

# MonitorKey®

## Data Key Programming Tool Operations Manual

THIS MANUAL CONTAINS TECHNICAL INFORMATION FOR THE **MONITORKEY®**  
DATA KEY PROGRAMMING TOOL AND SOFTWARE VERSION 2.4.3

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INCLUDED ARE GENERAL DESCRIPTION, OPERATIONAL DESCRIPTION,  
INSTALLATION, AND SPECIFICATIONS.

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## Section 1 GENERAL

### 1.1 OVERVIEW

The Eberle Design MonitorKey<sup>®</sup> programming tool set is used to format and program the nonvolatile memory of the Datakey<sup>™</sup> device used to configure the CMUip-2212 ATC Cabinet Monitor Unit series, CMU-212 ITS Cabinet Monitor Unit series and the 2018KCL Signal Monitor series. The hardware is designed to interface the USB or serial communications port of a personal computer to the Datakey<sup>™</sup> electronics. The MonitorKey<sup>®</sup> software provides the capability to format the monitor programming data and transfer this data to and from the Datakey<sup>™</sup> device.

The Eberle Design MonitorKey<sup>®</sup> software meets all specifications outlined in the ASHTO/ITE/NEMA *Intelligent Transportation System (ITS) Standard Specification for Roadside Cabinets Version 01.02.17b*.

For further information on monitor functions and Data Key parameters refer to the Eberle Design *CMU-2212 Operations Manual*, *CMU-212 Operations Manual*, and the *2018KCL Series Operations Manual*.

### 1.2 FUNCTIONS

#### 1.2.1 PROGRAMMING TOOL

The MonitorKey<sup>®</sup> programming tool provides all the electronics necessary to read data from and write data to the Datakey device. The programmer is configured to interface to the Datakey model LCK4000, providing 512 bytes of storage. Power for the MonitorKey<sup>®</sup> programming tool is obtained from the personal computer communications port so no external power supply source is required.



#### 1.2.2 PARAMETER FORMS

A parameter form is provided for each monitor function. Data is entered on the parameter form (see 3.6) and then saved to the main data buffer image. When all parameter forms are completed the Write function (see 3.5.3) transfers the contents of the data buffer to the nonvolatile memory of the Datakey device. Reading the contents of a Datakey device (see 3.5.2) sets the parameters of each form for review or modification.

#### 1.2.3 DATA KEY PARAMETER VERIFY

The Data Key Parameter Verify function (see 3.5.1) compares the contents of a Datakey device with parameters in the data buffer. The data buffer parameters may be set by changing parameters on the forms, reading the contents of a Datakey device, or loading a set of parameters from a file.

## **1.2.4 WIZARDS**

### **1.2.4.1 INITIAL PARAMETER SETUP WIZARD**

The Initial Parameter Setup wizard (see 3.7) helps define and set a basic set of parameters for a new Data Key setup. The wizard will ask a series of questions describing basic intersection setup and develop a template for many of the monitor parameters.

The Parameter Setup wizard DOES NOT set parameters for Permissive Matrix (conflict matrix) parameters, Unit Data parameters, Dark Channel Maps, Current Sense threshold parameters, or Virtual Channel parameters. These parameters must be set manually using the parameter forms.

After running the wizard ALL parameters should be verified for correct and safe operation in the intersection.

### **1.2.4.2 PARAMETER CHECK WIZARD**

The Parameter Check wizard (see 3.7.3) will apply a set of basic configuration rules to the data buffer and will provide a warning that configuration conflicts may exist. This is a basic parameter consistency check and DOES NOT guarantee that improper data is not set, or that unsafe intersection operation may not occur.

## **1.2.5 FILE MANAGEMENT**

Data Key images can be saved to files or retrieved from files (see 3.3). These files are binary coded files and are formatted for use with MonitorKey<sup>®</sup> software only.

### **1.2.6 PARAMETER REPORT**

The contents of the data buffer can be displayed in a hex format for numerical analysis (see 3.3.6). A report can also be printed that specifies all parameter settings (see 3.3.8).

## Section 2 INSTALLATION

### 2.1 COMPUTER (PC) REQUIREMENTS

To run the *MonitorKey* program, the following PC equipment is required:

Personal computer running Microsoft XP, Vista or Windows 7/8 (32 or 64 bit).

MonitorKey-USB: USB Port

MonitorKey-ST or –NM: available serial port (COM1 – COM16)

### 2.2 SOFTWARE UPDATES

The most current version of the *MonitorKey*® program can be downloaded from the Eberle Design web site at [www.EDItraffic.com](http://www.EDItraffic.com). Before installing a new update the currently installed version of the *MonitorKey*® program should be uninstalled from the computer. The *MonitorKey*® program can be uninstalled by going to the “Add/Remove Programs” icon in the Windows Settings/Control Panel window and selecting EDI MonitorKey.

### 2.3 PC TO MONITORKEY COMMUNICATIONS

#### 2.3.1 USB CABLE

The USB version of the MonitorKey Programming tool connects to the PC using a USB Standard-A type to Standard-B type cable.

#### 2.3.2 EIA-232 CABLE

Two versions of the serial port based MonitorKey Programming tool are provided depending on whether the serial interface is configured for a null modem type cable or a straight through cable connection to the PC. In both products the connector type on the MonitorKey tool is a 9 pin female plug.

##### 2.3.2.1 NULL MODEM VERSION (MONITORKEY-NM)

**A Null Modem cable is used** when connecting the *MonitorKey*® programming tool to a PC COM port with a DB-9 connector. The cable connector for the programming tool should be a male DB-9 type. Refer to section 5.1 for connection details.

##### 2.3.2.2 STRAIGHT THROUGH VERSION (MONITORKEY-ST)

**A Straight Through cable is used** when connecting the *MonitorKey*® programming tool to a PC COM port with a DB-9 connector. The cable connector for the programming tool should be a male DB-9 type. Refer to section 5.1 for connection details.

### 2.4 MONITORKEY SOFTWARE INSTALLATION

Insert the *MonitorKey*® installation CD-ROM in the PC CD-ROM drive. The program is on the CDROM at \MonitorKey Install\Setup.exe. The Installation Wizard will check the system and the installation process will begin. Answer the questions asked by the installation program.

Once installation is complete, the *MonitorKey*® program icon will be added to the Windows system. The icon is found by selecting Start/Programs/Eberle Design/MonitorKey.

## 2.4.1 USB DRIVER INSTALLATION

For the USB version of the MonitorKey Programming Tool additional USB drivers also need to be installed. **If a serial version of the MonitorKey Programming tool is being used then this USB driver installation is not necessary.**

The following procedure is used to install the drivers for the USB port of the EDI MonitorKey Programming Tool. The driver installation package is provided on the EDI MonitorKey Installation CDROM, or can be downloaded from our web site at [www.EDITraffic.com](http://www.EDITraffic.com).

### 1. General

- a. The MonitorKey main software should be installed before the USB driver software is installed. It is not required to install it first, but it makes the whole process more straight forward.

The program is on the CDROM at: \MonitorKey Install\Setup.exe.

- b. **Install the USB driver software before plugging in the MonitorKey Programming Tool.** See item #2 or #3 below depending on the PC operating system.

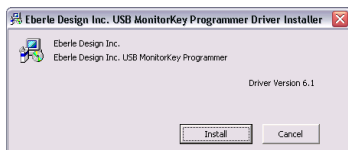
### 2. Windows XP Installation

- a. Do not connect the MonitorKey Programming Tool until instructed to do so.
- b. Run the USB driver installation program from the EDI MonitorKey CDROM.

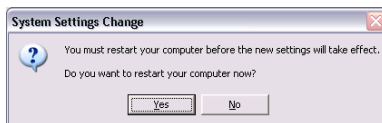
The program is on the CDROM at:

USBDriverInstall\EDI\_MonitorKey\_VCPInstaller.exe.

- c. The following screens should be displayed:

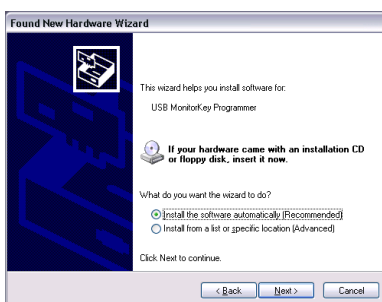


Click the **INSTALL** button.



Reboot your computer to complete the USB driver installation.

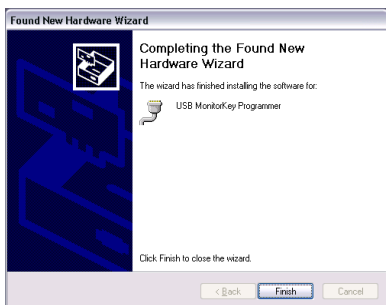
- d. Once the computer has been rebooted, connect the MonitorKey Programming Tool to a USB port of the computer. The following screens may be displayed:





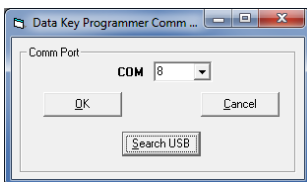
Select *NO, NOT AT THIS TIME*, click Next.

Select *INSTALL THE SOFTWARE AUTOMATICALLY*, click Next.



Click Finish.

- e. The USB driver installation is now completed. Install the MonitorKey program if not already done. Launch the program. The correct USB “COM” port can be selected from the PORT / SETTINGS menu item:



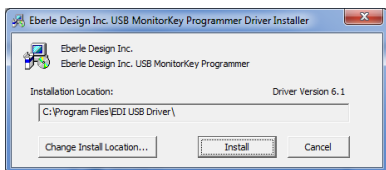
Click on the *SEARCH USB* button to discover the assigned USB COM port and then click OK. The assigned COM port can also be determined from the Windows Hardware Device Manager program. It will be listed under the section “Ports (COM & LPT)” as USB MonitorKey Programmer (COMxx), where xx is the port assignment.

### 3. Windows 7/8 Installation

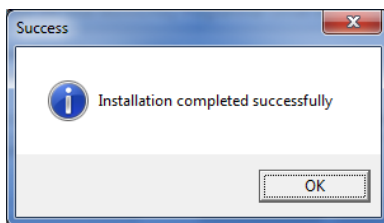
- a. Do not connect the MonitorKey Programming Tool until instructed to do so.
- b. Run the USB driver installation program from the EDI MonitorKey CDROM. The program is on the CDROM at:

USBDriverInstall\EDI\_MonitorKey\_VCPInstaller.exe.

- c. The following screens should be displayed:

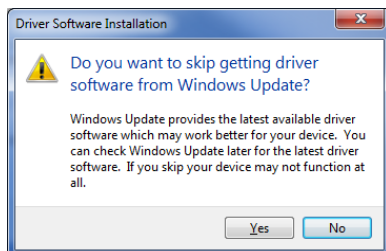
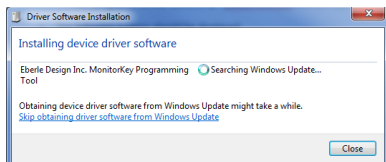


Click the *INSTALL* button.



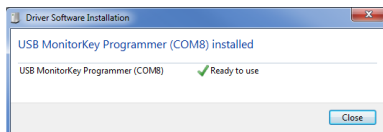
Click OK.

- d. Connect the MonitorKey Programming Tool to a USB port of the computer. The following screens may be displayed:



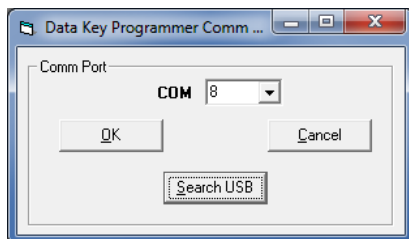
Click “Skip obtaining driver software from Windows Update”.

Click YES



Click CLOSE.

- e. Note that the COMx port number (COM8 shown in this example above) will vary depending on the installation. This is the COM value that the MonitorKey program will use for USB operation. The assigned COM port can also be determined from the Windows Hardware Device Manager program. It will be listed under the section “Ports (COM & LPT)” as USB MonitorKey Programmer (COMx), where x is the port assignment.
- f. The USB driver installation is now completed. Install the MonitorKey program if not already done. Launch the program. The correct USB “COM” port can be selected from the PORT / SETTINGS menu item:



Click on the *SEARCH USB* button to discover the assigned USB COM port and then click OK. The assigned COM port can also be determined from the Windows Hardware Device Manager program. It will be listed under the section “Ports (COM & LPT)” as USB MonitorKey Programmer (COMxx), where xx is the port assignment.

- g. Your EDI MonitorKey program and USB driver installation process is now complete.

#### 4. **Windows XP Uninstall**

- a. These programs can be uninstalled from the PC in typical fashion using the *Add or Remove Programs* window of the *Control Panel*. Select the following items and follow the instructions.
  - a. “Eberle Design Inc. USB MonitorKey Programmer (Driver Removal)”
  - b. “MonitorKey version x.x.x”

**5. Windows 7/8 Uninstall**

- a. These programs can be uninstalled from the PC in typical fashion using the *Programs and Features* window of the *Control Panel*. Select the following items and follow the instructions.
  - a. "Eberle Design Inc. USB MonitorKey Programmer (Driver Removal)"
  - b. "MonitorKey version x.x.x"

## Section 3 OPERATION

### 3.1 LAUNCHING MONITORKEY

#### 3.1.1 SPECIFYING THE PC COM PORT

The communications port of the PC must be specified to *MonitorKey*® in order to connect to the programming tool. The communications port can be specified in the PORT / SETTINGS menu window (section 3.4.1). This setting will be automatically saved by the program and used as the default setting each time *MonitorKey*® is subsequently launched.

A command line option can also be added to the *MonitorKey* shortcut used to launch the program. The command line should be specified as follows:

```
"<path>\MonitorKey.exe" /comm=X
```

Where X is the PC COM port to be connected to the programming tool. The software accommodates COM1 through COM16 (X = 1 thru 16). The <path> parameter is dependent on the installation location of the *MonitorKey*® software and is typically "C:\Program Files\Monitorkey" by default.

#### 3.1.2 SPECIFYING THE TARGET MONITOR

The *MonitorKey*® program must be configured for the monitor model that the Datakey will be used for. If the target model is not supplied by the command line parameter after the *MonitorKey*® program is first installed, a window is displayed that provides the user an opportunity to select the target model.

Selecting the target monitor can also be done or changed using a command line option added to the *MonitorKey*® shortcut used to launch the program. The command line should be specified as follows:

```
"<path>\MonitorKey.exe" /target=X
```

Where X is the monitor model name of the target. The *MonitorKey*® software currently supports the following models:

```
CMUip-2212  
CMU-2212  
CMUip-212  
CMU-212  
CMU-220VAC  
CMU-24VDC  
2018KCL (The 2018KCLip model should use the 2018KCL setting)
```

The <path> parameter is dependent on the installation location of the *MonitorKey*® software and is "C:\Program Files\Monitorkey" by default.

#### 3.1.3 SPECIFYING THE CMU-212 CHANNEL LABEL DISPLAY MODE

The *MonitorKey*® program can be configured to display the Channel numbers in a Phase/Ped mode rather than the default 1:1 channel numbering for the CMU-212 series. This can be done using a command line option added to the *MonitorKey*® shortcut used to launch the program. The command line should be specified as follows:

```
"<path>\MonitorKey.exe" /disp=phped
```

Where the parameter is either “phped” or “def”. If the “phped” option is provided then channels 1 through 12 will be labeled as 1, 2, 2P, 3, 4, 4P, 5, 6, 6P, 7, 8, 8P. This corresponds to the conventional 332 cabinet wiring scheme that assigns the physical pedestrian load switch to channels 3, 6, 9, and 12 respectively. Note that this option only modifies the labels displayed in the MonitorKey windows and does not affect physical assignments or monitoring functions.

The mode selected by /disp=def can be used to set the mode back to the default 1:1 labeling convention.

The <path> parameter is dependant on the installation location of the MonitorKey® software and is “C:\Program Files\Monitorkey” by default.

If the display mode is not supplied by the command line parameter after the MonitorKey® program is first installed, the numeric default mode (Channel 1 thru 32) is selected.

### 3.1.4 CONNECTING TO THE PROGRAMMING TOOL

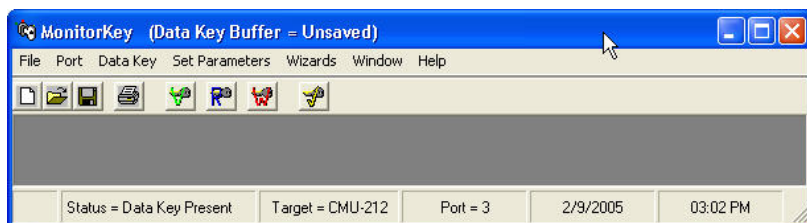
When the program is launched it will attempt to establish a communication link with the programming tool using the COM port specified in the settings or command line option. If the programming tool is not connected to the specified USB or serial port or communications cannot be established, an error message will be indicated. The PORT / SETTINGS menu window (section 3.4.1) can then be used to select the correct port.

The PORT / RECONNECT menu item (section 3.4.2) will also invoke an attempt to connect with the programming tool.

### 3.1.5 PROGRAMMER STATUS LEDS

A small green LED indicator located next to the key socket indicates that sufficient power is being supplied to the programming tool when illuminated. A small yellow LED indicator will be pulsed momentarily when data is transmitted from the programming tool to the PC. This occurs approximately once per second when no Read or Write operations are in progress. When a Read or Write operation is being performed the indicator will pulse more often. This pulsing indicates the communication connection is operating correctly.

## 3.2 MAIN MENU



### 3.2.1 STATUS BAR

The first panel of the Status Bar across the bottom of the MonitorKey main window will indicate the current status of the programming tool. This status will indicate the following conditions:

1. Data Key Programming Tool Not Connected

This message will appear when a valid connection has not been made to the programming tool or the connection has been lost.

2. Data Key Present or Not Present

If a programming tool is connected the status will indicate whether a Datakey device is inserted or not.

3. Reading Data Key

The Datakey device contents are being read.

4. Writing Data Key

The Datakey device contents are being written.


The second panel indicates the target monitor.

The third panel indicates the COM port selected.

### 3.3 FILE MENU


#### 3.3.1 NEW

The FILE / NEW menu item will reinitialize the data buffer with predefined default Data Key settings (see 5.3). Any existing data in the buffer is lost.

The  toolbar button will also invoke the FILE / NEW menu item.

#### 3.3.2 OPEN

The FILE / OPEN menu item will load a previously saved Data Key parameter file from disk. The default file extension is “.key”. Any existing data in the buffer is lost.


The  toolbar button will also invoke the FILE / OPEN menu item.

#### 3.3.3 SAVE KEY FILE

The FILE / SAVE KEY FILE menu item will re-save the contents of a previously saved data buffer to a file. The default file extension is “.key”. This file format is only readable by MonitorKey® software.


#### 3.3.4 SAVE KEY FILE AS

The FILE / SAVE KEY FILE AS menu item will save the contents of the data buffer to a file. A dialog box will allow the selection of a (new) path and file name for the data. The default file extension is “.key”. This file format is only readable by MonitorKey® software.

The  toolbar button will also invoke the FILE / SAVE KEY FILE AS menu item if the active window is not a Parameter Check report or a Data Key Buffer Parameters report.

#### 3.3.5 SAVE REPORT AS

The FILE / SAVE REPORT AS menu item will save the contents of the Parameter Check report or a Data Key Buffer Parameters report to a file. A dialog box will allow the selection of a (new) path and file name for the data. The default file extension is “.txt”. This file format is text.

The  toolbar button will also invoke the FILE / SAVE REPORT AS menu item if the active window is a Parameter Check report or a Data Key Buffer Parameters report.

#### 3.3.6 DISPLAY DATA BUFFER (HEX)

The FILE / DISPLAY DATA BUFFER menu item displays the raw binary contents of the data buffer in hex format. The left most column of numbers indicates the byte number (1 thru 512) of the first data of the corresponding row.


### 3.3.7 DISPLAY DATA BUFFER REPORT

The FILE / DISPLAY DATA BUFFER REPORT menu item displays the formatted contents of the data buffer in text format as the Data Key Buffer Parameters report.

### 3.3.8 PRINT REPORT

The FILE / PRINT REPORT menu item will print the contents of the Parameter Check report or a Data Key Buffer Parameters report to the default printer. The report window must be selected as the active window.



The  toolbar button will also invoke the FILE / PRINT REPORT menu item if the Parameter Check report or a Data Key Buffer Parameters report window is the active window.

### 3.3.9 SHOW BUFFER CHECK VALUE

The FILE / SHOW BUFFER CHECK VALUE will display the 16 bit Frame Check Sequence (FCS) value used to validate the contents of the Data Key when read. This data is contained in bytes 511 and 512 of the data buffer. The display format is decimal.

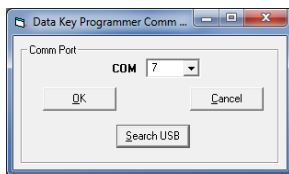
### 3.3.10 EXIT

The FILE / EXIT menu item will close all windows, close the communications port and terminate the *MonitorKey*® program.

## 3.4 PORT MENU

### 3.4.1 SETTINGS

The PORT / SETTINGS menu item is used to select the communications port of the PC to be used with the programming tool. Settings for COM1 through COM16 are provided. When the OK button is clicked, the *MonitorKey*® software will try to connect to the programming tool. If a valid connection is made, the new port setting will be updated in the MonitorKey registry.



#### 3.4.1.1 SEARCH USB

If the USB version of the MonitorKey Programming Tool is used, the “Search USB” button can be used to discover the assigned USB COM port and then click OK. The assigned COM port can also be determined from the Windows Hardware Device Manager program. It will be listed under the section “Ports (COM & LPT)” as USB MonitorKey Programmer (COMxx), where xx is the port assignment.

### 3.4.2 RECONNECT

The PORT / RECONNECT menu item will try to reconnect to the programming tool if a valid connection is lost.

## 3.5 DATA KEY MENU

### 3.5.1 VERIFY DATA KEY

The DATA KEY / VERIFY DATA KEY menu item will read the contents of the currently inserted Datakey device and compare it to the data buffer. The contents of the data buffer will not be modified.




The  toolbar button will also invoke the DATA KEY / VERIFY DATA KEY menu item.

### 3.5.2 READ DATA KEY

The DATA KEY / READ DATA KEY menu item will read the contents of the currently inserted Datakey device and save it to the data buffer. Any existing data in the buffer is lost.



The  toolbar button will also invoke the DATA KEY / READ DATA KEY menu item.

### 3.5.3 WRITE DATA KEY

The DATA KEY / WRITE DATA KEY menu item will write the contents of the data buffer to the currently inserted Datakey device. The Parameter Check Wizard (see 3.7.3) will be automatically run before writing the data to the Data Key to help ensure programming parameters are consistent. If no errors or warnings are generated the Data Key will be written. If errors or warnings are generated, the option of aborting the write function or continuing with the write function is given. Normally, all errors and warnings should be resolved before writing the data to the Data Key.



The  toolbar button will also invoke the DATA KEY / WRITE DATA KEY menu item.

### 3.5.4 PRODUCTION MODE

When many Data Keys need to be programmed with the same data, the Production Mode will provide a fast way to program. Once the data buffer is ready and the Parameter Check wizard (see 3.7.3) has produced a satisfactory report, select the DATA KEY / PRODUCTION MODE menu item. Each time a Data Key is inserted into the programmer it will automatically be programmed. When the DONE indicator is On, remove the Data Key and insert the next Data Key to be programmed. No other interaction with the MonitorKey® software is necessary. Continue this operation until the last Data Key is completed and then Exit the window.

## 3.6 SET PARAMETERS

The SET PARAMETERS forms are used to display and modify parameters for target monitor functions. Each monitor function has a parameter form associated with it. Each parameter form has three control buttons:

1. Set to Default

This button will reinitialize the parameter form with a default setup as defined in section 5.3. This default setup is typically the most conservative programming for that function and may not be suitable for actual intersection operation.

2. Save to Data Key Buffer

This button will transfer the contents of the parameter form to the data buffer. When a Write Data Key operation is invoked, the Datakey device is programmed with the contents of the data buffer, not the contents of the form. Once parameters for a form have been modified, the Save to Data Key Buffer button should be clicked to transfer the form data to the data buffer.

3. Close



The Close button will unload the parameter form and close the form window. If the parameters on the form have been modified and not saved to the data buffer, the form modifications will be lost.

### 3.6.1 CMUIP-2212 SERIES TARGET

See the EDI *CMUip-2212 Series Operation Manual* for details on the following parameters.

#### 3.6.1.1 UNIT DATA

The SET PARAMETERS/UNIT DATA form displays the following CMUip-2212 monitor parameters:

1. HDSP Configuration  
The HDSP programming is based on a configuration of *iPack*® Model 2202 cards installed into the Output Assembly. Each HDSP Model 2202 provides two channels of outputs.
2. Minimum Flash Interval  
Select a value between 6 and 16 seconds.
3. +12VDC Power Supply Monitor Enable  
A check mark ENABLES the cabinet +12VDC power supply monitor.
4. Monitor ID and User ID  
Each ID field accepts up to forty characters. The field will be saved as left justified.
5. Ethernet Network Parameters

#### 3.6.1.2 PERMISSIVE MATRIX

The SET PARAMETERS / PERMISSIVE MATRIX form displays the permissive channel pair programming for the CMUip-2212 Conflict function. For each of the channels 1 through 31, a check mark indicates the selected channel is PERMISSIVE (compatible) with the associated channel. A permissive channel is allowed to be active (Green or Yellow) concurrently with the associated channel.

#### 3.6.1.3 LACK OF SIGNAL

The SET PARAMETERS / LACK OF SIGNAL form displays the Lack of Signal Enable programming and Dark Map #1 through #4 programming for the CMUip-2212 Lack of Signal function. A check mark for the Lack of Signal parameters will ENABLE that channel for Lack of Signal monitoring. A check mark for the Dark Channel Map parameters will DISABLE that channel for Lack of Signal monitoring when the CMUip-2212 is using the selected map.

A channel should have Lack of Signal monitoring disabled if an input of that channel has been remapped to a Virtual Channel (channels 29:32). If a Virtual Channel does not have all three inputs assigned then it should have Lack of Signal monitoring disabled.

#### 3.6.1.4 MULTIPLE INPUT

The SET PARAMETERS / MULTIPLE INPUT form displays the Multiple Input Enable programming for the CMUip-2212 Multiple Input function. A check mark ENABLES a channel for the associated Multiple Input function; Green - Yellow, Yellow - Red, Green - Red.

#### 3.6.1.5 CLEARANCE

The SET PARAMETERS / CLEARANCE form displays the Minimum Yellow Change and Minimum Yellow Plus Red Change Enable programming for the CMUip-2212 Clearance function. A check mark ENABLES a channel for the associated Clearance function.

A channel with the Yellow input disabled (see 3.6.1.8) should have the Minimum Yellow Change function disabled.

### 3.6.1.6 CURRENT SENSE

The SET PARAMETERS / CURRENT SENSE form displays the Current Sense parameters for each of 32 possible physical channels. A check mark ENABLES an output (RYG) for CMUip-2212 Current Sense monitoring. If an active output is enabled and the load current for that output falls below the minimum value specified then the channel will be detected as Lack of Signal.

A channel should have Current Sense monitoring disabled if an input of that channel has been remapped to a Virtual Channel (29:32).

### 3.6.1.7 FIELD CHECK

The SET PARAMETERS / FIELD CHECK form displays the Field Check Enable programming for the CMUip-2212 Field Check function. A check mark ENABLES an input of a channel for the Field Check function.

An input should have Field Check monitoring disabled if it has been remapped to a Virtual Channel (channels 29:32). A Virtual Channel input should have Field Check monitoring disabled if it has not been mapped to a physical input. A Yellow input should have Field Check monitoring disabled if it has its associated Yellow Disable parameter checked.

### 3.6.1.8 YELLOW DISABLE

The SET PARAMETERS / YELLOW DISABLE form displays the Yellow Disable programming for each of 32 physical channels. A check mark forces the CMUip-2212 to set the state of the associated Yellow input of a channel to the Off state (0 volts) regardless of the voltage that may be sensed by the HDSP on that physical input.

### 3.6.1.9 VIRTUAL CHANNELS

The SET PARAMETERS / VIRTUAL CHANNELS menu item displays the input source mapping for the four virtual channels (29, 30, 31, and 32). The CMUip-2212 performs fault processing on the four virtual channels just as it does for each of the 28 physical channels. A virtual channel is actually composed of an image of inputs from physical channels.

For each of the virtual channel inputs, the parameter form provides a pull-down selection for the source channel and source color from which the virtual channel input is mapped. The CMUip-2212 will remap the input voltage from the source color and channel to the virtual channel. The physical channel input providing the source input will be set to the Off state (0 volts) by the CMUip-2212.

### 3.6.1.10 FLASHING YELLOW ARROW

The FLASHING YELLOW ARROW form displays the Flashing Yellow Arrow programming for up to six FYA channel pairs. For each FYA channel pair the Overlap (OLP) channel is the Red arrow, solid Yellow, and flashing Yellow arrow. The Protected channel is the Green arrow. The Opposing Thru channel is selected if Yellow Trap monitoring is enabled.

Flash rate detect will enable the CMU fault mode if the flashing Yellow arrow is stuck in the On state. The Red-Yellow Enable will enable monitoring of the Red and Yellow arrow of the Protected channel.

## 3.6.2 CMU-212 SERIES TARGET

See the EDI *CMU-212 Series Operation Manual* for details on the following parameters.

### 3.6.2.1 UNIT DATA

The SET PARAMETERS/UNIT DATA form displays the following CMU-212 monitor parameters:

1. AMU Configuration

The AMU programming is based on a configuration of four output assemblies. There are ten possible valid cabinet configurations:

Assembly #1	Assembly #2	Assembly #3	Assembly #4
14 channel	--	none	none
14 channel	--	14 channel	--
14 channel	--	6 channel	none
14 channel	--	6 channel	6 channel
6 channel	none	none	none
6 channel	6 channel	none	none
6 channel	6 channel	6 channel	none
6 channel	6 channel	6 channel	6 channel
6 channel	none	14 channel	--
6 channel	6 channel	14 channel	--

A 14-position assembly can only be assigned to assembly #1 or #3. If a 14-position assembly is installed in assembly #1, then assembly #2 is reserved. If a 14-position assembly is installed in assembly #3, then assembly #4 is reserved.

2. Minimum Flash Interval

Select a value between 6 and 16 seconds.

3. +12VDC Power Supply Monitor Enable

A check mark ENABLES the cabinet +12VDC power supply monitor.

4. Monitor ID and User ID

Each ID field accepts up to forty characters. The field will be saved as left justified.

5. Ethernet Parameters for the CMUip-212

**3.6.2.2 PERMISSIVE MATRIX**

The SET PARAMETERS / PERMISSIVE MATRIX form displays the permissive channel pair programming for the CMU-212 Conflict function. For each of the channels 1 through 31, a check mark indicates the selected channel is PERMISSIVE (compatible) with the associated channel. A permissive channel is allowed to be active (Green or Yellow) concurrently with the associated channel.

**3.6.2.3 LACK OF SIGNAL**

The SET PARAMETERS / LACK OF SIGNAL form displays the Lack of Signal Enable programming and Dark Map #1 through #4 programming for the CMU-212 Lack of Signal function. A check mark for the Lack of Signal parameters will ENABLE that channel for Lack of Signal monitoring. A check mark for the Dark Channel Map parameters will DISABLE that channel for Lack of Signal monitoring when the CMU-212 is using the selected map.

A channel should have Lack of Signal monitoring disabled if an input of that channel has been remapped to a Virtual Channel (channels 29:32). If a Virtual Channel does not have all three inputs assigned it should have Lack of Signal monitoring disabled.

**3.6.2.4 MULTIPLE INPUT**

The SET PARAMETERS / MULTIPLE INPUT form displays the Multiple Input Enable programming for the CMU-212 Multiple Input function. A check mark ENABLES a channel for the associated Multiple Input function; Green - Yellow, Yellow - Red, Green - Red.

### 3.6.2.5 CLEARANCE

The SET PARAMETERS / CLEARANCE form displays the Minimum Yellow Change and Minimum Yellow Plus Red Change Enable programming for the CMU-212 Clearance function. A check mark ENABLES a channel for the associated Clearance function.

A channel with the Yellow input disabled (see 3.6.1.8) should have the Minimum Yellow Change function disabled.

### 3.6.2.6 CURRENT SENSE

The SET PARAMETERS / CURRENT SENSE form displays the Current Sense parameters for each of 28 physical channels. A check mark ENABLES a channel for CMU-212 Current Sense monitoring. If a channel is enabled and the total load current to the channel falls below the minimum value specified by the %FS parameter times the Full Scale value parameter then the channel will be detected as Lack of Signal.

The Full Scale parameter is determined by how many turns of the load switch supply wire (primary) pass through the current sense transformer:

Number of Primary Turns	Full Scale
1	1.00 Amps
2	0.50 Amps
3	0.33 Amps
4	0.25 Amps

The Percent Full Scale (%FS) parameter sets the minimum load current threshold for the channel. Once the Full Scale parameter has been set, the minimum total load current required to prevent a Lack of Signal fault = %FS/100 \* Full Scale. For example, if the Full Scale parameter is set to 1.0 Amps indicating one turn of wire on the transformer primary, and the Percent Full Scale (%FS) parameter is 20, then the minimum total load current required to prevent a Lack of Signal fault on that channel is:

$$20/100 * 1.0 = 0.2 \text{ Amps}$$

A channel should have Current Sense monitoring disabled if an input of that channel has been remapped to a Virtual Channel (29:32).

### 3.6.2.7 FIELD CHECK

The SET PARAMETERS / FIELD CHECK form displays the Field Check Enable programming for the CMU-212 Field Check function. A check mark ENABLES an input of a channel for the Field Check function.

An input should have Field Check monitoring disabled if it has been remapped to a Virtual Channel (channels 29:32). A Virtual Channel input should have Field Check monitoring disabled if it has not been mapped to a physical input. A Yellow input should have Field Check monitoring disabled if it has its associated Yellow Disable parameter checked.

### 3.6.2.8 YELLOW DISABLE

The SET PARAMETERS / YELLOW DISABLE form displays the Yellow Disable programming for each of 28 physical channels. A check mark forces the CMU-212 to set the state of the associated Yellow input of a channel to the Off state (0 volts) regardless of the voltage that may be sensed by the AMU-214 on that physical input.

### 3.6.2.9 VIRTUAL CHANNELS

The SET PARAMETERS / VIRTUAL CHANNELS menu item displays the input source mapping for the four virtual channels (29, 30, 31, and 32). The CMU-212 performs fault processing on the four virtual channels just as it does for each of the 28 physical channels. A virtual channel is actually composed of an image of inputs from physical channels.

For each of the virtual channel inputs, the parameter form provides a pull-down selection for the source channel and source color from which the virtual channel input is mapped. The CMU-212 will remap the input voltage from the source color and channel to the virtual channel. The physical channel input providing the source input will be set to the Off state (0 volts) by the CMU-212.

### 3.6.2.10 FLASHING YELLOW ARROW

The FLASHING YELLOW ARROW form displays the Flashing Yellow Arrow programming for up to six FYA channel pairs. For each FYA channel pair the Overlap (OLP) channel is the Red arrow, solid Yellow, and flashing Yellow arrow. The Protected channel is the Green arrow. The Opposing Thru channel is selected if Yellow Trap monitoring is enabled.

Flash rate detect will enable the CMU fault mode if the flashing Yellow arrow is stuck in the On state. The Red-Yellow Enable will enable monitoring of the Red and Yellow arrow of the Protected channel.

### 3.6.3 2018KCL SERIES TARGET

See the EDI *2018KCL Operation Manual* for details on the following parameters.

#### 3.6.3.1 UNIT DATA

The SET PARAMETERS/UNIT DATA form displays the following 2018KCL series monitor parameters:

1. COMM Port Settings. Note the settings for the 2018KCLip model must be set to the default values of 9600 baud, Even parity.
2. Minimum Flash Interval  
Select a value of None, or between 4 and 10 seconds.
3. Monitor Options
4. Monitor ID number and name  
The ID Number field accepts 0:99999999. The ID Name field accepts up to thirty characters. The field will be saved as left justified.
5. Flashing Yellow Arrow Enables
6. Ethernet Parameters for the 2018KCLip

#### 3.6.3.2 PERMISSIVE MATRIX

The SET PARAMETERS / PERMISSIVE MATRIX form displays the permissive channel pair programming for the Conflict function. For each of the primary channels 1 through 17, a check mark indicates the selected channel is PERMISSIVE (compatible) with the associated channel. A permissive channel is allowed to be active (Green or Yellow) concurrently with the associated channel.

#### 3.6.3.3 RED FAIL ENABLE

The SET PARAMETERS / RED FAIL form displays the Red Fail Enable programming for the Red Fail function. A check mark for the Red Fail parameters will ENABLE that channel for Red Fail monitoring.

#### 3.6.3.4 DUAL INDICATION

The SET PARAMETERS / DUAL INDICATION form displays the Green-Yellow, Yellow-Red, and Green-Red Enable programming for the Dual Indication function. A check mark ENABLES a channel for the associated Dual Indication function; Green - Yellow, Yellow - Red, Green - Red.

### 3.6.3.5 CLEARANCE

The SET PARAMETERS / CLEARANCE form displays the Minimum Yellow Change and Minimum Yellow Plus Red Change Enable programming for the Clearance function. A check mark ENABLES a channel for the associated Clearance function.

A channel with the Yellow input disabled (see 3.6.2.6) should have the Minimum Yellow Change function disabled.

### 3.6.3.6 YELLOW DISABLE

The SET PARAMETERS / YELLOW DISABLE form displays the Yellow Disable programming. A check mark forces the monitor to set the state of the associated Yellow input of a channel to the Off state (0 volts) regardless of the voltage that may be sensed on that input.

## 3.7 WIZARDS

**- WARNING -**

**The Parameter Setup Wizard is an aid to setup basic form parameters. Before programming a Data Key device, ALL parameter forms should be completely programmed and manually reviewed for correctness, consistency with the intersection configuration and cabinet wiring, and consistency with other form parameters.**

### 3.7.1 PARAMETER SETUP WIZARD (TARGET = CMUIP-2212)

The WIZARDS / PARAMETER SETUP WIZARD menu item launches the Parameter Setup Wizard. This wizard will assist in developing an initial basic template for a new Data Key. Using a series of basic questions regarding cabinet configuration and intersection approach assignments, the wizard will format the data buffer parameters for the following functions:

1. HDSP Configuration
2. Lack of Signal Enable
3. Multiple Input
4. Clearance
5. Field Check Enable
6. Yellow Disable
7. Current Sense Channel Enable

The following parameters retain their default settings (see 5.3) and are NOT set by the wizard. They must be set manually:

1. Permissive Matrix (see 3.6.1.2)
2. Dark Channel Maps (see 3.6.1.3)
3. Current Sense Threshold Parameters (see 3.6.1.6)
4. Virtual Channel Assignments (see 3.6.1.9)
5. Flashing Yellow Arrow (see 3.6.1.10)

### 3.7.2 PARAMETER SETUP WIZARD (TARGET = CMU-212)

The WIZARDS / PARAMETER SETUP WIZARD menu item launches the Parameter Setup Wizard. This wizard will assist in developing an initial basic template for a new Data Key. Using a series of basic questions regarding cabinet configuration and intersection approach assignments, the wizard will format the data buffer parameters for the following functions:

1. AMU Configuration
2. Lack of Signal Enable
3. Multiple Input
4. Clearance
5. Field Check Enable
6. Yellow Disable
7. Current Sense Channel Enable

The following parameters retain their default settings (see 5.3) and are NOT set by the wizard. They must be set manually:

1. Permissive Matrix (see 3.6.1.2)
2. Dark Channel Maps (see 3.6.1.3)
3. Current Sense Threshold Parameters (see 3.6.1.6)
4. Virtual Channel Assignments (see 3.6.1.9)
5. Flashing Yellow Arrow (see 3.6.2.10)

### 3.7.3 PARAMETER SETUP WIZARD (TARGET = 2018KCL)

The WIZARDS / PARAMETER SETUP WIZARD menu item launches the Parameter Setup Wizard. This wizard will assist in developing an initial basic template for a new Data Key. Using a series of basic questions regarding cabinet configuration and intersection approach assignments, the wizard will format the data buffer parameters for the following functions:

1. Red Fail Enable
2. Dual Indication Enable
3. Minimum Yellow and Minimum Yellow Plus Red Clearance Enable
4. Yellow Disable

The following parameters retain their default settings (see 5.3) and are NOT set by the wizard. They must be set manually:

1. Permissive Matrix (see 3.6.2.2)
2. Unit Data Parameters (see 3.6.2.1)

### 3.7.4 PARAMETER CHECK WIZARD

The WIZARDS / PARAMETER CHECK menu item launches the Parameter Check Wizard. This wizard will perform a basic error and consistency check on form parameters that have been saved to the data buffer. The results are displayed in a report format that can also be printed to the default printer. Two levels of checks are performed, Error and Warning.

An Error indicates a parameter is incorrectly set and may result in incorrect operation of the monitor if programmed into the Data Key. Errors should always be corrected before

proceeding. Warnings indicate that a parameter is set inconsistently with other parameters and review is suggested before proceeding.

The Parameter Check does not modify the data buffer parameters. Any changes to the data buffer must be done manually using the parameter forms. The Parameter Check should then be run again until a report with no errors or warnings is obtained. The results of the Parameter Check will not prevent the programming of a Data Key.

**- WARNING -**

**The Parameter Check Wizard is an aid to verify form parameter consistency and DOES NOT guarantee that improper data is not set, or that unsafe intersection operation may not occur. It is not intended as a complete check for correctness or completeness.**

**Before programming a Data Key device, ALL parameter forms should be completely programmed and manually reviewed for correctness, consistency with the intersection configuration and cabinet wiring, and consistency with other form parameters.**


A check mark next to the WIZARDS / PARAMETER CHECK menu item indicates the Parameter Check wizard has already been run on the current contents of the data buffer.



The  toolbar button will also invoke the WIZARDS / PARAMETER CHECK menu item.

The FILE / PRINT REPORT menu item sends a text listing of the Parameter Check report to the default printer. The Parameter Check report window must be selected as the active window.



The  toolbar button will also invoke the FILE / PRINT REPORT menu item if the Parameter Check report window is the active window.

## 3.8 WINDOW

### 3.8.1 CLOSE ALL

The WINDOW / CLOSE ALL menu item will close all open windows.

### 3.8.2 CASCADE

The WINDOW / CASCADE menu item will arrange all open windows in a cascading format starting from the upper left corner of the *MonitorKey*® main window.

### 3.8.3 ARRANGE ICONS

The WINDOW / ARRANGE ICONS menu item will organize all the icons of minimized windows horizontally across the bottom of the *MonitorKey*® main window.

## 3.9 HELP

### 3.9.1 HELP CONTENTS

The HELP / HELP CONTENTS menu item launches the on-line help system.



### **3.9.2 DATA KEY PROTOCOL VERSION**

The HELP / DATA KEY PROTOCOL VERSION menu item displays the format version for the data buffer and the format version for the *MonitorKey*<sup>®</sup> program. The format version is used to ensure that any changes to the Data Key data structure are managed correctly.

The format version of the Data Key should always be exactly the same as the format version of the *MonitorKey*<sup>®</sup> program and the format version of the target monitor that the Data Key will be used with. Consult with the factory for format version compatibility issues.

### **3.9.3 ABOUT MONITORKEY**

The HELP / ABOUT MONITORKEY menu item will display the software version of the *MonitorKey*<sup>®</sup> program, the firmware version of the currently connected programming tool, and technical support information for Eberle Design Inc.

## Section 4 TROUBLE SHOOTING

### 4.1 STATUS INDICATOR

A small red LED indicator located next to the key socket indicates that sufficient power is being supplied to the programming tool when illuminated. If the indicator is not illuminated when the *MonitorKey*<sup>®</sup> program is active, the serial port may not be compatible with the programming tool power requirements.

The indicator will be pulsed Off when data is transmitted to the PC. This occurs approximately once per second when no Read or Write operations are in progress. When a data transfer is being performed the indicator will pulse Off more often. This pulsing indicates a communication connection is operating correctly.

### 4.2 CABLE PROBLEMS

Most connection problems are related to an incorrect or damaged communications cable. Be sure the cable is a "Null Modem" type cable, i.e. pin #2 of male end goes to pin #3 of the female end, pin #3 of male end goes to pin #2 of the female end.

### 4.3 ERROR MESSAGES

#### 4.3.1 COMMUNICATIONS ERRORS

##### CRC ERROR

Data communications between the PC and the programming tool have been corrupted.

##### NO HANDLE

A valid communications connection has not been made with the programming tool.

##### RX TIMEOUT ERROR

Data communications has been lost with the programming tool. No response was received.

##### DATA KEY PROGRAMMING TOOL NOT CONNECTED

A valid communications connection with the programming tool has been lost.

##### USB MONITORKEY PROGRAMER IS NOT CONNECTED

The USB COM port has been selected but the cable is not connected to the programming tool.

#### 4.3.2 DATA KEY ERRORS

##### DATA KEY NOT PRESENT

A Read or Write device operation was attempted without a Data Key device inserted in the programming tool.

##### INVALID DATA CHECK VALUE

A Data Key device was read with an invalid data check value for the data.

##### COMMAND READ FAILURE

The programming tool was unable to read data from the Data Key device.

##### COMMAND NOT SUPPORTED

An invalid command was sent to the programming device.

##### COMMAND RESPONSE INVALID

An invalid response was received from the programming device.

#### COMMAND WRITE FAILURE

The programming tool was unable to write data to the Data Key device.

#### 4.3.3 FILE ERRORS

##### INVALID DATA CHECK VALUE

A Data Key file was opened with an invalid data check value for the data.

##### INVALID FILE FORMAT

A Data Key file was opened with an invalid file format.

#### 4.4 TECHNICAL SUPPORT

Additional technical support may be obtained by contacting Eberle Design Inc.

Eberle Design Inc.  
Phoenix, AZ 85040 USA

Telephone: (480) 968-6407  
Fax: (602) 437-1996  
e-mail: [support@EDIttraffic.com](mailto:support@EDIttraffic.com)  
Web Site: [www.EDIttraffic.com](http://www.EDIttraffic.com)

## Section 5 SPECIFICATIONS

### 5.1 EIA-232 CONNECTOR

#### 5.1.1 NULL MODEM VERSION (MONITORKEY-NM)

The front panel EIA-232 connector is a 9 pin metal shell “DB9S” female subminiature type connector. **The port is configured as a DTE device such that a Null Modem cable is required to connect directly to a personal computer COM port.**

PC				MonitorKey		
Pin #	Function	I/O		Pin #	Function	I/O
2	Receive Data	In	←	3	Transmit Data	Out
3	Transmit Data	Out	→	2	Receive Data	In
4	DTR	Out	→	6	Power	In
5	Signal Ground	--	↔	5	Signal Ground	-
7	RTS	Out	→	8	Power	In

#### 5.1.2 STRAIGHT THROUGH VERSION (MONITORKEY-ST)

The front panel EIA-232 connector is a 9 pin metal shell “DB9S” female subminiature type connector. **The port is configured as a DCE device such that a Straight Through cable is required to connect directly to a personal computer COM port.**

PC				MonitorKey		
Pin #	Function	I/O		Pin #	Function	I/O
3	Receive Data	In	←	3	Transmit Data	Out
2	Transmit Data	Out	→	2	Receive Data	In
4	DTR	Out	→	4	Power	In
5	Signal Ground	--	↔	5	Signal Ground	-
7	RTS	Out	→	7	Power	In

### 5.2 POWER REQUIREMENTS

Operating Voltage (DTR, RTS) ..... +4 Vdc to +15 Vdc  
Maximum Input Current (DTR, RTS)..... 5 mA

### 5.3 DATA KEY DEFAULT PARAMETERS (TARGET = CMUIP-2212 SERIES)

Byte #	Contents	Default Value
1	Format Version	0x20
2:63	Permissive Matrix	Non-permissive (0)
64:67	Lack of Signal Enable	Enabled (1)
68:79	Dark Channel Maps 1:4	Disabled (0)
84:95	Multiple Input Enable	Enabled (1)
96:103	Clearance Enable	Enabled (1)
104:107	Yellow Input Disable	Disabled (0)
108:119	Current Sense Enable	Enabled (1)

Byte #	Contents	Default Value
<b>120:215</b>	Current Sense Threshold	20 mA
<b>216:227</b>	Field Check Enable	Enabled (1)
<b>228</b>	Minimum Flash Interval	6 seconds
<b>229</b>	+12VDC Monitor	Enabled (1)
<b>230:241</b>	Virtual Channel Assignment	None (0)
<b>242:245</b>	HDSP Configuration	Enabled (1)
<b>246:285</b>	Monitor ID	None (0)
<b>286:325</b>	User ID	None (0)
<b>326:353</b>	Ethernet Parameters	
<b>354:510</b>	Reserved	0
<b>511</b>	FCS Check Value (lsb)	0x57
<b>512</b>	FCS Check Value (msb)	0x56

#### 5.4 DATA KEY DEFAULT PARAMETERS (TARGET = CMU-212 SERIES)

Byte #	Contents	Default Value
<b>1</b>	Format Version	0x01
<b>2:63</b>	Permissive Matrix	Non-permissive (0)
<b>64:67</b>	Lack of Signal Enable	Enabled (1)
<b>68:79</b>	Dark Channel Maps 1:4	Disabled (0)
<b>84:95</b>	Multiple Input Enable	Enabled (1)
<b>96:103</b>	Clearance Enable	Enabled (1)
<b>104:107</b>	Yellow Input Disable	Disabled (0)
<b>108:111</b>	Current Sense Enable	Enabled (1)
<b>112:118</b>	Current Sense Full Scale	1.0 Amp (00)
<b>119:146</b>	Current Sense Threshold	25%
<b>147:158</b>	Field Check Enable	Enabled (1)
<b>159</b>	Minimum Flash Interval	6 seconds
<b>160</b>	+12VDC Monitor	Enabled (1)
<b>161:172</b>	Virtual Channel Assignment	None (0)
<b>173:176</b>	AMU Configuration	14,0,0,0
<b>177:216</b>	Monitor ID	None (0)
<b>217:256</b>	User ID	None (0)
<b>267:510</b>	Reserved	0
<b>511</b>	FCS Check Value (lsb)	0x6F
<b>512</b>	FCS Check Value (msb)	0x4A

#### 5.5 DATA KEY DEFAULT PARAMETERS (TARGET = 2018KCL SERIES)

Byte #	Contents	Default Value
<b>1</b>	Format Version	0x81
<b>2:52</b>	Permissive Matrix	Non-permissive (0)
<b>53:55</b>	Red Fail Enable	Enabled (1)
<b>56:58</b>	GY Dual Enable	Enabled (1)

<b>Byte #</b>	<b>Contents</b>	<b>Default Value</b>
<b>59:61</b>	YR Dual Enable	Enabled (1)
<b>62:64</b>	GR Dual Enable	Enabled (1)
<b>65:67</b>	MYC Enable	Enabled (1)
<b>68:70</b>	MYRC Enable	Enabled (1)
<b>71:73</b>	Yellow Disable	Enabled (0)
<b>74</b>	Minimum Flash	6
<b>75</b>	Options 1	Off (0x00)
<b>76</b>	Options 2	Off (0x00)
<b>77</b>	Comm Port 1 Settings	9600-Even (0x10)
<b>78</b>	Reserved	(0x10)
<b>79:82</b>	Monitor ID Number	00000000
<b>83:122</b>	Monitor ID Name	None (0)
<b>123</b>	FYA Enable	(0x00)
<b>124:508</b>	Reserved	(0x00)
<b>509</b>	Reserved	(0x01)
<b>510</b>	Model	2018KCL = 8
<b>511</b>	FCS Check Value (lsb)	2018KCL = 0xE4
<b>512</b>	FCS Check Value (msb)	2018KCL = 0x3A