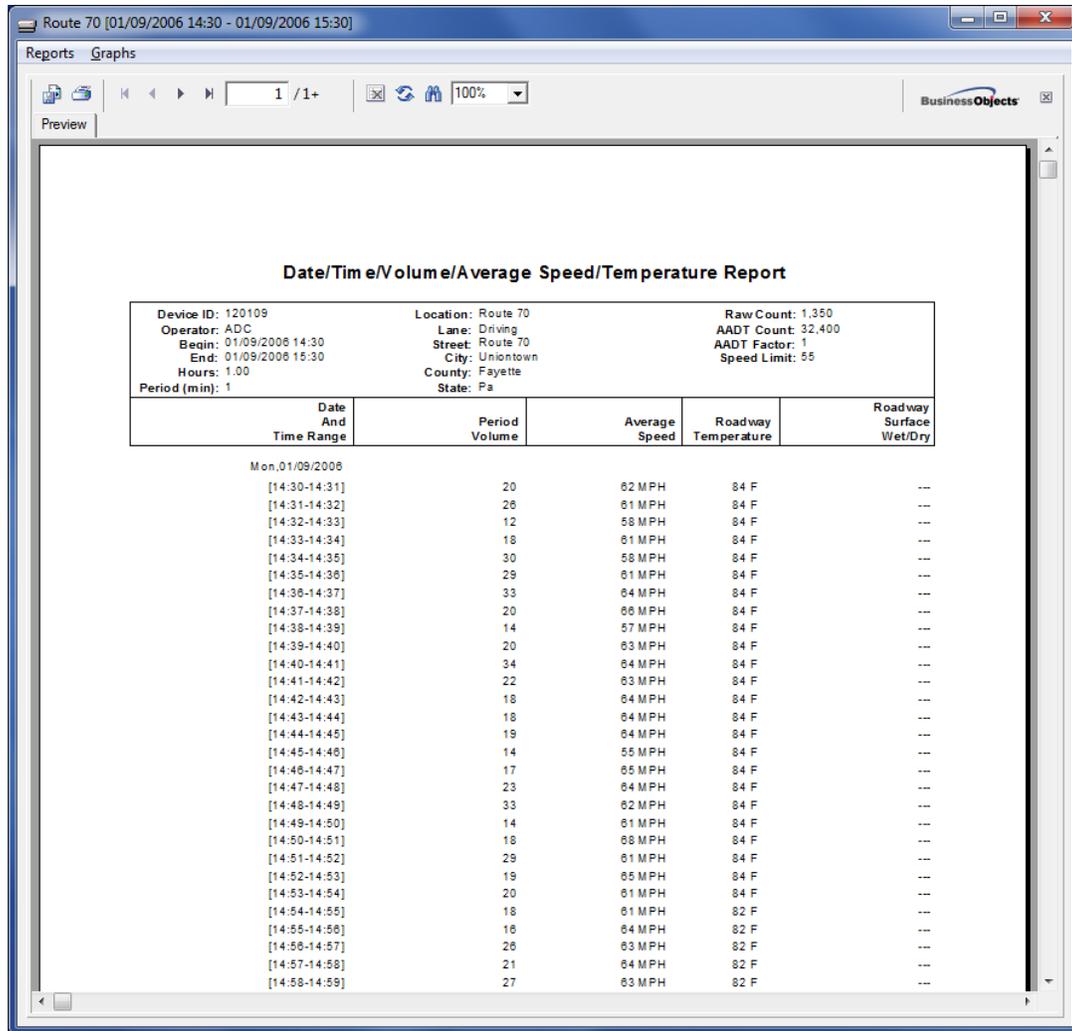


Figure 18: Reports Window

The Reports Window provides a convenient control and navigation toolbar as well as preview pane where the report/graph is displayed. This window also has Reports and Graphs menu that allows switching between different HDM reports and graphs.

3.1.3.2 Combined Reports Menu Item

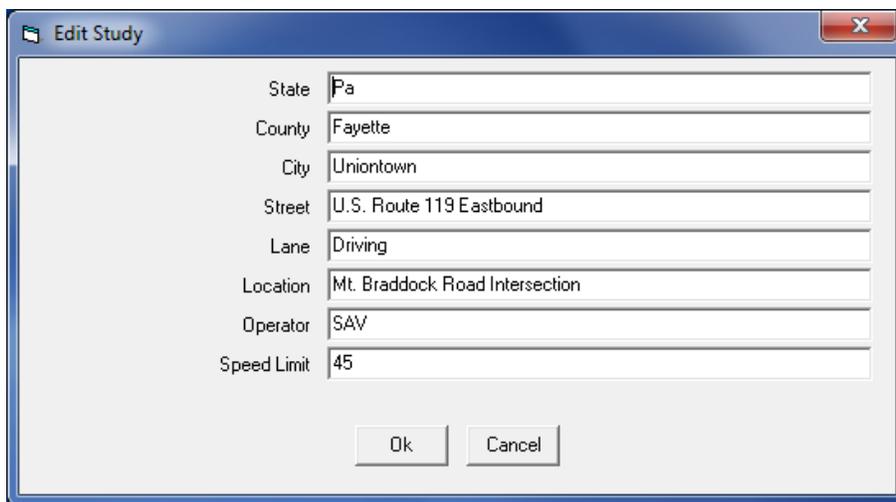
The Combined Reports menu item opens up the Reports Window with generated first combined report for selected multiple studies.

3.1.3.3 Delete Menu Item

The Delete menu item allows user to delete selected studies. Upon selecting one or more desired studies and choosing this menu item user will be presented with the confirmation message and given affirmative confirmation HDM will **destroy** selected studies also removing their entries from the Studies Window.

3.1.3.4 Edit Menu Item

The Edit menu item allows user to edit selected study header information. Upon selecting desired study and choosing this menu item user will be presented with the Edit Study window (see figure below). Edit menu item is only enabled for a single selected study and disabled otherwise.



The screenshot shows a window titled "Edit Study" with a close button (X) in the top right corner. The window contains several text input fields with labels to their left:

State	Pa
County	Fayette
City	Uniontown
Street	U.S. Route 119 Eastbound
Lane	Driving
Location	Mt. Braddock Road Intersection
Operator	SAV
Speed Limit	45

At the bottom of the window, there are two buttons: "Ok" and "Cancel".

Figure 19: Edit Study Window

NOTE: Changing study information does not affect study vehicle and bin data. In order to trigger application of data filters please use Derive New study functionality.

3.1.3.5 Change AADT Factor Menu Item

The Change AADT Factor menu item opens up the window (see figure below) that allows user to change AADT Factor for selected single study. The HDM uses AADT Factor when calculating AADT during report generation. The AADT Factor allows to scale AADT number up or down. The default AADT Factor value is 1.0.

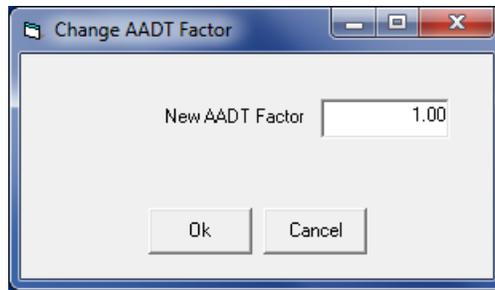


Figure 20: Change AADT Factor Window

NOTE: The Change AADT Factor menu item is enabled only when a single study is selected in the Studies Window.

3.1.3.6 Derive New Menu Item

Once traffic study is read from portable traffic counter it is stored in the selected catalog. HDM does not allow editing original study data with the exception of changing AADT Factor. But studies conducted with NC200 and NC300 portable traffic counters (since they contain every vehicle data) can be used to create new studies using Derive New menu item at which point some or all study parameters can be changed (see figure below).

NOTE: The Derive New menu item is disabled for studies conducted by NC97 counters.

Figure 21: Derive New Study Window

When deriving new studies user can select a single study or multiple studies to be the source of data for the new one. The “Destination Catalog” dropdown allows selecting any of currently opened catalogs or adding a new one or opening an existing one by the means of the “Add New” button.

The “Remove overlapping data” checkbox is enabled only when more than one study is used as a source for the new one. When it is checked it tells HDM to order source studies by time (the oldest study first) and when merging them into a new study skip any overlapping data in case source studies overlap. This means that all the data from the first study will be taken; if the second study starts before the first one finishes HDM will assume the starting date/time of the second study to be the end date/time of the first study and will take only data from that time range. Merging any subsequent studies will be done the same way.

If the “Remove overlapping data” checkbox is not HDM will simply take all data from all the studies and merge it into a single study.

NOTE: HDM does not perform any checks for gaps between studies.

The “Studies” dropdown allows user to choose one out of selected source studies to serve as a source of initial study parameters. Of course any of the parameters then can be modified.

The study start and end date/time ranges can be modified directly by changing each part of the field by selecting that part of the field with the mouse and then using numeric keypad or up and down arrows to change values (such as year, month, day, hours, and minutes). The end date/time can also be changed by specifying study duration in days, hours and minutes using the fields located right below the study end date/time box.

The speed and length bins are specified as a list of ranges. As they appear in figure above the speed bins should be read 0-10, 10-15, 15-20, etc. where the upper speed bin setting is not inclusive. HDM allows specifying 14 speed bin ranges (which will result in defining 15 speed bins) and 7 length bin ranges (which will result in defining 8 length bins).

Once all desired parameters are entered and the “OK” button is clicked, HDM will validate all entered information and if any of the fields contains invalid entry will notify the user about validation error allowing the user to enter new values. Otherwise it will create a new study which will show up in the destination catalog as the last entry.

3.1.3.7 Export Study Menu Item

The Export Study menu item opens up the window (see figure below) that allows user to produce the data file from the selected study in a few provided data formats.

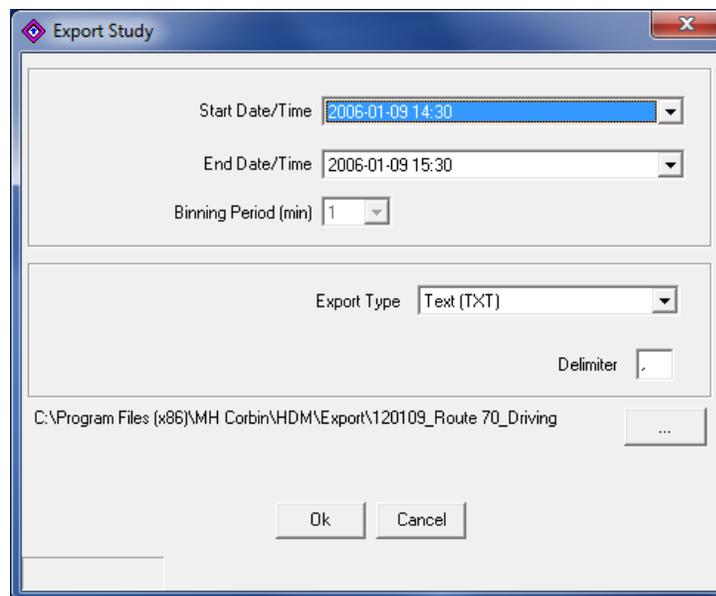


Figure 22: Export Study Window

HDM supports the following formats:

- Text (TXT)
- Comma Separated Values (CSV)
- Gold River (GR)

- LP (Old) Data File (DAT)
- HDM Data File (DAT)

The Export Study Window allows user to select start and end date/time and the location of the export file.

NOTE: If the export file with the same name already exists in the target directory, the old file is overwritten

3.1.3.8 Export Sequential Data Menu Item

The Export Sequential Data menu item allows user to export selected study's sequential data to a sequential.txt file. If the sequential study data is not present (which is the case with NC97 studies) this menu item is disabled. The export file is placed into the Export subfolder that can be found in HDM program folder. The sequential.txt file is generated in CSV format with first row of the file containing the description of the columns.

NOTE: Every time Export Sequential Data menu item is executed the sequential.txt file is overwritten.

3.1.3.9 Export HTV Menu Item

The Export HTV menu item allows user to export selected study using Expanded FHWA TMG Card 3 Format (HTV). Before exporting data user is presented with the export parameters window that allows changing certain values (including the output file path and name). For more information on FHWA TMG Card 3 format please refer to FHWA Traffic Monitoring Guide.

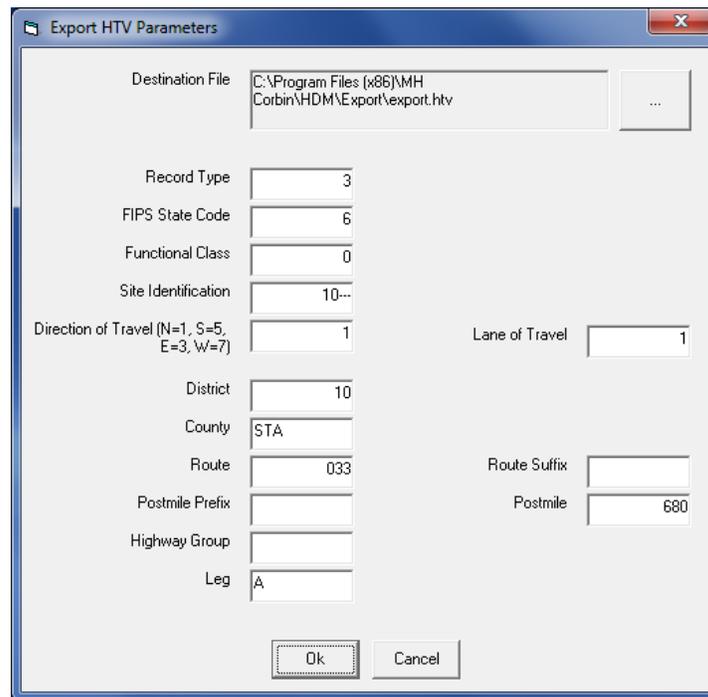


Figure 23: Export HTV window

3.1.3.10 Batch Print Menu Item

The Batch Print menu item generates user specified (via Application - > Properties -> Reports) reports and graphs for selected studies and sends them to the default printer. If the default printer is not selected on the computer running HDM the printer selection dialog is presented to the user.

3.1.4 Device Menu

The Device menu items deal with portable traffic counter control.

3.1.4.1 Program Study Menu Item

The Program Study menu item should be used to program study to portable traffic counter. Once selected it will bring the window (see figure below) that will allow user to set up study parameters and after clicking "Program" button program the study to the device.

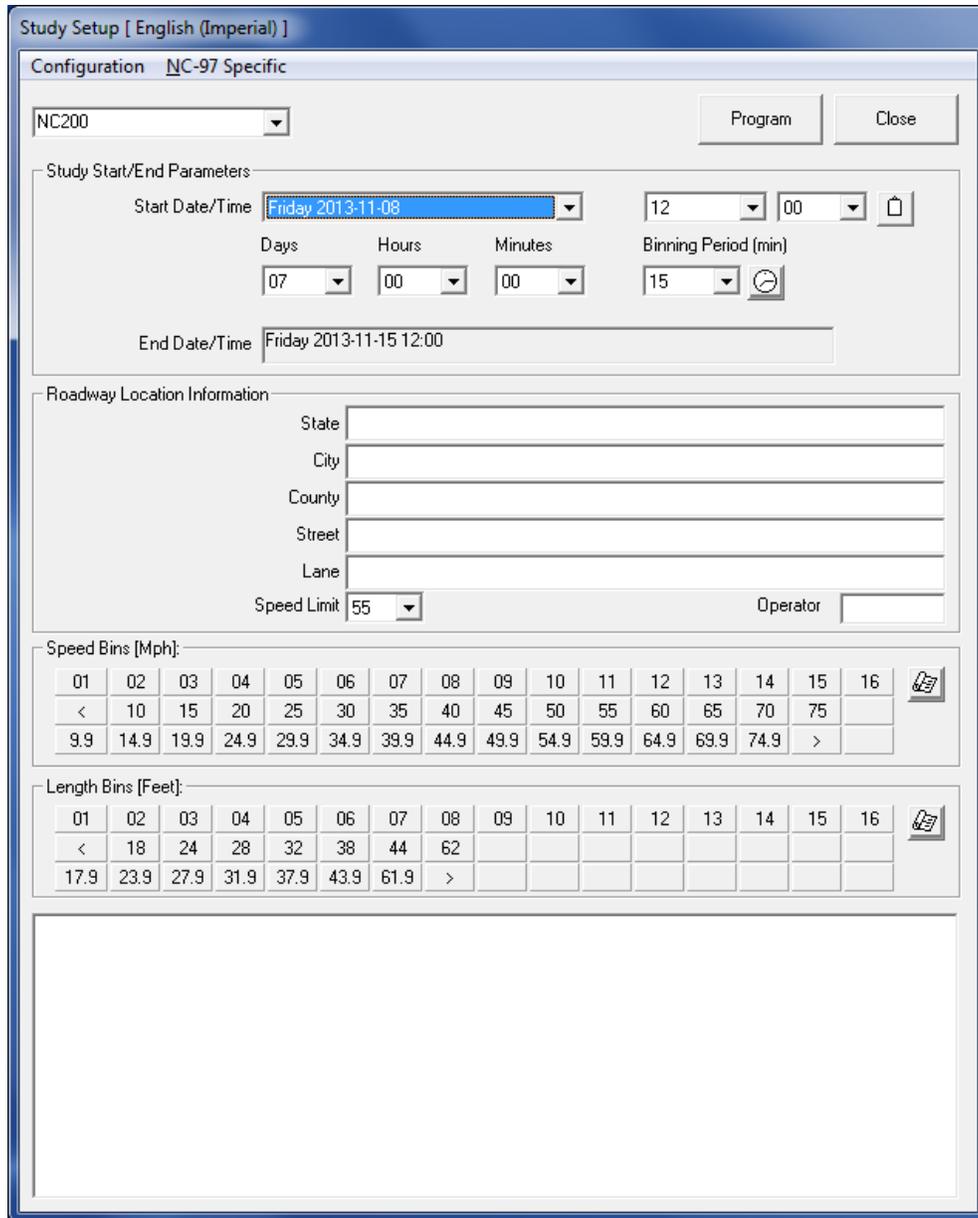


Figure 24: Setup Study Window

When programming the study user has to tell HDM which device the study will be programmed to in order for HDM to use correct device access method. HDM will remember this value and will use it next time any of device control windows (e.g. Study Setup, Study Read, etc.) are opened.

Next step in setting up a study is specifying study start and end date/time. The start date/time settings fields are self-explanatory. The end date/time is specified by using start date/time and adding the duration of the study to it. Setup Study Window will display end date/time in a separate (read-only) field.

NOTE: When programming study to the traffic counter, HDM will synchronize the date and time of the counter with the date and time of your computer. If the time on the computer is not correct the time on the counter will not be correct either.

The binning period determines the interval at which binning will be conducted as well as environmental information will be captured. Depending on the device type there is a maximum number of periods that can be specified for the duration of the study. The HDM will check this number when programming the device and will notify the user about the error in case this maximum number is exceeded. You can check the maximum number of periods for each device type by clicking on the clock icon next to the binning period dropdown.

The Roadway Location Information fields are self-explanatory. These fields are optional.

The speed and length bins are used to bin study data. Please use the push button to the right of the bins grid to open bins editing dialog.

Once the Program button is clicked HDM will try to communicate to the traffic counter and program the study. It will prompt the user to connect the traffic counter and once programming has been successfully completed – to disconnect the traffic counter. In case of an error the “Operation Failed...” error message will be displayed in the pop up window.

The Setup Study Window contains menu that allows users to save and load study setup information as well as to specify additional NC97 device specific programming options.

3.1.4.1.1 Configuration -> Load Menu Item

The Configuration -> Load menu item of the Setup Study Window allows user to load study setup configuration previously saved using Configuration -> Save or Configuration -> Save As menu items.

3.1.4.1.2 Configuration -> Save Menu Item

The Configuration -> Save menu item of the Setup Study Window saves all user entered values into the HDM study programming information (HPS) file. If the Configuration -> Save As menu item was used earlier the settings are saved into the file specified during that save operation. Otherwise Default.hps file is used and can be found in HDM program folder.

3.1.4.1.3 Configuration -> Save As Menu Item

The Configuration -> Save As menu item of the Setup Study Window saves all user entered values into the HDM study programming information (HPS) file allowing user to specify the file. Subsequent Configuration -> Save operations use the file that was specified during Configuration -> Save As invocation.

3.1.4.1.4 NC-97 Specific Menu

There are three NC97 device specific features that may be either enabled or disabled using this menu. If an option is enabled, it will be displayed with a check mark next to the option.

Otherwise the feature is disabled. When you program a NC97 traffic counter, any feature enabled (checked) on this menu will be enabled on the device you program. The features are:

- Reverse Vehicle Count Enabled
- Assume Free Flowing Traffic
- Verification Transmitter ON

Toggle the options by clicking on them. A checked option is enabled. Unchecked items are not enabled. Remember, these settings only apply to the NC97. The only time HDM will attempt to set the selected features is when a NC97 is being programmed.

3.1.4.1.4.1 Reverse Vehicle Count Enabled Menu Item

This menu item when enabled instructs device to count reverse vehicles (i.e., include vehicles that traverse the unit in the opposite direction).

3.1.4.1.4.2 Assume Free Flowing Traffic

This menu item when enabled puts the NC97 device in a mode where it assumes that the majority of traffic passing over the unit will be free flowing versus stop-and-go. This setting allows the unit to make some basic assumptions about traffic patterns and helps to filter out anomalies.

3.1.4.1.4.3 Verification Transmitter ON

This menu item instructs the NC97 device to transmit wirelessly verification messages during the preparation period and during the first several minutes of the study. If you are not using this feature, be sure to disable it when programming NC97 counters to increase battery life during the study.

3.1.4.2 Read Study Menu Item

The Read Study menu item opens up the window (see figure below) that allows user to read traffic study from the portable traffic counter.

NOTE: The Read Study menu item is enabled only when a single catalog is selected (which becomes destination catalog for the study).

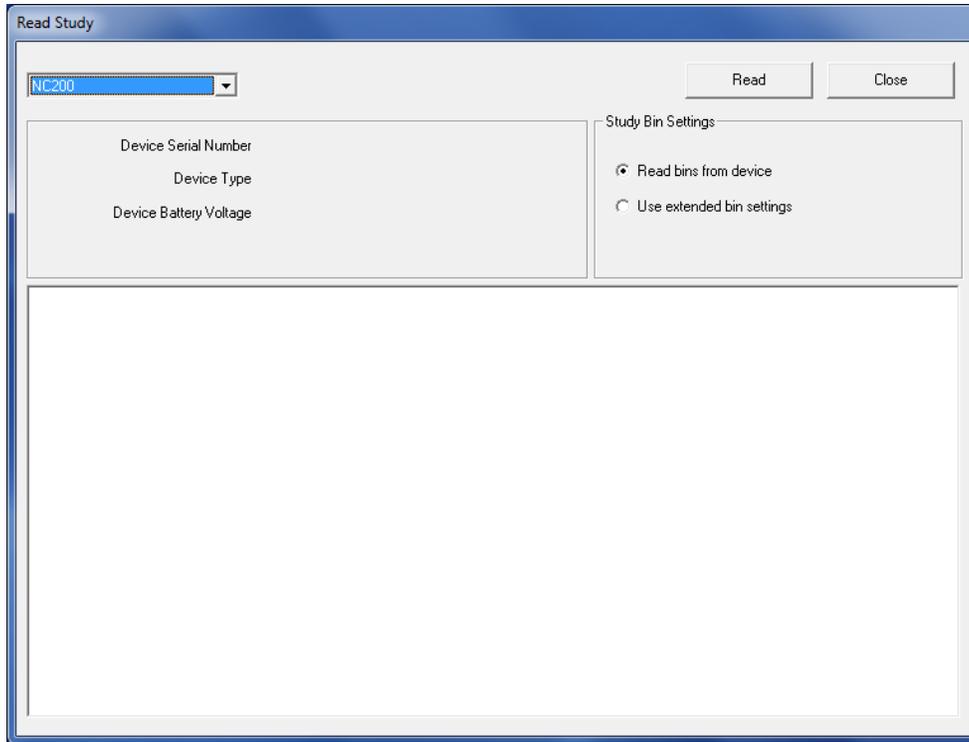


Figure 25: Read Study Window

User must select the correct device type to let HDM know what device access method to use. The Read Study Window also allows user to specify different bin settings (through use of extended bin settings) when reading traffic data for devices that supports every vehicle records (NC300/200 devices). That way read data is binned using extended bin settings and not the settings specified when the study was programmed.

If study data is successfully read the user is notified with the success message (see figure below) and a new study entry is added to the end of the list of studies for the selected catalog.

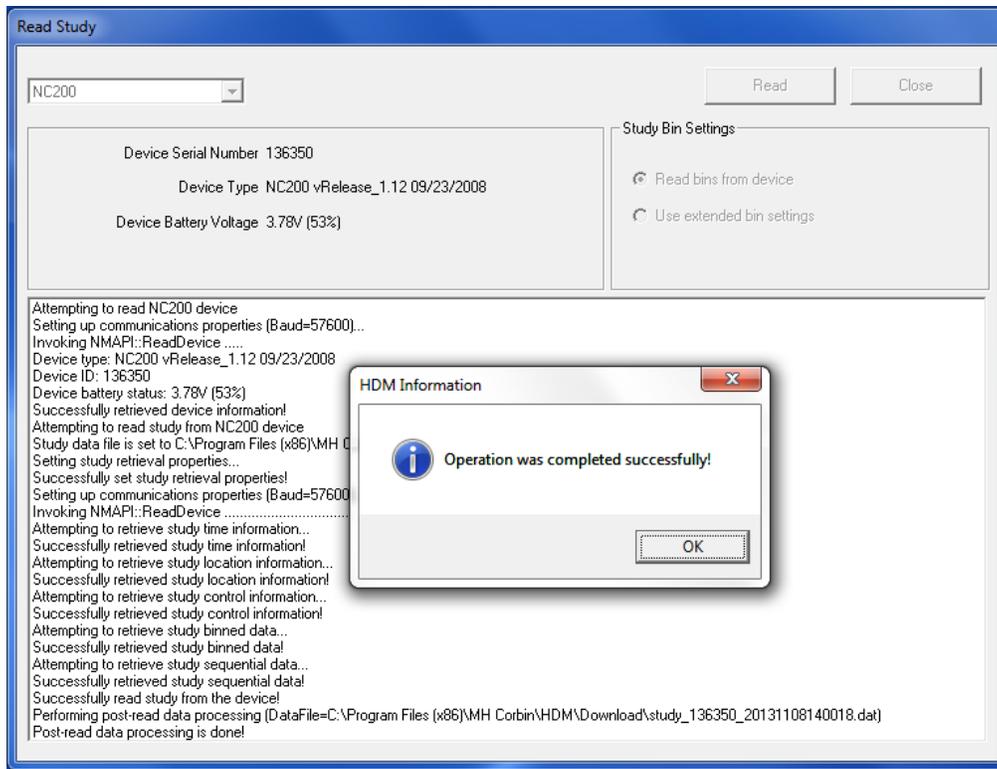


Figure 26: Successfully Read Study

3.1.4.3 Start Battery Discharge Menu Item

The Start Battery Discharge menu item opens up the window that allows user to activate battery discharge circuitry of the portable traffic counter. Line with other device access windows user must select the correct device type to let HDM know what device access method to use.

Only NC300 and most of NC200 devices have this functionality. If the battery discharge activation is attempted on the device that does not support this feature the error message is displayed.

The battery discharge and recharge cycle has nothing to do with the lithium-ion battery maintenance. The NC300 and most of NC200 devices have a circuitry for determining battery capacity. Sometimes this circuitry gets out of synchronization with the battery. Only in those specific cases the user is urged to perform complete battery discharge and recharge. The out of synchronization condition exists whenever the battery voltage is over 4 volts (fully charged NC300/200 battery reads 4.2V) and HDM reported battery percentage is way under or over 100%.

3.1.4.4 Retrieve Battery Information Menu Item

The Retrieve Battery Information menu item opens up the window (see figure below) that allows user to read device identification and battery information.

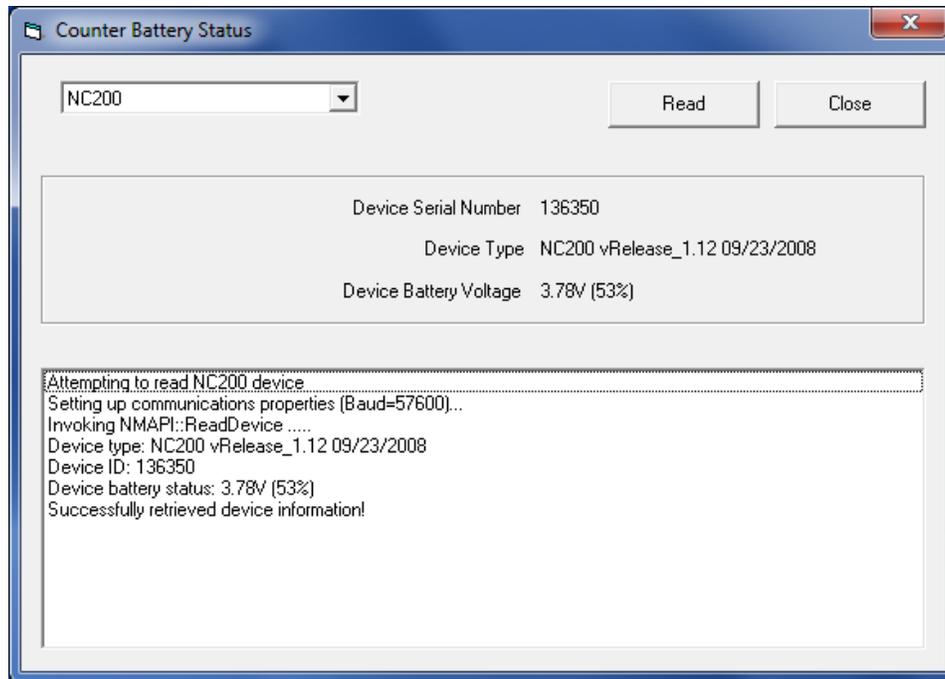


Figure 27: Counter Battery Status Window

User must select the correct device type to let HDM know what device access method to use. After the successful read attempt the window will display the device serial number, the device type and the device battery status (voltage and percentage of charge remaining).

3.1.5 Utilities Menu

3.1.5.1 Import HDM Data File Menu Item

The Import HDM Data File menu item allows user to import HDM data file which contains traffic study.

NOTE: The Read Study menu item is enabled only when a single catalog is selected (which becomes destination catalog for the study).

Whenever HDM reads the study from the device it writes all data into a DAT file and stores that file in the Download directory which can be found in HDM program folder. After successful read HDM imports the file which results in a new study. Thus these data files can be imported into HDM at any other time using Import HDM Data File functionality.

3.1.5.2 Convert Measurement Units Menu Item

The Convert Measurement Units menu item opens up window (see figure below) that presents user with a simple diagram providing a conversion from feet to meters or from meters to feet. Simply slide the pointer to the known feet or meters value and the converted value is shown. More precise values are shown at the top of the window and nearest whole values are shown as pop ups by left clicking the cursors. The range of conversion is limited from 0 to 120 feet consistent with the expected lengths of vehicles.

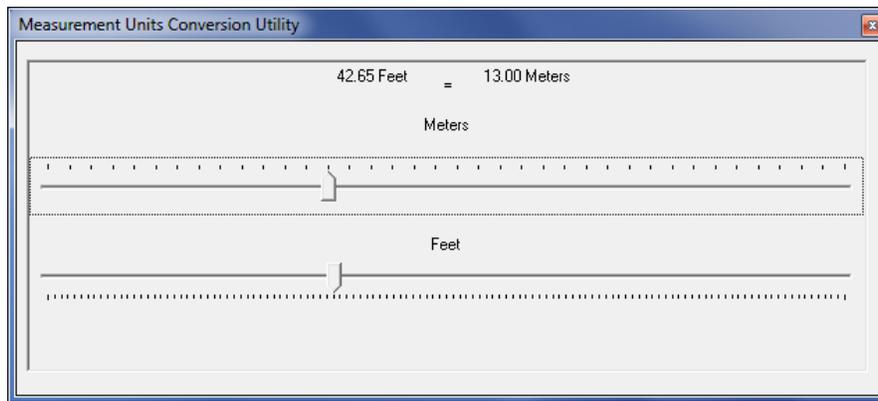


Figure 28: Measurement Units Conversion Utility Window

3.1.6 Help Menu

3.1.6.1 User Manual Menu Item

The User Manual menu item opens up the window that display this user manual.

3.1.6.2 View Configuration Menu Item

The View Configuration menu item opens HDM.ini file. The HDM configuration file (HDM.ini) gets created the first time HDM is run and contains HDM program runtime settings that get preserved between HDM sessions.

3.1.6.3 View HDM Log Menu Item

The View HDM Log Menu Item opens current HDM program log file. If the log file does not exist the menu item is disabled. HDM creates a different log file for each day.

3.1.6.4 View NMAPI Log Menu Item

The View NMAPI Log Menu Item opens current HDM NMAPI log file. If the log file does not exist the menu item is disabled. The NMAPI component is responsible for communications with NC200 and NC300 counters. Thus any errors while accessing those counters will be logged in this log file. NMAPI creates a different log file for each day.

3.1.6.5 View NMAPI Communications Log Menu Item

The View NMAPI Communications Log Menu Item opens current HDM NMAPI communications log file. If the log file does not exist the menu item is disabled. The NMAPI component is responsible for communications with NC200 and NC300 counters. The NMAPI communications log contains all the data bytes sent to and received from the counter. NMAPI creates a different log file for each day.

3.1.6.6 About Menu Item

The About menu item opens up the window that contains information about HDM application.

3.2 Reports

This section lists all reports provided by HDM software. All reports and graphs begin with a title and summary information. For reports, this is followed by boxes with the column headers.

3.2.1 Date/Time/Volume/Average Speed/Temperature Report

The Date/Time/Volume/Average Speed/Temperature report provides detailed information on a period by period basis. Information included in this report consists of volume, average speed for the period, and road temperature. Summaries are provided for the day and the study.

3.2.2 Date/Time/Volume/Average Headway Report

The Date/Time/Volume/Average Headway report shows the volume and average headway for each period in the study. A study summary is provided.

3.2.3 Time/Class Report

The Time/Class report shows the number of vehicles that were classified by length of vehicle for each period and class with totals. An hourly summary and study summary is provided.

3.2.4 Time/Speed Report

The Time/Speed report shows the number of vehicles that were classified by speed of vehicle for each period and class with totals. An hourly summary and study summary is provided.

3.2.5 Class/Volume Report

The Time/Class report shows the number of vehicles that were classified by length of vehicle for each period and class with totals. A percentage of peak traffic is calculated for each period. An hourly summary and study summary is provided.

3.2.6 Average Speed by Class Report

The Average Speed by Class report provides the average speed for each class for each period of the report. The average speed per period is provided along with a daily and study summary.

3.2.7 Summary Report

The Summary report provides a plain text report summarizing all the information obtained by the traffic study. Summary reports were designed to meet management reporting needs.

3.2.8 [Raw] Volume Report

The [Raw] Volume report counts all vehicles detected by the traffic counter. Occupancy is not calculated in this release. A study summary is provided.

3.2.9 [Raw] Class Report

The [Raw] Class report provides the raw classification bins for each period in the study. A total for each length class is provided.

3.2.10 Environmental Report

The Environmental report is available only for studies conducted using NC300 counter that were programmed with HDM v9.2.7 or later. The report provides roadway temperature information as well as voltage and magnetic sensor values of the counter. The information is captured at the end of each period during the study.

3.3 Graphs

HDM graphs are simply reports with graphical component displays. All of the functionality for reports applies to graphs as well.

3.3.1 Speed/Volume Graph

The Speed/Volume graph shows the volume of classified vehicles within each speed class for the study. Actual counts are provided below the graphical display.

3.3.2 Time/Volume Graph

The Time/Volume study shows the volume of vehicles counted for each hour or period (whichever is greater) for a given day.

3.3.3 Gap/Time Graph

The Gap/Time study shows the average gap time in seconds for each hour or period (whichever is greater) for a given day. If the average gap time is 5 seconds, then an average of 12 cars per minute were counted by the traffic counter.

3.3.4 Vehicle Percentage Graph

The Vehicle Percentage graph illustrates the percentage of vehicles that fall into each length class. The actual count is also provided.

3.3.5 Class/Volume Graph

The Class/Volume report displays the volume of vehicles classified by length. A summary is provided after the graph.

4 Appendix

This appendix covers various topics not otherwise related to the specific functionality of the user interface.

4.1 Maintenance Tips:

- **(NC300/200/100 devices)** Keep the unit plugged into the charger when not in use. It will not overcharge.
- **(NC97 devices)** Replace the battery in the IP-10A with a new 9-volt battery once a month. A low battery in the IP-10A causes communication problems. When no communication can be established with the device, check another device for communication as well. If more than one traffic counter fails to communicate, it may be the IP-10A's battery is the source. To be safe, replace the IP-10A's battery often if you use it frequently. If you do not use it frequently, change it the next time you use it, especially at the beginning of the season after sitting for an extended period of time. If you have a voltmeter, use it to check the battery voltage. If the battery is below 8 volts it should not be used in the IP10-A.
- Charge traffic counters for a **FULL 12 HOURS** before programming. The **red** LED on the charger indicates charging of the battery. The **green** LED on the charger indicates that the battery is not being charged. It does not indicated fully charged battery. Thus when charging the battery make sure the charger LED turns **red** and stays that way for some time before turning **green**.

IMPORTANT: When charging the device, always plug the connector into the traffic counter before plugging the AC adapter into the wall socket. When disconnecting the traffic counter from the charger, always remove the AC adapter from the wall socket before disconnecting the traffic counter from the charger.

- Do not charge the NC97 and NC200/100 device after the unit has been programmed for a study. This will cause an interrupt in the program and shut down the traffic counter before the study begins. The NC300 devices can be charged at any time.
- If you are placing the unit on roads that may be exposed to liquids containing high salt concentrations, place tape over the communications pins or place the device in a plastic bag. Highly conductive liquids reaching the programming pins can cause the unit to terminate the study. This is especially true in areas where Magnesium Chloride is used. Magnesium Chloride can also react with aluminum housing of the device and cause damage to the housing. Winter deployment of a traffic counter is risky and not recommended. Snow Plow blades ride on the road surface and will dislodge the unit and potentially damage it.

- Clean the communications pins if you notice a buildup of corrosion on and around the programming pins of the unit. Corrosion can cause failed communication.
- If no communication can be established when reading the device after a study, charge it for at least 15 minutes (or until the NC300/200/100 battery charging light is green), and try again.
- When installing a traffic counter, make sure that the **road surface is level and clear of debris**. The road is not a friendly environment for electronics. The aluminum housing protects the electronic circuitry inside the housing. The aluminum housing is very strong and includes a water tight seal. It is important that the shape of the housing is not altered by the force of tires striking the unit. On a flat surface, the force of impact is evenly distributed. If the unit is installed on an uneven surface, the force of the impact is not evenly distributed. If enough force is applied, the housing may be bent to the contour of the road. If the housing is bent, the watertight seal may be lost. Once this happens, water will eventually enter the unit and start to damage the circuit board. A unit securely installed on a flat area of the road using the protective cover is the best protection against damage.

4.2 Study Finish (F Codes):

All MH Corbin traffic counter keep track of their own current processing state. The unit will transition through several states as it is programmed, prepares for a study, begins and concludes a study. When you read the contents of the unit, one of the values returned from the unit is its current state. In general, at the end of a study you are expecting to see a "F1" state which denotes the normal termination of an active study. This state will be retained in the unit until you program it again when it will again transition through several states until a study is completed.

Status Codes are displayed to you when you are reading the unit or importing a .dat file. The code associated with the study may indicate that some type of error occurred during the study process. Because the only time the Status Code is important is when it indicates some type of Failure, it is typically referred to as a Failure code. These codes are merely displayed by the HDM program, they are internal to the unit and do not indicate a problem with the HDM software. The following list shows the possible Codes that can be generated by a unit during a study:

- **F0 – Start-up State (memory is clear)**
- **F1 – Normal Termination**
- **F11 – Waiting for start time**
- **F13 – In Progress**
- **F14 – Empty Battery**
- **F15 – Memory Full**

4.2.1 F0 – Start-Up State

The F0 state will be seen very seldom by a user, it means that the unit has been initialized and no study state is currently being tracked. This might be a code that you see if you receive a new unit that has been initialized prior to shipment.

4.2.2 F1 – Normal Termination

This status indicates that a study has been completed. The study began on the start date and was concluded on the end date as programmed by the user.

4.2.3 F11 – Waiting for Start Time

The F11 state indicates that the unit was successfully programmed and is waiting for the start time to be reached. If you read the unit at any point prior to the start time, this is the status code that will be reported. If you intentionally read the study before the start time then this code is the expected result. If you read the contents prior to the study start time there will not be any study data to download from the unit.

There are times when this status is reported but it is not the expected result. Here are some of the known ways that this type of status code can be received unexpectedly:

Possible Causes/Solutions:

- The date/time on the computer used to program the unit was not correct. The unit clock is synchronized to the clock of your personal computer during the programming session. You must ensure that the year, month, day and time on your personal computer are accurate. If the date/time on your computer is off by one day, the traffic counter might either begin the study before you get it onto the road or possibly still be waiting to begin the study when you retrieve it.
- Traffic counter was not programmed at least 30 minutes in advance. MH Corbin traffic counters need some warm-up time before they can conduct a traffic study. Failure to give the unit time to adjust itself to the conditions present in the study area can cause unexpected results.
- You failed to remove the programming cable when instructed, or plugged it back in to the serial cable before the study commenced. Once the unit has been programmed, you must unplug it from the programming cable. The unit is constantly checking for input voltages on the serial interface. If it detects voltages, it must assume that a user is initiating a communications session. When a session is initiated, the unit closes down the study.
Once you finish programming the unit, do not plug it into the serial interface until you have removed it from the road and the study has finished.

If you are experiencing repeated F11 failures, please contact MH Corbin customer service for further assistance. Repeated status codes of this type may indicate a problem with the unit's internal clock or a problem with serial communications circuitry.

4.2.4 F13 – In Progress

An F13 error occurs when the unit is interrupted during a study. Possible causes:

- Programming errors.
- Component failure due to road damage.
- High concentration of road salt causing conductivity between the pins.
- The unit could have been dislodged from the road.
- Communicating with the unit before the end time of the study.

If you receive an F13 error and the unit shows no sign of physical damage, follow the steps below:

- Reprogram the unit for a 15-minute study. Be sure to check that the start and end times are correct. The device will be set to match the time on your PC clock. If you try to communicate with the unit before the end time, you will receive the F13 error.
- Place the unit on your desk for the duration of the study. Be careful not to allow any metal to come in contact with the pins. Do not charge the unit after programming a study. This will cause the unit to shut down.
- Wait a few minutes after the end time and download the results from the traffic counter. If the study runs to completion, recharge the unit and program for your next study.
- If you receive the same error message, check the Current.dat file for the failure code and contact MH Corbin customer service.

4.2.5 F14 – Empty Battery

An F14 status indicates that during the study, the battery voltage dropped below normal operating range. To preserve the data already collected the traffic counter will shut down. Possible Causes/Solutions:

- Charge the device for **12 hours** prior to programming the unit or for the NC300/200/100 units, until the green LED is lit. This will ensure that the device is at optimal battery level for your study.
- Check the battery voltage prior to programming the device. The HDM software offers a way to check the battery voltage under the Device menu.
- If a study will be longer than 48 to 72 hours, set the period for reporting data to at least 60 minutes. The smaller the period, the more battery life you use because the unit must format and store the data at the end of each period, which requires more battery power. If you use a 60-minute period, you will use less battery life than if you were using a 1-minute or 15-minute period.

- If the device cannot be charged to full battery capacity, the unit may require repair or battery replacement. Contact MH Corbin customer service.

4.2.6 F15 – Memory Full

An F15 status indicates that the memory capacity was reached while running the study. The unit had no more room to store study data and the study was ended.

Possible Causes/Solutions:

- High volumes of traffic.
- Small reporting periods for a long study.
- Interference in the magnetic field surrounding the traffic counter that kept the unit awake.

To avoid receiving this error, follow the steps below:

- If you are programming for an extended study, such as five to seven days, use a period length of at least 60 minutes. This will allow the traffic counter to store more data while using a smaller portion of the memory.
- If you are placing the device on a heavily traveled road, consider using two traffic counters and joining the studies together. The second traffic counter would need to be programmed to begin at the same time that the first one would end. This would allow you to accomplish the study without exceeding the memory limits of the unit.
- Changes in the magnetic field surrounding the traffic counter can cause the unit to register extremely high counts. AC Power lines, construction generators, or underground power lines can cause such changes. If you suspect that there may be a problem with AC interference, try moving the device to a different location for another study. If the unit still fails due to memory failure, contact MH Corbin customer service.

5 Frequently Asked Questions

- **What does the term "Occupancy" mean?**

Occupancy is the percentage of time during the collection period when vehicles were directly over the unit. If you conducted a study with one minute periods and your occupancy was reported at 10%, vehicles were directly overtop the unit for six seconds. Occupancy is affected by both vehicle volume and speed. At higher speeds, vehicles are only over the unit for a fraction of a second. At slower speeds the same vehicle could be over the unit for several seconds.

- **What is the 85th percentile and how is it calculated?**

The eighty-fifth percentile is a calculation used by traffic departments and agencies as a means of determining a normal range of vehicle speeds. If one hundred vehicles pass through the location, the function would rank the speeds from lowest to highest. The speed of the 85th vehicle would then constitute the 85th percentile. Many agencies post speed limits at the 85th percentile as opposed to the average speed. The average speed separates the fastest 50% and slowest 50% of motorists in a normal speed distribution. In other words, the average speed is typically the 50th percentile speed. Most motorists travel at about the same speeds, so setting the speed limit at the 85th percentile legalizes the vast majority of motorists. About 70% of motorists travel in a 10-mph grouping (called the "pace"), which generally covers all but the fastest 15% and slowest 15%. If the speed limit were set at the average speed, only 50% of motorists would be legalized.

Calculation:

- TotalVehicles = Number of Vehicles in all bins
- Over85% = Sum of Bins until the bin equals or exceeds 85%
- SpeedofBin = SpeedBin Speed when 85% is equaled or exceeded
- SpeedofNextBin = SpeedBin Speed after 85%
- SpeedBinCounts = SpeedBin Count when 85% is equaled or exceeded
- 85%OfTotal = 85% of Total Vehicles

$$85thPercentile = SpeedofNextBin - [(Over85\% - 85\%OfTotal) * (SpeedofNextBin - SpeedofBin)]$$

Example:

	SpeedBinCounts														
SpeedBins	9	10	15	20	25	30	35	40	45	50	55	60	65	70	71
Counts	6	10	32	40	10	2	0	0	0	0	0	0	0	0	0

- TotalVehicles = 100
- 85% of 100 = 85
- Over85% = 88 (including speed of 20)
- SpeedofBin = 20
- SpeedofNextBin = 25
- SpeedBinCounts = 40
- 85thPercentile = (25) - [(88 - 85) / (40) * (25 - 20)]

- **Why is my 85th percentile N/A?**

An 85th percentile value of “N/A” means that the eighty-fifth highest speed value fell in the top speed bin that you defined. The top bin has a minimum value, but no true maximum value. In order for the 85th percentile to be calculated there needs to be a minimum and maximum value assigned to the bin. When you are doing studies specifically to determine the 85th percentile, make sure that your speed bins are setup so that less than fifteen percent of the traffic will be in the top bin. If you ran your study with a NC300 or NC200 counter, use the “derive new study” function to set speed bins with higher values.

- **How is the Average Speed calculated?**

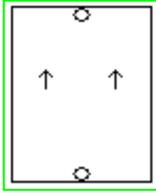
The average speed is calculated by taking the median (center value) for each speed bin multiplied by the vehicle count for each speed bin. The result is then divided by the total number of classified vehicles. Exception: Vehicle counts in the last bin are multiplied by the bin value. No valid center point can be applied to this bin calculation.

NOTE: The center value is calculated by taking the value in the current bin and the value of the next bin. For example, if the second bin range is (10 to 14), the median of 10 to 15 is used.

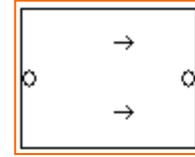
- **Why are volume counts sometimes different then the classified counts?**

When MH Corbin traffic counter detects a vehicle it will register a vehicle count. If the speed and length of the vehicle can be determined, the unit will register the vehicle speed and vehicle length and increment the appropriate bin counts based on the bin settings established by the user. In cases where a vehicle is detected but speed and length cannot be determined, the vehicle count is the only incremented value. This is the basic cause of the difference between volume counts and classified counts.

Speed and length measurements depend on mathematical calculations being made by the unit as a vehicle passes over it. MH Corbin traffic counter has a detection zone around the unit where two sensors measure disturbances to amplified magnetic fields. The circuitry then filters, enhances and applies electronic gain to the detected disturbances. Essentially, magnetic disturbances produced by the ferrous metal in a vehicle passing through the sensing zone are registered by two matching sensing circuits. Each sensors output is aligned so that a correlation can be performed on the two sources of input. The spacing between the two sensors is tightly controlled during manufacturing so that the time it takes for the vehicle to traverse both sensor can be determined with a high level of accuracy. There are times when the magnetic disturbance measured by the two independent sensors is not consistent. In some cases this is due to vehicles changing speed while the vehicle passes over the sensors. A vehicle traversing the unit in a diagonal direction while changing lanes is another potential classification error. Another source of classification problem is experienced when a vehicle has an abnormal construction. Logging trucks typically have a long trailer that is basically a narrow metal beam. This type of vehicle is very difficult to classify correctly for the device using VMI sensors. The likelihood that entire length of the narrow metal beam will be detected is slim and the likelihood that the logging truck will either be counted only or classified as a much smaller vehicle is high. All sensing technologies currently employed for traffic



counting applications have their limitations. A small percentage of anomalies should be anticipated when using any type of traffic counters. In general, set your studies up to run for at least a twenty four hour period. Over this period of time, the statistical significance of an anomaly is greatly diminished.



The angle that a vehicle passes over the unit can also be affected by how you align the unit on the road. Place the unit in a straight section of roadway where vehicles are not in the act of navigating turns or curves.

Align the unit so that vehicles will traverse the unit in the same direction as the arrows visible on the top of the units housing. Do not align the unit so that the arrows point at oncoming traffic, have the arrows pointing the same direction as the traffic.

Placing the unit at an angle, (relative to the flow of traffic) can impact the product's performance. If traffic were traversing this document from bottom to top, ideal orientation to traffic is shown to the left. The absolute worst orientation is as shown to the right. At a 90 Degree angle to traffic flow, oncoming vehicles are detected by both sensors at the same time. The vehicle's speed is undeterminable.

If the unit is not correctly aligned with traffic flow when installed, the calculations used to determine speed are affected. The Cosine of the angle deviating from true traffic flow becomes a permanent bias. For best accuracy, (in terms of speed and length measurements), straight areas of roadway where motorists are not dramatically changing speeds is optimal.

- **What is AADT and AADT factor?**

AADT stands for Annual Average Daily Traffic. Calculating the AADT is the process of normalizing the volume counts obtained by a traffic study to represent a full twenty-four hour day. The AADT Factor is a numeric multiplier to be applied to the study. The AADT Factor is typically assigned by state and federal agencies based on the results of long term count estimates. If your agency does not require that you normalize volumes using adjustment factors for seasonal, day of the week or other criteria, use 1.0 as the AADT factor. This applies no additional adjustment to the volume except for the basic determination of a normalized twenty-four hour volume calculation. AADT volume will always be a representation of twenty-four hour period of normalized traffic. The AADT count is determined based on raw count. Any vehicle detected by the unit regardless of classification is included.

- **What is Period?**

The study period is an interval of time that the unit will use for accumulating volume and traffic statistics. Each time the interval is met, the unit will store traffic statistics. If you specify a five minute period, a traffic frame will be created and stored by the unit every 300 seconds. The period has a direct relation on the amount of memory allocated for a study. Make sure that the collection period is short enough to give you the detail you need, but long enough to be sure the unit will be able to store the whole study in memory.

- **What is the difference between Raw Count and Classified Count?**

The Raw Count includes ALL vehicles detected by the unit. The Classified Count includes only the count of vehicles that were classified by speed and length. If the vehicle's speed and length

could not be determined, the vehicle is Unclassified which means reflected in the Raw Count, but not reflected in the Classified Count.

- **I have a lot of studies in my catalog. How can I organize them?**

HDM lets you open multiple catalogs at the same time. This makes it easy for you to organize your studies into smaller groups. Remember you can sort the studies displayed by clicking on the field name in the Study Window. The studies in the currently selected catalogs will be sorted by that field. Clicking the same field again reverses the sort order (ascending or descending).

- **How far in advance can I program a traffic counter?**

HDM will allow you to select the maximum number of days before deployment. HDM will allow you to set your threshold to a maximum of 28 days. This maximum threshold was set for select customers with highly specialized units. There are very few cases where this much lead time is actually necessary or desired. Remember that the unit is consuming battery while it is waiting for the programmed start date and time. You should program the unit as close to the start date and time as is possible so that you are not unnecessarily consuming battery capacity. If you are conducting studies of a duration that comes close to the maximum battery capacity of the unit, you should fully charge the unit and program it to commence the study within hours, not days. A lead time of one day is sufficient in almost all cases for getting the units to the location to be deployed.

- **For how many days can I program a traffic counter?**

The number of days that a study can last depends on the volume of traffic, the period length, and the battery voltage. A high volume road with a period of 1 minute will not last more than a day or two. To maximize the number of days in a study, increase the period and ensure that the batteries are fully charged. Check your user manual for specifications on your particular traffic counter. See the device programming section for more information.

The NC300 and NC200/100 counters have a fail-safe mechanism in it that stops the study when the battery gets too low. Program the study for an unreasonable amount of days if you wish (say a 31 day study). Pick it up within a day or two after the study was to end and you will still get all of the data up until the time that the battery voltage dropped to an unacceptable level.

- **How long should I charge the MH Corbin traffic counter?**

NC300 and NC200/100: Charge the battery until the LED on the cable turns **green** for a full charge. The battery will not over-charge, so you don't have to watch it closely. The simplest way to maintain operational readiness is to always plug in the charger when the unit is not programmed for a study.

Older models: MH Corbin traffic counter should be charged for a **full 12 hours** before the unit is deployed. The unit needs 12 hours to get a full charge. If you charge the device for less than 12 hours the voltage might read OK but it will not last long.

- **What is the best way to install a traffic counter?**

You can refer to our online **Installation Guide** that uses our Protective Cover. The hard rubber Protective Cover is the recommended method of installation because it is quick, easy and provides the protection that will give your traffic counter a long service life.

- **If MH Corbin traffic counter is left under water, will it be damaged?**

As long as the device maintains a water-tight seal it should be fine. The pin holes are sealed from the inside so moisture should not penetrate the unit. Before reading the study please ensure that the pin holes are clean and dry.

If your unit is damaged, contact the MH Corbin customer support for an RMA. Follow the instructions in the Operations Manual when installing your units on the roadway. The best way to prevent damage is to not subject the unit's enclosure to uneven pressures. Avoid areas of the roadway where the surface is pocked, jagged or extremely uneven. Pieces of asphalt or concrete jutting up from the surface should be avoided when selecting the area of placement. If a vehicle's tire traverses the installed unit, the unit is pushed downward by the impact. When the unit is installed on a normal area of the road surface, the force is evenly distributed with no ill effects. If the unit is installed on top of an extrusion, the extrusion becomes a single point of impact and a potential source of damage.

- **Is the data collection at extreme temperatures as accurate as within normal ranges?**

The sensors have been tested in environmental chambers at temperatures ranging from -30 °C to +75 °C (-22 °F to +167 °F). The MH Corbin traffic counters were accurate throughout.

- **Why do I have counts in my highest speed bin when I know for a fact that no one goes that fast?**

If the vehicle passes over only a small portion of the traffic counters detection zone the counter will "see" it as a fast going long vehicle. Typically such vehicle records will have speeds above 100 mph. HDM displays data as it was collected by the counter and leaves filtering out of such records up to the user. The filtering out is done by setting data filters in HDM (Application -> Properties -> Study menu item) before new study is read from the counter or before new study is derived from one or more existing studies.

6 Troubleshooting

- **NC97 Traffic counter communication failure:**

Check the cables and IP adapter.

Ensure everything is connected properly.

The red light on the IP adapter should be illuminated.

If the red light on the IP is not illuminated when using the device:

- You may have the wrong Com port selected.
- The IP adapter may need a new battery.
- Try performing the same operation one more time.

- **Traffic counter is reading very high car counts and the speeds are wrong:**

MH Corbin traffic counter use magnetic fields to measure car counts and car speeds. AC current will also register on the device. This may result in huge car counts and speeds. The best solution is to move the device and try again. Take a look around and make sure there are no electrical boxes on the side of the road or power lines overhead. If you can't see anything, the power lines may be buried. Run a series of short studies (15 minutes) up or down the road until you find a spot where there is no interference.

- **The study status is WAITING or F11:**

The traffic counter started the study but never finished the warm-up.

Did you pick the device up too early?

- The interface cable was unplugged after acknowledging the prompt to disconnect the device. Please make sure you disconnect the device and only then dismiss the prompt window.
- View the header and check the Start Time. You may have picked up the unit during its magnetic warm-up time.
- The unit has a hardware problem. Program a 10-minute study and place it on your desk for the duration of the study. Read the study once it has completed. All counts should be 0, but the study should conclude successfully. If this does not work, contact your distributor or MH Corbin customer service.

- **The study status is In Progress or F13:**

The traffic counter did not complete its study. It shut down before the programmed End Time. Usually the data up to this point is OK, but it did not run the full time. Sometimes this indicates a hardware problem. Sometimes the reason is obvious, such as the unit sustained damage or came loose from the road.

When there is no obvious reason, the unit may have a hardware problem. Program a 10-minute study and place it on your desk for the duration of the study. Read the study once it has completed. All counts should be 0, but the study should conclude successfully. If this does not work, contact your distributor or MH Corbin customer service.

- **The study status is Empty Battery of F14:**

The battery in the traffic counter dropped below the minimum allowed by the program. To protect the memory, the device turned itself off. The study up to this point is OK, and the data can be used. Make sure you re-charge this device for a full 24 hours before using it again. No harm is done to the unit when this happens. You might check the length of the study against the table of the battery life in the traffic counter manual and ensure the device can actually run long enough to complete the study.

- **The study status is Memory Full of F15:**

The memory of the traffic counter is full and the program shut down to preserve the data to this point. The data read is OK.

7 Software License Agreement

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