



DATREND  
Systems Inc.

**CMX<sup>TM</sup>**

**Interface Application for  
vPad and ES-601  
Electrical Safety Analyzer**

Operating Manual



**CMX™**  
*Interface Application for  
vPad and ES-601 Electrical Safety Analyzer*  
Operating Manual

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## Abbreviations and Definitions

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The following abbreviations, terms and acronyms may be used throughout this manual:

<b>App</b>	Software application for a mobile device
<b>Safety Standard</b>	Standards established by various national and international agencies. The most recognized Standards Organizations include: AAMI - Association for Advancement of Medical Instrumentation IEC - International Electrotechnical Commission

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## Symbol Definitions

The following symbols may be found on the vPad-ES, vPad-353 and/or ES601 which is used in conjunction with the CMX App. Observe these precautions:



CONSULT MANUAL FOR PROPER OPERATION

Operating manuals are available which provide valuable information on the proper use of the safety analyzers. It is highly recommended the operator read the instructions thoroughly before operating the device. It is possible to damage the Equipment Under Test (EUT) and/or cause harm to the operator if the safety analyzer is used incorrectly.



Patient Leads: Hazardous Voltage: 264 VAC or 500 VDC max

This warning appears on the label for the patient lead connections. During electrical safety testing of the isolation of the EUT patient applied parts leads with respect to either ground, or to the power input leads, a voltage of either 100% of the AC line voltage may be present on the (CAT I) lead connectors. This voltage may reach a maximum of ~264 VAC and, while current limited, represents a serious shock hazard to the operator. Proper precautions should be taken when performing a test which includes the application of this voltage to the EUT patient leads. The display of safety analyzer will indicate when a hazardous voltage is present at the patient lead connectors.



CAUTION: Electrical Shock Hazard, Refer Servicing to Qualified Personnel  
CAUTION: Consult Accompanying Documents

These warnings appear on the serial number label of the safety analyzers. The safety analyzers contain hazardous electrical voltages internally which WILL BE present when the covers are removed. The operator should read the Operating Manual to determine what actions to take in the event of failure of the safety analyzer. Refer to the Troubleshooting and Maintenance Section of the Operating Manual for the analyzer.



Kelvin Cable

The Kelvin Cable (CAT I) is used to measure the Line Cord Grounding Resistance, using a 25 Amp rms current, or, a pulsed 1 amp current (200 mA RMS). The voltage present at these terminals is below 6 volts. Consult the Operating Manual of the safety analyzer for the proper operation of the Grounding Resistance test.

## CMX OPERATORS MANUAL



DO NOT EXCEED THE FOLLOWING CURRENT LOAD ON THE EUT RECEPTACLE:

15AMPS @ 100 - 120 VAC, 60 Hz (in 20A circuit)  
11AMPS @ 100 - 120 VAC, 60 Hz (in 15A circuit)  
12AMPS @ 230 VAC, 50 Hz (in 16A circuit)

The regulatory requirements for loading a circuit (cct.) in a power distribution system sets a current limit on any individual receptacle to 80% of the value of the circuit breaker on that circuit. For instance, in a circuit with a 15A circuit breaker (or fuse), the maximum current allowed to be drawn from any individual receptacle is 12A. Allowing 1A for the safety analyzer circuitry, the load current for the Equipment Under Test (EUT) should not exceed 11A. These limits are set by the Electrical Code in most jurisdictions in an attempt to avoid unexpected circuit overloads and subsequent circuit failure. If the EUT load is expected to approach the maximum value on a routine basis, it is recommended that a circuit with only a single receptacle be provided for use with the safety analyzer.



WARNING: OPENING THE <Safety Analyzer> MAY COMPROMISE USER SAFETY.  
REFER SERVICING TO DATREND AUTHORIZED AGENT.

A safety analyzer is a complex instrument which contains internally distributed line voltages and other high voltages for specific measurement purposes. Failure to observe appropriate measures when the instrument has been opened, or failure to reassemble correctly may compromise the safety of the user.



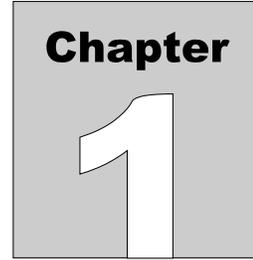
WARNING: GROUNDING CIRCUIT CONTINUITY IS VITAL FOR SAFE OPERATION. NEVER OPERATE THE <Safety Analyzer> WITH GROUNDING CONDUCTOR DISCONNECTED.

Proper grounding is essential to ensure operator safety. Do not bypass the grounding provisions inherent in the design of the safety analyzer, otherwise, the operator may be subjected to an electrical shock risk.



WARNING: HAZARDOUS VOLTAGES OR CONDITIONS MAY EXIST DURING TESTS. CONSULT THE ACCOMPANYING DOCUMENTS FOR APPROPRIATE PRECAUTIONS.

During the execution of an electrical safety test on the EUT, the safety analyzer may apply a high voltage (up to 264 VAC) to the EUT. While this voltage is current limited, it does represent a shock hazard to the operator if precautions are not followed. Consult the instructions in this manual regarding Isolation Leakage Current tests (MAP test) for further information.



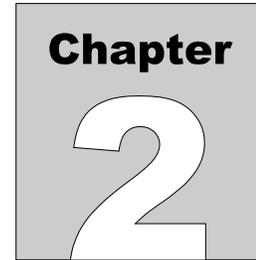
# 1 Specifications

CMX™ is a software application which is used as a bridge between a number of existing CMMS programs and the Datrend safety analyzers: ES601, vPad-EST™, vPad-EST™ Rugged, and vPad-353™. Many CMMS systems currently on the market have the ability to interface to the medTester Safety Analyzer, a legacy product from the 1980's. As the only automated platform at that time, CMMS vendors developed interface modules which communicated with the medTester via RS-232 serial protocols to load the tester with test parameters and collect the test results for inclusion in the CMMS program. In addition, the CMMS programs normally create (duplicate) test parameter files on the PC and can import test report files which exist on the PC (from other sources).

Other CMMS programs exist which do not have a medTester interface. In these cases it may be possible to use the vPad-EQM™ app as a basic CMMS interface. See the vPad-EQM™ Operator's Manual for further details.

Datrend utilizes the file export/import capabilities of the CMMS program as the communication link between the Datrend safety analyzers and the CMMS program.

**CMX OPERATORS MANUAL**



## 2 Overview

CMMS systems typically have the ability to create filtered lists of scheduled preventive maintenance and performance testing activities. These activities are normally in the form of a list of tasks (a procedure) to be performed for each device or device type in the asset inventory. These lists may be printed out, presented on-line or in some cases transferred to a testing device for completion. The only available testing device for many years was the medTester automated safety analyzer. This limitation has been removed with the availability of the Datrend line of safety analyzers: ES601, ES601-CMMS, vPad-ES, vPad-ES Rugged, and vPad-353. By utilizing the same basic CMMS output, Datrend safety analyzers can work together with the CMMS system to provide the legacy input/output features of the CMMS system with the updated capabilities and features of Datrend's safety analyzers.

There is a large population of legacy medTester users with CMMS programs which have procedures and tasks entered based on the criteria of the original medTester interface. The CMMS programs are also setup for this type of procedure and task entry. To maintain compatibility with what has become a standard input/output methodology, Datrend has adopted the same basic process, modifying certain items to provide improved capabilities where warranted. CMX is a bridge between the output files of the CMMS program and the Datrend safety analyzer, making file format changes or correcting faulty data as needed to ensure the procedures are executed correctly.

Datrend's ES-601 has an interface program (ES601pc) which allows information to be transferred via USB between the analyzer and the PC. There may be, however, entries in the export files that are not in the correct format. These errors can stem from using incompatible codes for procedures or tasks, data entry errors in the CMMS system, unusual outputs from the CMMS system, duplicate entries, etc. The medTester would allow these entries to be downloaded, but would simply ignore things it did not understand. This could allow procedures or tasks to be skipped, or devices to be 'unavailable' from the medTester selection (they simply would not appear in the listing). CMX can be used as a pre-processor for the export files to identify and correct these types of errors before loading them into the ES601.

Datrend has developed these error checking/correction capabilities on the basis of extensive review of typical outputs from the CMMS systems to which our customers have access. In the event you encounter export files which will not convert correctly using CMX, contact Datrend customer service and Datrend will work with you to improve the capabilities of CMX to meet your needs.

For ES601-CMMS and the vPad safety analyzers, CMX performs the same sort of error checking and provides output options depending on the specific analyzer.

## 2.1 Features

### 2.1.1 Automation Autosequences

An integral part of an automated test system is the ability to perform a predefined safety test or to communicate with an external test device (eg. Defibrillator tester) using a single 'AutoSequence' code. In the medTester, there are a series of AutoSequences, A1 through A89, that are predefined for use with the CMMS programs. Some of the AutoSequences are reserved for electrical safety tests and some are reserved for external testers.

For example:

AUTOSEQUENCE A4 is an electrical safety sequence  
AUTOSEQUENCE A31 is a defibrillator tester (Impulse 4000) sequence  
AUTOSEQUENCE A63 is an electrosurgical tester (DNI 454) sequence

Datrend safety analyzers have improved upon the flexibility of automated testing, and (may) use alternate coding for equivalent AutoSequences. Because users may have expended a considerable amount of effort in creating procedures which include the legacy sequence designators (A1 - A89), CMX is designed to map the legacy codes to the equivalent Datrend code, wherever necessary.

### 2.1.2 Test Instructions

Certain test instructions (tasks) may not be executable as written. CMX reviews the tasks, highlights the questionable tasks and provides the opportunity to modify the task to execute correctly.

### 2.1.3 Procedure Checking

CMX checks the procedure lists and the tasks for continuity, and automatically corrects task numbering and procedure listing errors wherever possible.

### 2.1.4 Equipment Lists Conversion

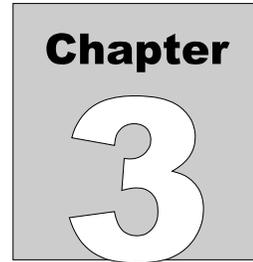
ES601-CMMS and vPad safety analyzers have the capability of including equipment information (eg. Make, model, serial number, etc.) in the equipment test record. This can always be entered manually for each test, but if the information is available from the CMMS system, it can be provided to the safety analyzer for automatic view, editing and inclusion in the test record. CMX will convert a CSV (comma separated value) file from a CMMS program into a vPad or ES601-CMMS compatible format and send the file to the appropriate location for the safety analyzer.

## **2.2 System Requirement**

CMX runs on Win 7, Win 8 and Win 10. For Bluetooth file transfer between the PC and the Android tablet for vPad, if the Windows computer does not have built in Bluetooth support, Bluetooth hardware such as a Bluetooth dongle (eg. Iogear GBU521W6 or equivalent) needs to be installed on the PC. The Microsoft Bluetooth stack and Broadcom WIDCOMM stack are supported.

Microsoft Netframework 3.5+ is needed on the PC to use the Bluetooth file transfer feature.

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## **3 Installation**

The CMX program is provided as a self installing executable file, CMX\_Setup.exe. In some instances, access to certain locations on your PC may be restricted and this program will need to be installed by the Administrator of the computer. If there are any problems in installing or using the program due to missing files (eg. missing INI file), contact your IT department for assistance.

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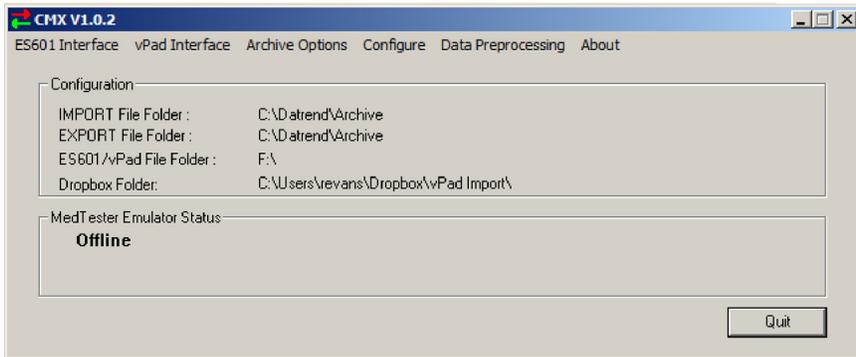


# 4 Operation

This chapter explains how to use CMX with the ES601 and vPad safety analyzers.

## 4.1 Main Screen

The CMX main screen provides 6 menu items, as shown in Figure 1



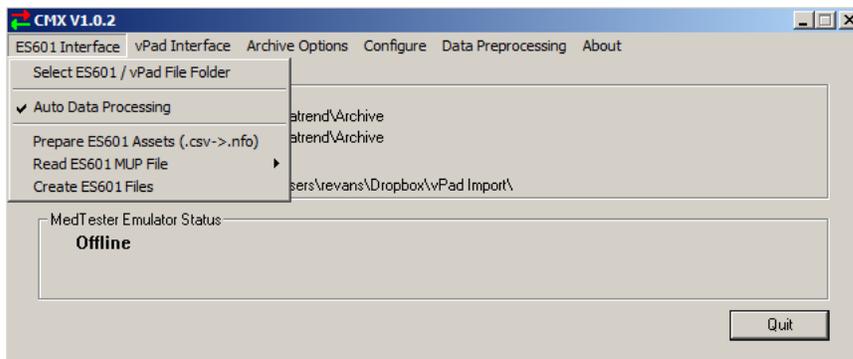
The options available under each of the menu items will be described in detail in the sections following.

## 4.2 ES601 Interface

The Interface menu item provides six options for data processing.

### 4.2.1 Select ES601/vPad File Folder

The ES601/vPad File Folder is the destination folder for the data files to be sent to the ES601-CMMS or the vPad safety analyzer, as created by CMX. The files used by ES601-CMMS have a different format than the vPad files. This is where CMX will place the files created when the **Auto Data Processing** or the **Create ES601 Files** option is checked. This would normally be a USB drive, but may be a folder on the PC.



The ES601-CMMS safety analyzer uses a USB drive to transport files between the analyzer and the PC. If the intent is to have the same schedule and equipment data on every ES601-CMMS device in the department, this destination folder should be a folder on the PC. Once the output data has been created and stored in this folder, it can be copied directly to multiple USB drives without reprocessing the original CMMS data files. If you have only one ES601-CMMS analyzer, or prefer to have different schedules on each ES601-CMMS you have, then the destination folder can be the root folder of the USB drive. In this case, the USB drive **MUST** be moved from the ES601-CMMS device to the PC first. If you intend to have one schedule per analyzer, you will need to create a new set of MTEXT files on the CMMS system for each schedule and then process the files using CMX. If you are using vPad and wish to transfer data on a USB drive, this is the means to identify the USB drive location.

When you select this option, the following Browse for Folder dialog box will appear. Select the USB drive or the folder location where you wish the CMX output to be placed.



### 4.2.2 Auto Data Processing

If the CMMS program can not create the MTEXTORT files directly, without the medTester connected, checking this option will cause the CMX program to emulate the medTester, responding to the CMMS commands on the serial port. For this to work, certain hardware and software configurations are required, see [Configure COM Ports](#).

With this option enabled, and the CMX/MedTester Emulator Status window showing **Ready**, CMX will automatically respond to the CMMS program's RS232 commands as it tries to upload or download information. The files received in this mode will automatically be processed, however, they may contain errors (see [Data Preprocessing](#)). The preferred method is to create files on the PC and import files from the PC so that they can be validated for errors/bad data.

### 4.2.3 Prepare ES601 Assets (.csv →.nfo)

Automated Safety Analyzers generally have the ability to manually input Asset (Equipment) information, such as Make, Model, etc., into the test record. Normally these fields are left blank in the test record, as inputting the information is too time consuming. ES601-CMMS and vPad are able to utilize an equipment information data set provided by the CMMS system to populate these fields automatically. In the vPad Interface tab, the same process is followed for the **Prepare Equipment File** option, and this option is covered here.

For ES601 Safety Analyzers, select the **Prepare ES601 Assets (.csv →.nfo)** option.

For vPad Safety Analyzers, select the **vPad Interface\Prepare Equipment File** option.

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Using the CMMS system, create an Excel Spreadsheet output of the complete equipment asset database, named equipment.xls or .csv, with the following fields included (in this preferred order, if possible):

- Control Number (asset #, ID, Tag,...)
- Description
- Manufacturer (Name)
- Model
- Serial Number
- Location (eg. ICU)
- Facility (eg. Women's Clinic)

for vPad only, the following may be included:

- Checklist
- Tech
- Last PM Date (mm/dd/yyyy)
- Next PM Date (mm/dd/yyyy)
- Schedule (# months)
- Status
- RiskManagement
- AEM
- Address1
- Address2
- Address3
- SoftwareVersion
- Department
- Room
- Edited
- ActiveState

The CSV file would then have information in the following format for ES601:

```
line 1: "Control Number","Description","Manufacturer","Model","Serial Number","Location","Facility"  
line 2: "091302B","BLENDER, AIR/O2","BIO-MED DEVICES","2001","091303B","Riverside","Riverside"
```

If the file is for vPad, the following additional information can optionally be included:

```
line 1: , "Checklist","TechCode","Last PM Date","NextPM Due","Schedule","Status","RiskManagement", "AEM"  
line 2: , "Pulse Oximeter", "Smith", "1/3/2011", "1/3/2012", "12", "Pass", "Level 3", "None"  
  
line 1: , "Address1", "Address2", "Address3", "SoftwareVersion", "Department", "Room", "Edited", "ActiveState"  
line 2: , "101 Smith St", "Richmond", "VA", "Rev 1.7", "Enterology", "Rm 223", "0", "1"
```

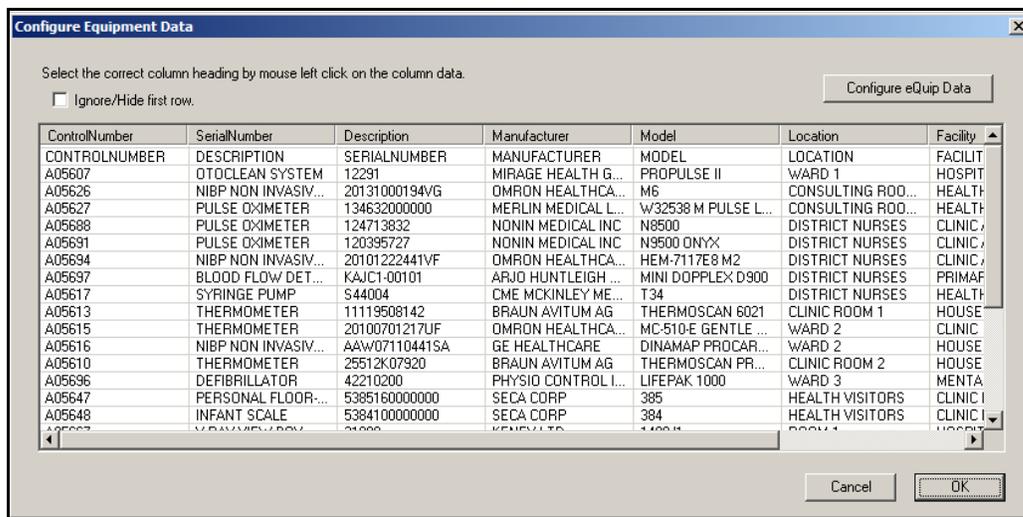
Where line 1 is the titles line and lines 2 through ##### are the actual data for the equipment asset(s). Consult the vPad-mT and vPad-EQM program manuals for descriptions of the optional fields.

## CMX OPERATORS MANUAL

Open the equipment.csv file in Excel and use Format/Column/Autofit Selection, and scan through the data for any obvious errors in format. Fix any issues that are encountered, then Save As a CSV file of the same name. Of particular note is the serial number field. If it is long and all numeric, Excel may automatically convert it to exponential format (eg. 1.56E+8 from 156009843). To obtain the correct number, reformat these cells to Numeric with 0 decimal places.

If the CSV file is for ES601-CMMS, it can be read and converted to ES601 format, and automatically copied to the **ES601 File Folder** using the **Create ES601 Files** option.

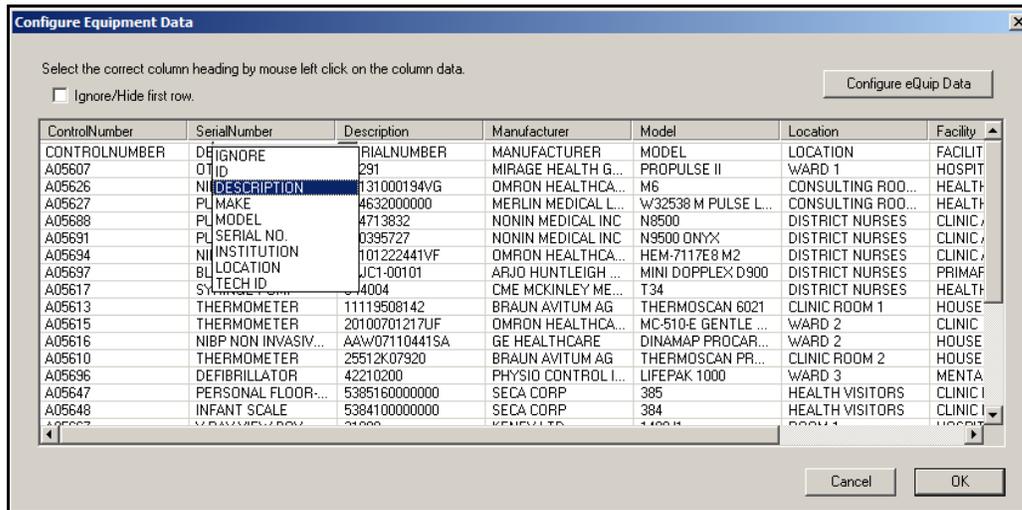
When you select a **Prepare ...File...** option, a standard Windows Open File dialog box will be presented. Navigate to the location of the Equipment CSV file, select the file and press **Open**. The **Prepare** function will read the data in the CSV file and present it on the screen as shown below:



ControlNumber	SerialNumber	Description	Manufacturer	Model	Location	Facility
CONTROLNUMBER	DESCRIPTION	SERIALNUMBER	MANUFACTURER	MODEL	LOCATION	FACILITY
A05607	OTOCLEAN SYSTEM	12291	MIRAGE HEALTH G...	PROPULSE II	WARD 1	HOSPIT
A05626	NIBP NON INVASIV...	20131000194VG	OMRON HEALTHCA...	M6	CONSULTING ROO...	HEALTH
A05627	PULSE OXIMETER	134632000000	MERLIN MEDICAL L...	W32538 M PULSE L...	CONSULTING ROO...	HEALTH
A05688	PULSE OXIMETER	124713832	NONIN MEDICAL INC	N8500	DISTRICT NURSES	CLINIC
A05691	PULSE OXIMETER	120395727	NONIN MEDICAL INC	N9500 ONYX	DISTRICT NURSES	CLINIC
A05694	NIBP NON INVASIV...	20101222441VF	OMRON HEALTHCA...	HEM-7117E8 M2	DISTRICT NURSES	CLINIC
A05697	BLOOD FLOW/DET...	KAJC1-00101	ARJO HUNTLEIGH ...	MINI DOPPLEX D900	DISTRICT NURSES	PRIMAF
A05617	SYRINGE PUMP	S44004	CME MCKINLEY ME...	T34	DISTRICT NURSES	HEALTH
A05613	THERMOMETER	11119508142	BRAUN AVITUM AG	THERMOSCAN 6021	CLINIC ROOM 1	HOUSE
A05615	THERMOMETER	20100701217UF	OMRON HEALTHCA...	MC-510-E GENTLE ...	WARD 2	CLINIC
A05616	NIBP NON INVASIV...	AAW07110441SA	GE HEALTHCARE	DINAMAP PROCAR...	WARD 2	HOUSE
A05610	THERMOMETER	25512K07920	BRAUN AVITUM AG	THERMOSCAN PR...	CLINIC ROOM 2	HOUSE
A05696	DEFIBRILLATOR	42210200	PHYSIO CONTROL I...	LIFEPAK 1000	WARD 3	MENTA
A05647	PERSONAL FLOOR...	5385160000000	SECA CORP	385	HEALTH VISITORS	CLINIC I
A05648	INFANT SCALE	5384100000000	SECA CORP	384	HEALTH VISITORS	CLINIC I

Since the columns may not be in the expected order the first time the program is run, they may not be named correctly yet, and may be showing the column name as SerialNumber when the file's column name (included in the file) is DESCRIPTION. Click below the column name bar in the columns where the names do not match. A list box will appear which provides a selection of the 'correct' names. Select a name for the column, and it will be applied to the title bar. The number of columns will differ between the ES601 and the vPad option. Provide the correct name that identifies the contents of each column. CMX will place the data in the correct order in the output file based on the names that have been applied to the columns. In the above example, column 1 has been identified as the 'ID' (Control Number), and the second column is about to be identified as the description.

## CMX OPERATORS MANUAL



The first row of the database commonly contains the column titles, as assigned by the CMMS program. This is useful when assigning the CMX column names, but is not necessary for the output file. Check the **Ignore/Hide first row** checkbox to exclude the first row from being included in the output.

### 4.2.4 Read ES601 MUP File

When test reports are created, the ES601-CMMS safety analyzer stores the test records on the USB drive on the analyzer. When transferring test records to the PC, the USB drive is removed from the ES601-CMMS and placed in a USB port on the PC. This USB port is the **ES601/vPad File Folder** as selected in 4.2.1. If the USB port where the USB drive has been placed is not the same as indicated on the screen, correct the **ES601/vPad File Folder** before proceeding.

On the USB drive, for ES601-CMMS, the test records will have been stored in a file named **ES601IMP.MUP**. When you **Read ES601 MUP File**, CMX will read the test record file, rename it to **MTIMPORT.MUP** and place a copy in the **MUP File Folder**. Depending on the archive setting in 4.3.3, the MUP file on the USB drive may be deleted.

### 4.2.5 Create ES601 Files

The output files from the CMMS system (**MTEXTPORT.IDN**, **MTEXTPORT.IDN** and **MTEXTPORT.LST**) should be placed in the **EXPORT File Folder**. This can normally be set as the destination in the CMMS program. If the files are found where expected, CMX will process and reformat the data into files that are compatible with ES601-CMMS.

If an error occurs when processing the **MTEXTPORT** file(s), an error dialog box will be presented. If, when processing the **ITM** file, there are commands encountered that can easily be fixed, the error box will allow this to be done. If the errors can not easily be corrected, it may be necessary to

## **CMX OPERATORS MANUAL**

Preprocess the files to identify and correct more serious problems. Preprocessing will be discussed in section 4.5.

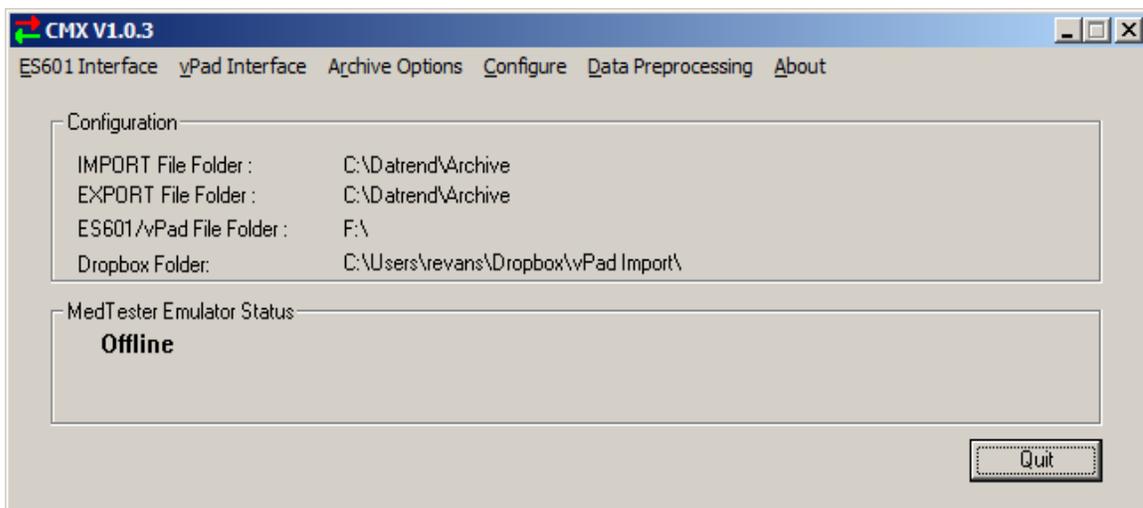
The output from this option is 4 data files (ES601EXP.EQR, .INS, .TP1 and .TP2) which are placed in the **ES601/vPad File Folder** destination.

## 4.3 vPad Interface

The Interface menu item provides seven options for data processing.

### 4.3.1 Use USB Transfer

The Use USB Transfer option specifies that the destination for the data files to be sent to the vPad safety analyzer, will be the location (USB or folder) as defined in the **ES601 Interface>Select ES601/vPad File Folder**. This is where CMX will place the files created when the **Export...** option (below) is selected. This would normally be a USB drive, but may be a folder on the PC.



### 4.3.2 Use Bluetooth Transfer

The Use Bluetooth Transfer option specifies that the data files to be sent to the vPad safety analyzer tablet, will be sent via Bluetooth. This is the method of file transfer to be used when an **Export...** option (below) is selected.

### 4.3.3 Use Dropbox

The Use Dropbox option specifies that the destination for the data files to be sent to the vPad safety analyzer, will be the location of the Dropbox folder on the PC, as selected on the **Configure** tab. Dropbox must be installed on the PC, and on the vPad tablet for Dropbox file transfers to work.

## CMX OPERATORS MANUAL

### 4.3.4 Prepare Equipment File

Using the CMMS system, create an Excel Spreadsheet output of the complete equipment asset database, named equipment.xls or .csv, with the following fields included (in this preferred order, if possible):

- Control Number (asset #, ID, Tag,...)
- Description
- Manufacturer (Name)
- Model
- Serial Number
- Location (eg. ICU)
- Facility (eg. Women's Clinic)
- Checklist
- Tech
- Last PM Date (mm/dd/yyyy)
- Next PM Date (mm/dd/yyyy)
- Schedule (# months)
- Status
- RiskManagement
- AEM
- Address1
- Address2
- Address3
- SoftwareVersion
- Department
- Room
- Edited
- ActiveState

The CSV file would then have information in the following format:

```
line 1: "Control Number","Description","Manufacturer","Model","Serial Number","Location","Facility"
line 2: "091302B","BLENDER, AIR/O2","BIO-MED DEVICES","2001","091303B","Riverside","Riverside"

line 1: ,"Checklist","TechCode","Last PM Date","NextPM Due","Schedule","Status","RiskManagement","AEM"
line 2: ,"Pulse Oximeter","Smith","1/3/2011","1/3/2012","12","Pass","Level 3","None"

line 1: ,"Address1","Address2","Address3","SoftwareVersion","Department","Room","Edited","ActiveState"
line 2: ,"101 Smith St","Richmond","VA","Rev 1.7","Enterology","Rm 223","0","1"
```

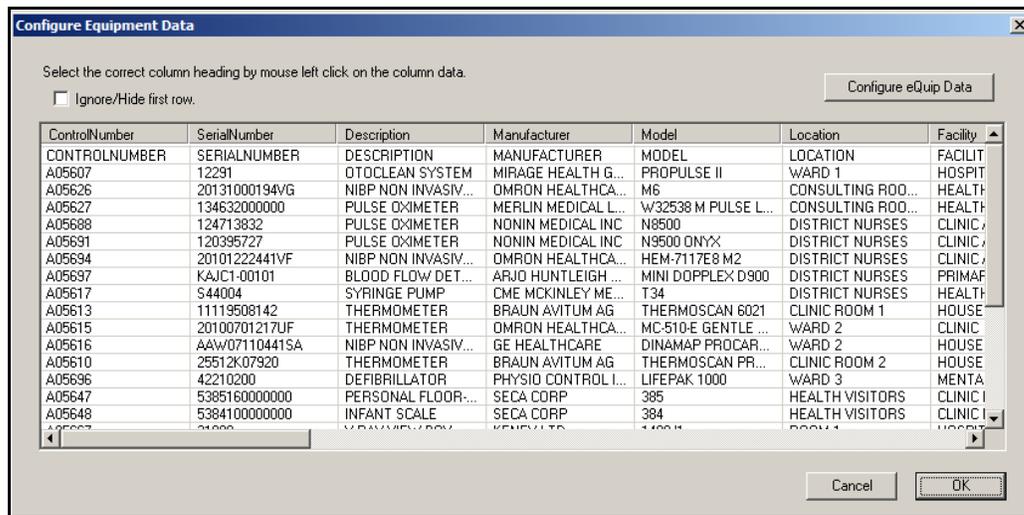
Where line 1 is the titles line and lines 2 through ##### are the actual data for the equipment asset(s). Consult the vPad-mT and vPad-EQM program manuals for descriptions of the optional fields.

Open the equipment.csv file in Excel and use Format/Column/Autofit Selection, and scan through the data for any obvious errors in format. Fix any issues that are encountered, then Save As a CSV file of the same name. Of particular note is the serial number field. If it is long and all numeric,

## CMX OPERATORS MANUAL

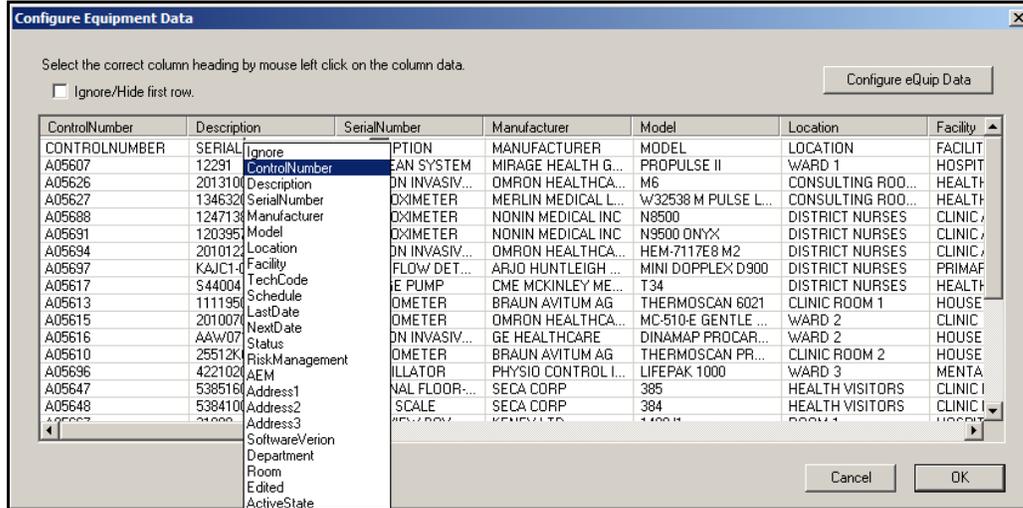
Excel may automatically convert it to exponential format (eg. 1.56E+8 from 156009843). To obtain the correct number, reformat these cells to Numeric with 0 decimal places.

When you select a **Prepare ...File...** option, a standard Windows Open File dialog box will be presented. Navigate to the location of the Equipment CSV file, select the file and press **Open**. Note that the file does not need to be named equipment.csv, however, when the 'prepared' file is saved it will be named equipment.csv and will over write the original if it was named equipment.csv. The **Prepare** function will read the data in the CSV file and present it on the screen as shown below:



Since the columns may not be in the expected order the first time the program is run, they may not be named correctly yet, and may be showing the column name as SerialNumber when the file's column name (included in the file) is DESCRIPTION. Click below the column name bar in the columns where the names do not match. A list box will appear which provides a selection of the 'correct' names. Select a name for the column, and it will be applied to the title bar. The number of columns will differ between the ES601 and the vPad option. Provide the correct name that identifies the contents of each column. CMX will place the data in the correct order in the output file based on the names that have been applied to the columns. In the above example, column 1 has been identified as the 'ID' (Control Number), and the second column is about to be identified as the description.

## CMX OPERATORS MANUAL



The first row of the database commonly contains the column titles, as assigned by the CMMS program. This is useful when assigning the CMX column names, but is not necessary for the output file. Check the **Ignore/Hide first row** checkbox to exclude the first row from being included in the output.

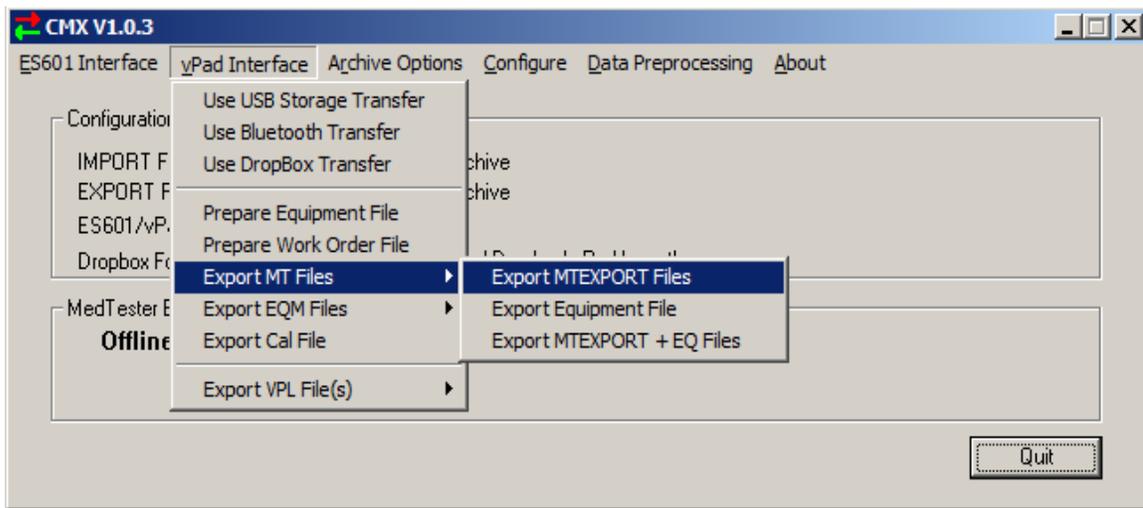
### 4.3.5 Prepare Work Order File

Using the CMMS system, create an Excel Spreadsheet output of the complete work order database, named WorkOrderInfo.xls or .csv, with the following fields included (in this preferred order, if possible):

"WorkOrder"	This is a unique entry, identifying the work or job
"ControlNumber"	This is the unique ID of the device to be tested
"Description"	The description of the problem to be corrected
"Open_Date"	The date the WO was opened
"Closed_Date"	The date the WO was closed
"Report_Filename"	The filename of the test report
"Status"	Typically PASS or FAIL
"TechCode"	As in the Equipment list above
"WOType"	User defined in a text file list WorkType.txt, in Datrend\Database folder
"ReportedDate"	Normally the same as Open_Date
"ReportedBy"	Person reporting the problem
"ContactInfo"	How/where to contact the person above
"Checklist"	The name of the Checklist to follow
"PassDateReported"	A flag indicating that the ReportedDate data should be included in the test report
"PassProblemBy"	A flag indicating that the ReportedBy data should be included in the test report
"PassContactInfo"	A flag indicating that the ContactInfo data should be included in the test report
"PassProblemDesc"	A flag indicating that the (Problem)Description should be included in the test report

### 4.3.6 Export MT Files

vPad-mT uses the 3 MTEXTORT files generated by the CMMS program as the basis of the Checklists available through the program. Using these files provides backward compatibility for legacy medTester users. The MTEXTORT files may benefit from **Data Preprocessing** to identify and correct potential errors in the files. See section 4.6 on using the **Data Preprocessing** function. The **Export MT Files/Export MTEXTORT Files** function combines these three files into a single file called CMX.TXT. This file will contain each filename (surrounded by }...{) followed by the contents of the file. The CMX.TXT file can be copied to a USB drive, sent via Bluetooth to the tablet, or placed in Dropbox for later access.



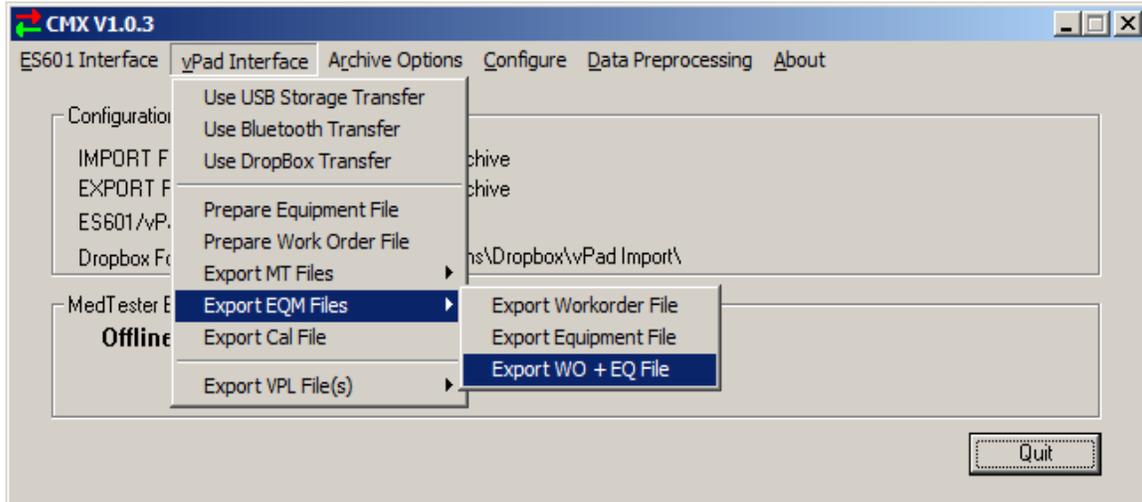
To provide additional information on a device, an equipment file may also be transferred to the tablet. The contents of this file are described in section 4.2.3. If **Export Equipment File** is selected, the equipment file will be included in the CMX.TXT file in the manner described above, with the filename (surrounded by }EQUIPMENT.CSV{) entered first, followed by the contents of the file.

If **Export MTEXTORT + EQ Files** is selected, all 3 MTEXTORT files and the equipment file will be included in a single CMX.TXT file and transferred according to the selected method.

### 4.3.7 Export EQM Files

vPad-EQM can use two types of imported files; 1) Equipment, and 2) Work Orders. These files are common CSV type files, and can be created or edited using Excel. The file format (column content) can be seen by first exporting the file(s) to the PC or USB drive from vPad-EQM. See the vPad-EQM Operator Manual for further instructions on this process.

## CMX OPERATORS MANUAL



This file transfer function can be used to update the files on the tablet if these files will be maintained in a database or spreadsheet on a PC. This can be particularly useful if you have a PC based equipment asset program or a home grown maintenance program which does not have medTester compatibility.

The equipment and/or the workorder files are placed in the CMX.TXT file using the same format as before, with the filename (surrounded by }...{ ) entered first, followed by the contents of the file. If a user is using vPad-EQM, they would not normally also use vPat-mT, so the CMT.TXT file will contain only the files related to the current Export function; in this case the EQM files. If files related to mT or Cal need to be transferred, they must be created and transferred separately.

### 4.3.8 Export Cal Files

vPad-Cal uses one imported file; CALEQUIPMENT.CSV. This file is a common CSV type file containing information of the devices used to test the medical devices in the other vPad Apps, and can be created or edited using Excel. The file format (column content) can be seen by first exporting the file to the PC or USB drive from vPad-Cal. See the vPad-Cal Operator Manual for further instructions on this process.

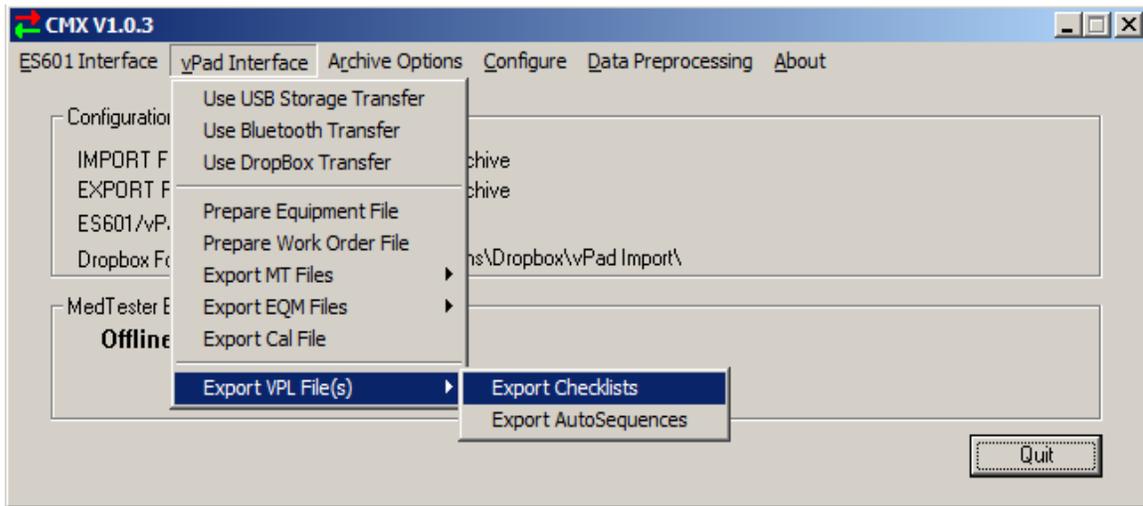
The **Export Cal File** function will create a CMX.TXT file which contains only the single CALEQUIPMENT.CSV file.

This file transfer function can be used to update the file on the tablet if these files will be maintained in a database or spreadsheet on a PC.

The CALEQUIPMENT.CSV file is placed in the CMX.TXT file using the same format as before, with the filename (surrounded by }...{ ) entered first, followed by the contents of the file. If files related to mT or EQM need to be transferred, they must be created and transferred separately.

### 4.3.9 Export VPL Files

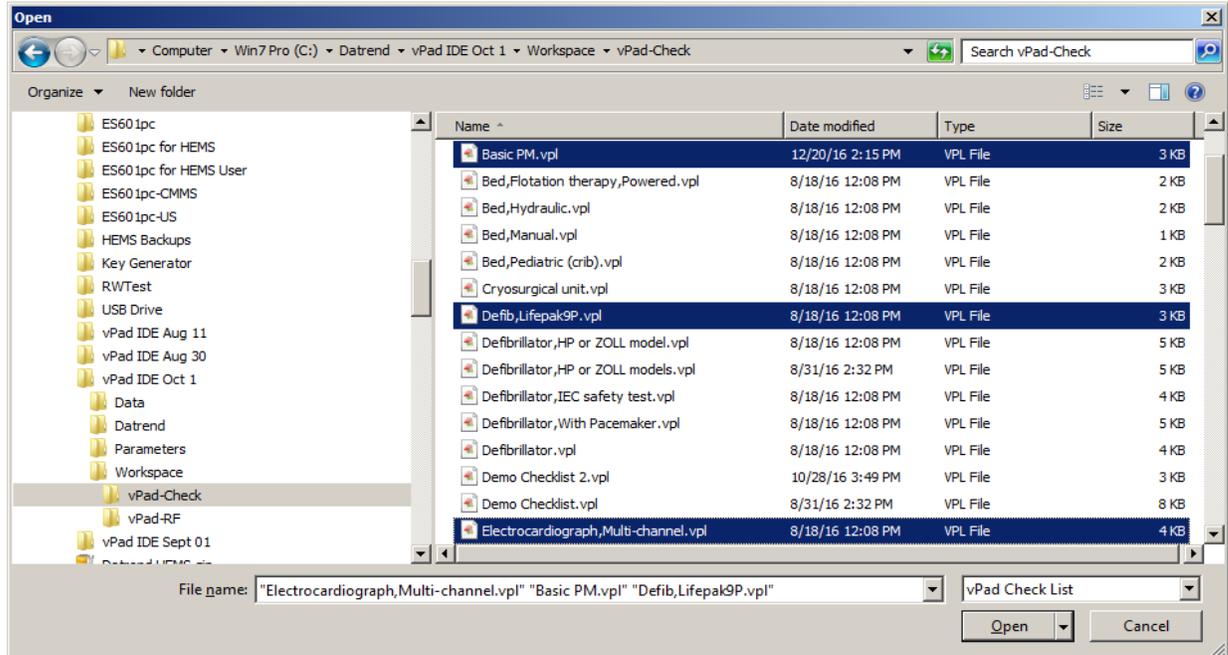
vPad-Check and vPad-mT use a file called a vPL file to instruct the tablet what to do during a Checklist. These files are text based, and are stored in different locations on the tablet, depending on the App with which they are to be used. vPad-Check vPL files are stored in the vPad-Check folder on the tablet; and those used by vPad-mT are stored in the vPad-mT\Autosequences folder. The only difference between the checklists used by vPad-mT is that they are referred to as Autosequences to maintain the legacy naming convention for the medTester, and they have ‘simple’ filenames of A1 to A89, although the numbers can go much higher with the vPad system.



The **Export VPL File** function will create an installation zip file which contains the vPad-Check checklists or the vPad-mT autosequences, including the folder structure which is found on the tablet.

VPL or Autosequence files(which are also VPL files) can be selected from a Windows Open files dialog which will appear when either **Export Checklists** or **Export AutoSequences** is chosen. One or more files may be selected using the Shift-Click or Control-Click key strokes commonly associated with Windows. When the Open button is pressed/clicked, the selected files will be placed in a zip file, with the required file/folder structure expected by the vPad App. The zip file created by **Export Checklists** is named vPad\_Check\_VPL.zip, and the zip file created by **Export AutoSequences** is named vPad\_MT\_VPL.zip.

## CMX OPERATORS MANUAL

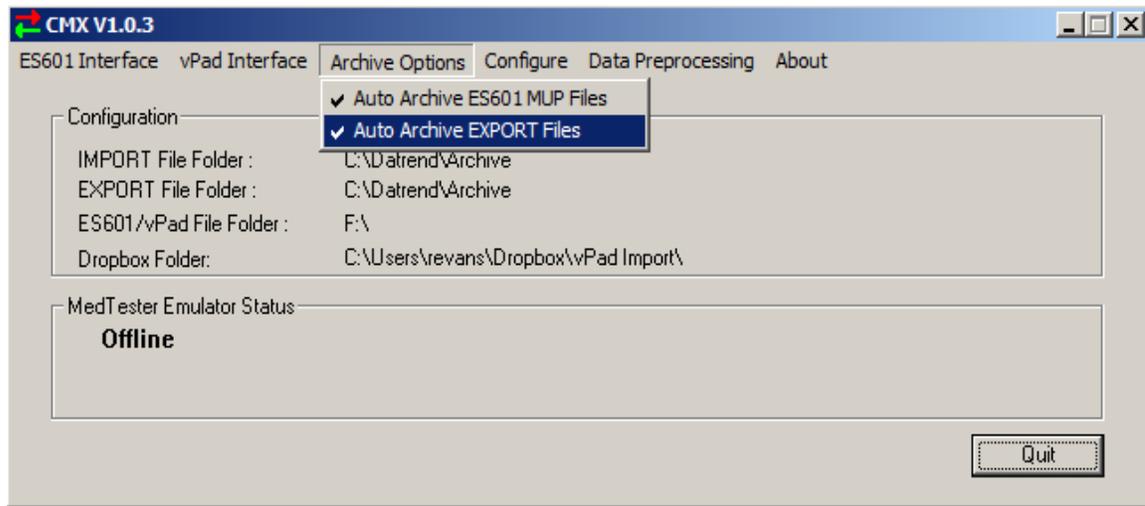


In this way, the VPL files can be edited/created on the PC and uploaded to the tablet as necessary as a single file, or as a batch of files. The zip file (vpad\_\*\*\*\_vpl.zip) will be transferred to the tablet via the selected method. Note that VPL files may be edited and zipped for transfer using the vPad-IDE programming interface program.

This zip file can be processed on the tablet using the vPad Installer App. This App will look for the zip file(s) first on the USB drive and then in the Bluetooth folder. Zip files for installation of other information/apps may also exist on the USB drive or in the Bluetooth folder. If the zip file is on Dropbox, the file should be copied to the Bluetooth folder first. If vpad\_\*\*\*\_vpl.zip is found, it will appear in the list of installation packages in the vPad Installer list. Select the zip file of interest and then touch **Install**, to unzip the vPL files onto the tablet. If the tablet has one or more vPL files which have duplicate file names, they will be overwritten without checking or warning. Be sure the files you are installing are the correct versions.

## 4.4 Archive Options

It is often helpful to have an archived copy of the files that have been processed, in case a problem is encountered at a later date. This selection provides some options on what is to be archived.



### 4.4.1 Auto Archive ES601 MUP Files

Enabling this setting will cause CMX to make a backup version of the **ES601IMP.MUP** file which is currently in the MUP File Folder location, before it reads a new MUP file from the USB drive, and place it in the **Archive** folder in the **MUP File Folder**. If the **Archive** folder does not exist, it will be created. The archived file will have the backup date appended to the filename. The MUP file will be deleted from the USB drive location after the file is read/copied.

### 4.4.2 Auto Archive Export Files

Enabling this setting will cause CMX to make backup versions of the 3 **MTEXT** files, and place them in an **Archive** folder in the **EXPORT File Folder**. If the **Archive** folder does not exist, it will be created. The archived files will have the backup date appended to the filename. The MTEXT files will be archived and deleted from the **EXPORT File Folder** location after the ES601 files are created and placed on the USB drive.

### 4.5 Configure

The **Configure** menu provides the options of setting up the default directories for the import/export files, the ability to define how medTester Autosequence numbers will be mapped to ES601 or vPad procedures, and which COM port will be used in the medTester emulation.

#### 4.5.1 Select MUP File Folder

The **MUP File Folder** is the location where the CMMS program will look for the test result MUP file. When the **MTIMPORT.MUP** file is read from the USB drive (for ES601-CMMS), or from vPad, this is the destination directory.

#### 4.5.2 Select EXPORT File Folder

The **EXPORT File Folder** is the location where the CMMS program is expected to place the three (3) **MTEXPORT** files, along with any other files which are to be exported. This is the location that CMX will look for files when **Preprocessing** for errors, **Creating ES601 Files** or **Transferring to Bluetooth**, etc. .

This is also the directory where the **EQUIPMENT.CSV**, **CALEQUIPMENT.CSV** and **WORKORDERINFO.CSV** file(s) is expected to be for transfer to the safety analyzer.

#### 4.5.3 Checkitem Conversion

ES601-CMMS has some differences from the medTester in the way it names the AutoSequence, both for electrical safety, and for controlling other test devices (such as defibrillator testers). The medTester names its AutoSequences A1 through A89, with groups of sequences allocated to specific devices(eg. A1-A15 electrical safety; A30 - A49 defibrillators, etc). ES601-CMMS names its 24 electrical safety sequences SAF001 to SAF024, and defibrillator sequences for Phase3 to DFB001 to DFB012. In addition, ES601-CMMS has a series of User Defined sequences that can be used for non-Datrend products. **Checkitem Conversion** provides a mapping of what ES601 sequence should be used when a particular medTester sequence is encountered. For instance, the sequence A4 may be mapped to the ES601 sequence SAF012.

The translation table is shown below. To change the ES601 'Command' for a given Checkitem, click on the command and a list of options will appear. Select the one required and it will be placed in the 'Command' location for that Checkitem.

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Checkitem	Sequence Type	Command
A1	Electrical safety autosequence	SAF01
A2	Electrical safety autosequence	SAF02
A3	Electrical safety autosequence	SAF03
A4	Electrical safety autosequence	SAF04
A5	Electrical safety autosequence	SAF05
A6	Electrical safety autosequence	SAF01
A7	Electrical safety autosequence	SAF02
A8	Electrical safety autosequence	SAF03
A9	Electrical safety autosequence	SAF04
A10	Electrical safety autosequence	SAF05
A11	Electrical safety autosequence	SAF06
A12	Electrical safety autosequence	SAF07
A13	Electrical safety autosequence	SAF08
A14	Electrical safety autosequence	SAF09
A15	Electrical safety autosequence	SAF10
A16	Monitor / toolbox test	SAF11
A17	Monitor / toolbox test	SAF12
A18	Monitor / toolbox test	UT501
A19	Monitor / toolbox test	UT502
A20	Pacemaker autosequence	UT401
A21	Pacemaker autosequence	UT402
A22	Pacemaker autosequence	UT403
A23	Pacemaker autosequence	UT404
A24	Pacemaker autosequence	UT405

### 4.5.4 Configure COM Port

The CMMS programs which can benefit from the use of the CMX program will have an option to communicate with the medTester safety analyzer (send output MXEXPORT files or import test report MUP files) via one of the COM ports on the PC. If the CMMS program *must* be connected via the serial port of the medTester in order to create and save the MTEXT files, or to import the MUP file; the CMX program provides an emulation program that simulates this connection. This allows the CMMS program to create/import the necessary files without an actual connection to a medTester.

Normally the CMMS program communicates on COM1 - COM3. CMX intercepts the serial communications from this serial port and communicates to the virtual medTester via the COM port designated in this setup option. For instance, a NULL Modem cable could be connected to a 4<sup>th</sup> hardware COM port (eg.COM6) or to a USB/Serial port convertor which installs to COM9. The extra serial port must be less than or equal to 12.

Contact Datrend for further details on using and interconnection required for this function.

## **4.6 Data Preprocessing**

In dealing with actual user(hospital) files from a number of CMMS systems, a number of errors have been encountered which could cause problems in actually running checklists. The medTester 'handled' these problems by ignoring them, which means that certain entries in the **MTEXTPORT** files simply would be skipped without the users knowledge. CMX provides preprocessing functions that detect and allow correction of the typical errors that have been encountered on real user files.

### **4.6.1 Compress ITM File**

The **MTEXTPORT.ITM** may contain duplicate item/task entries. Duplication of entries in the ITM file are the result of the way in which the CMMS program processes its data. This can cause potential confusion when attempting to process the ITM file. This option goes through the **ITM** file and removes any duplicate entries. In some cases this has resulted in a reduction of over 80 percent on file size. Items/tasks that are not used in the Checklists are also removed.

### **4.6.2 Fix ITM/LST Numbers**

The **MTEXTPORT.ITM** and **LST** file may contain entries which are incorrectly indexed (uses a name instead of a number). This option makes the necessary corrections to both files to maintain the requisite cross indexing.

### **4.6.3 Verify Checkitems**

The **MTEXTPORT.ITM** file may contain entries which are simply incorrect and must be changed to process correctly. Selecting this option will allow the user to fix errors related to the problems listed below.

Some typical problems are:

- entries which are the result of input errors when the items/tasks were originally entered.
- Items/tasks that are identified using letters instead of numbers
- entries that have more than one AutoSequence listed on one line
- entries that have text before the AUTOSEQUENCE designator
- Checklist names that contain a comma

ES601-CMMS also has some differences from the medTester, in the remote commands it can process. In the **MTEXTPORT.ITM** file, the potential problems are with items/tasks which have a remote command designator '**M**'. These command lines are identified by CMX and displayed for the user to edit, as necessary. For instance, the line '**86, M, TAC RECORD READING**' can not be processed since the ES601-CMMS does not support the legacy analog tachometer originally used by

## CMX OPERATORS MANUAL

the medTester. This line could be changed to **'86, I, RECORD TACHOMETER READING, 1200-1300 RPM'**. There are also a list of internal medTester codes that are not supported by vPad. If encountered, the user is given the opportunity to change them.

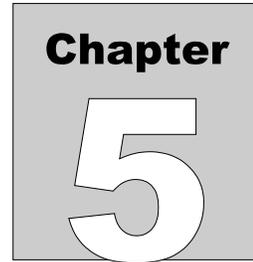
If the program encounters an entry which it thinks has an issue, but can not fix automatically, it will present the line on the screen and allow it to be edited. If an **'M'** command is encountered which is valid (to control a supported device) the command text can be saved to a file called **'Accepted\_M.txt'**, which is located in the CMX program folder. Commands found in this file will not be flagged again.

Changes made automatically, or by user interaction will be recorded in a **LOG** file. This file can be used as a reference to make corrections to the CMMS program, so that the errors will not continue to occur in the future. See the **MTEXPOR File Folder\Log** to view this test file.

If an instruction is encountered by the vPad-mT program which it does not understand, it will be skipped. It is therefore important to correct errors here to avoid unexpected results when using vPad-mT.

### 4.7 About

This selection provides information about the version of the CMX program.



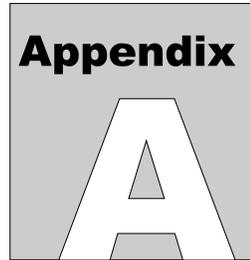
## 5 Upgrades and Maintenance

Software Applications (Apps) may from time-to-time be upgraded to provide enhanced features or improvements. Contact Datrend or your local dealer for information on these upgrades.

In some cases, the changes made to an App may be to correct operational issues that have come to the attention of DSI. These shall generally be referred to as maintenance upgrades. In other cases, the changes may be to improve performance or add features which would enhance the overall functionality of the App. The decision to apply a charge to any upgrade shall be solely at the discretion of DSI.

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# Appendix A

## Setup for Importing / Exporting CMMS data from/to ES601 or vPad

### 1. CMX

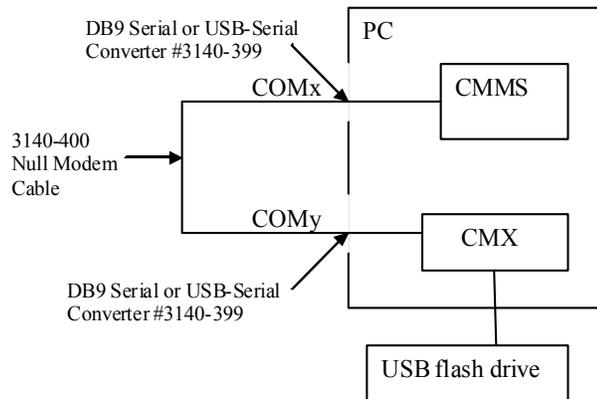
CMX is a utility program that can emulate the medTester when communicating with a CMMS program. All CMMS systems communicate with medTester through a COM port. While most CMMS programs can create the requisite MTEXT files without a serial connection, some require the serial connection to be made. The CMX utility software runs on a PC to emulate a MedTester serial connection, enabling the CMMS program to create the required MTEXT files and import the resulting MUP file (test reports).

The CMMS program must have a medTester interface module installed (except for EQ2/HEMS which has a ES601 module). This module normally communicates with the medTester. We use this legacy module to create the MTEXT files, with the CMX utility providing the expected responses which would normally be provided by the medTester. The medTester module normally communicates with a medTester via a hardware/built-in serial port from COM1 to COM3. The CMX program needs to have this COM port re-directed back to a second COM port on the PC. This is done using a Null Modem cable (3140-400). If the PC does not have an available hardware port, a USB to Serial Converter (3140-399) can be used for the second connection.

Run the CMX\_Setup.exe program to install the CMX program. Start CMX and select the 'USB Interface'. Disable 'Auto USB Processing'. On your computer, check to see which COM port is used by the CMMS program, in most cases it will be 1 or 3. Connect this port to a second COM port on your computer (with a COMM # less than 12) using a NULL modem cable (DSI #3140-400). If you do not have an available COM port, use a USB to Serial converter (DSI #3140-399) to create one. The USB to Serial converter will automatically assign itself to an arbitrary COM port. Check which port this is using Control Panel/Device

Manager. If the COM port number is greater than 12, reassign the USB to Serial converter to a port less than 12. In CMX, select 'Configure' and Set the COM port # to match the 'second' COMM port #. Leave the Baud rate at 9600, the usual default setting on the CMMS program.

The following picture shows the data flow and hardware connections.



When you run the CMMS program, and attempt to connect to the medTester, the CMX program will intercept the serial port communications and respond as if a medTester is connected. This will allow the CMMS program to create the required MTEXTOR files.

## 2. Data Flow

For the international and US versions of ES601, the ES601pc(-US) program is used to convert the MTEXTOR files and transfer the files directly to the ES601, or to convert the ES601 test reports into a MUP file.

The transfer of data to the ES601 is accomplished using the ES601pc(-US) program via the USB device port on the ES601. Select the 'CMMS (or Sentinel) Interface' button and use the 'Browse' button to point to the location of the MTEXTOR file. Due to the memory structure of the ES601, the number of Instructions is limited to 1044 and the number of CMMS Checklists is limited to 500. If the ES601 has Instructions programmed which are related to User Defined Tests, then the number of Instructions available to the CMMS Checklists is limited to the difference between 1044 and the User Defined Instructions.

This limitation is overcome in the Version 5 Firmware with the hardware Memory expansion option, ES601-CMMS. This option adds 2 Gb of memory via a USB Thumbdrive module which expands the available memory via a removable USB Thumbdrive. In this case, the Thumbdrive holds ALL of the CMMS converted file, from the CMX program.

For ES601-CMMS, after the MTEXTORT files have been located, the conversion to ES601 files is started by pressing the 'Create ES601 Files' in the CMX program. It will convert the files as required and will: a) make substitutions for the medTester autosequences A1 – A89 as defined under the 'Configure/Checkitem Conversion' selection; and b) flag any occurrences of an 'M' opcode instruction for checking, to ensure it can be completed. The converted files will be placed in the 'ES601/vPad File Folder' location, which would normally be a USB drive.

The 'Configure/Checkitem Conversion' selection provides a substitution map, indicating which ES601 autosequence to use for a given medTester Axx autosequence. For instance, the medTester safety autosequences A1 – A10 are mapped to ES601 safety autosequences SAF01 – SAF10. These sequences on the ES601 have been programmed to match the default sequences of a medTester. If the medTester safety sequences have been changed, then the matching ES601 sequence must be changed to conform. Other sequences should be checked as well to ensure the logic of the mapping. For instance, the defibrillator autosequence A30 (from the medTester defibrillator plugin module option) could be mapped to a Phase3/ES601 plugin module DFB01, or to a user defined test for an Impulse 4000, UT312. In either case, a test which best matches the A30 sequence would need to be programmed into the ES601 (see the manual for details or contact Datrend).

There are some medTester remote control codes that are not supported, such as 'TAC' for the medTester tachometer. To enable the end user to identify possible problems, all 'M' commands that should invoke a remote command are logged and displayed to the user for review and possible editing. This check function is performed by the CMX program as the files are output by the CMMS program. In this way, the MTEXTORT files should be processed correctly for the ES601-CMMS analyzer.

The Preprocessor options in CMX allow you to check the MTEXTORT files without making AutoSequence substitutions. This is for checking the files before using them with vPad-mT or the ES601pc(-US) programs.

To import a set of test records into the CMMS system, connect the ES601 to the PC and run the ES601pc(-US) program. Select the CMMS Interface and change the file path to match the location that the CMMS program will expect to find the MUP file. Press the Import ES601 MUP File to get the test records from ES601 and convert them to MUP format. Run the CMX program and ensure the 'Configure/ MUP File Folder' matches that set in the ES601pc-US program. Run the CMMS program/medTester module and import the MUP file as if a medTester is connected (the CMMS program should still be running).

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