

KMAX-MM Quick Start

Thank you for purchasing KMAX-MM from InterWorking Labs (IWL.) This quick start guide is intended to help you set up and begin using your KMAX-MM.

If you have trouble or questions please contact InterWorking Labs by email at support@iwl.com

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1 Package Contents

Please check that you have the following items that are shipped in the KMAX-MM package:

- The KMAX-MM device. The serial number and MAC addresses may be found on a label on the bottom.
- The power adapter. Use only the adapter supplied by IWL.



2 Passwords

Please save these passwords, which are required to perform administrative operations on KMAX-MM:

Username	Password	Function
kinfo	info	Get configuration using the serial cable
ksetup	jhgta5c	Set configuration using the serial cable

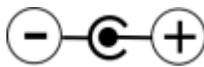
3 Operating Environment

3.1 Location

Consider where you will be installing KMAX-MM. This will dictate the IP address that you will need to assign to the management interface. The management interface is logically distinct from the two data ports – the traffic that you will be impairing should be on an entirely separate subnet.

3.2 Electrical Power

The power connector has the following specifications:



Voltage 12V, DC
Current 2A (or more)
Sleeve: Ground
Center post: 2.5mm, Positive

Use only the power supply provided by IWL.

Assure that the power supply is not dangling from a power outlet and that the cord from the power supply to the KMAX-MM itself is not entangled.

Note: *Power-over-Ethernet (PoE) is not provided by any Ethernet port on KMAX-MM.*

3.3 Temperature, Humidity, and Airflow

KMAX-MM will become warm to the touch as it operates. It will become warmer when it is carrying heavy packet loads.

KMAX-MM uses passive cooling; it should not be placed in a tightly confined space with no airflow.

KMAX-MM should be in a location with normal office or computer room temperature and humidity levels.

3.4 Vibration and Orientation

KMAX-MM contains no rotating or moving parts, but should not be subjected to more vibration than is typical for a computer rack that contains operating disk drives.

KMAX-MM may be mounted in any orientation.

4 Startup/Boot Process

The boot-up process usually takes between 90 and 120 seconds. To reboot KMAX-MM, unplug the power adapter, then plug it back in. The LEDs on the front of KMAX-MM indicate status:



5 Management Interface IP Address

If KMAX-MM has not been configured with a static IP address **and** your network does not have a DHCP server then KMAX-MM will use a default IP address 192.168.0.5 and a netmask of 255.255.255.0.

6 Ethernet Interfaces

The KMAX-MM has three Ethernet interfaces. One is used for control – this is called the “management interface”. You will connect the management interface to an IPv4 network that is accessible from the web browser(s) through which you will operate KMAX-MM.

The other two Ethernet interfaces are used to carry the packets that will be passing between the devices you are testing.

The management interface is highlighted in this image:

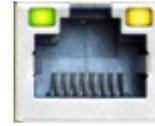


The LEDs on the KMAX-MM Ethernet ports indicate negotiated connection speed and activity:

The green LED on the left blinks if there is send or receive activity, no matter the negotiated speed.



The meaning of the yellow LED on the right depends on the type of board:



- **APU2 (indicated by blue USB connectors):** Lit for 1 Gbits/sec, not lit otherwise.
- **APU (indicated by black USB connectors):** Lit and steady if the interface is running at 100 Mbits/sec. The LED is off if the interface is running at 10 Mbits/sec or 1 Gbits/sec.

6.1 Configuration Of The Management Interface

Before using KMAX-MM you will need to establish a known IPv4 address for the management interface.

Use a standard RJ45 based Ethernet cable to connect the management port on KMAX-MM to your network. The Ethernet jacks on KMAX-MM have auto MDI/MDI-X logic, so it should not matter whether you use a standard straight-through Ethernet cable or a crossover cable.

You could allow that interface to obtain its address dynamically, but that can be inconvenient if you can't predict what address your DHCP server will assign.

If the KMAX-MM tries to use DHCP and fails to obtain an address it will fall back to the IP address 192.168.0.5/24.

Usually it will be more convenient to assign a known, fixed network number.

Once you have assigned the network numbers to the management interface you can use the KMAX-MM web GUI to set the network numbers. But that creates a chicken-and-egg problem: How do you set the network numbers so that you can get to the web page to set the network numbers? The following sections describe how to resolve this.

- **Recommended and easiest:** Use the USB Flash drive configuration utility. See Appendix A.
- Use the offline method. See Appendix B.
- Use the serial cable configuration utility. See Appendix C
- Use DHCP. See Appendix D. This method allows KMAX-MM to ask a DHCP server on your network for a dynamic IP address. The drawback of this method is that it may be difficult for you to ascertain what address the DHCP server assigned. With DHCP you may obtain a different IP address every time you reboot KMAX-MM.

If you have been successful you should be able to “ping” the KMAX-MM from another computer on your network. You should also be able to reach KMAX-MM from a web browser

on your network using a URL of the form `http://xxx.xxx.xxx.xxx/` where `xxx.xxx.xxx.xxx` is the IP address that was assigned to KMAX-MM.

6.2 Reviewing IP Configuration With The *kinfo* Account

You may view the KMAX-MM management interface settings via SSH or the serial port.

If using SSH, simply connect to the KMAX with the login name “*kinfo*”. This presupposes that you already know the address that KMAX-MM is using.

If using the serial port you will need to set up the serial connection as described in Appendix C then connect, using a terminal emulator program, to the KMAX-MM serial interface, and then login.

- Username: *kinfo*
- Password: See the top of this document for the *kinfo* user password.

After you login, a script will display several windows that show the current IP configuration.

6.3 KMAX Network Services

Be aware that KMAX-MM's management interface may attempt to use or provide certain services on your network:

- DHCP
- SSH (TCP port 22)
- DNS – Domain Name System (UDP port 53)
- HTTP (TCP port 80) and HTTPS (TCP port 443)
- NTP- Network Time Protocol (UDP port 123)
- SNMP – Simple Network Management Protocol (UDP ports 161 and 162)
- SYSLOG – System logging (Syslog, UDP port 514)

7 KMAX Browser Web Interface:

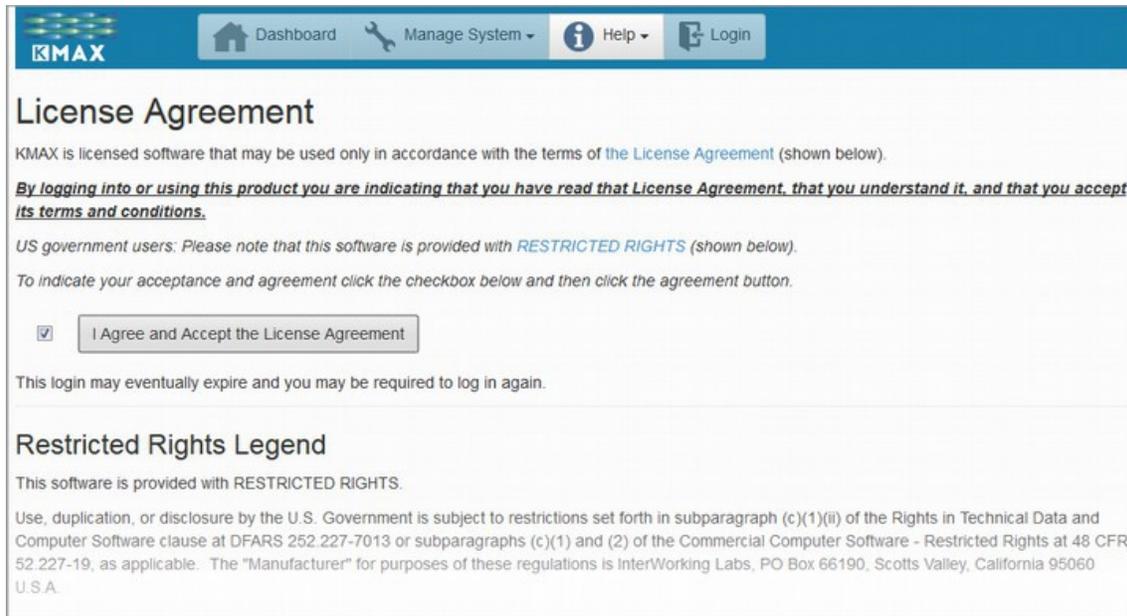
The KMAX family or products is controlled by a web browser. Supported browsers include:

Operating system	Browsers supported
Windows 7 and 10	Chrome and Firefox
Mac 10.9 (Mavericks), 10.10 (Yosemite), and 10.11 (El Capitan)	Chrome, Firefox, and Safari
Linux 64 bit	Chrome and Firefox
Linux 32 bit	Firefox only (Chrome is ending support for 32-bit Linux)

KMAX-MM makes heavy use of JavaScript and modern web browser technologies such as HTML 5 and websockets. Please make sure that your browser is up-to-date and that it is running on a platform with adequate memory and processor resources.

7.1 Login Screen

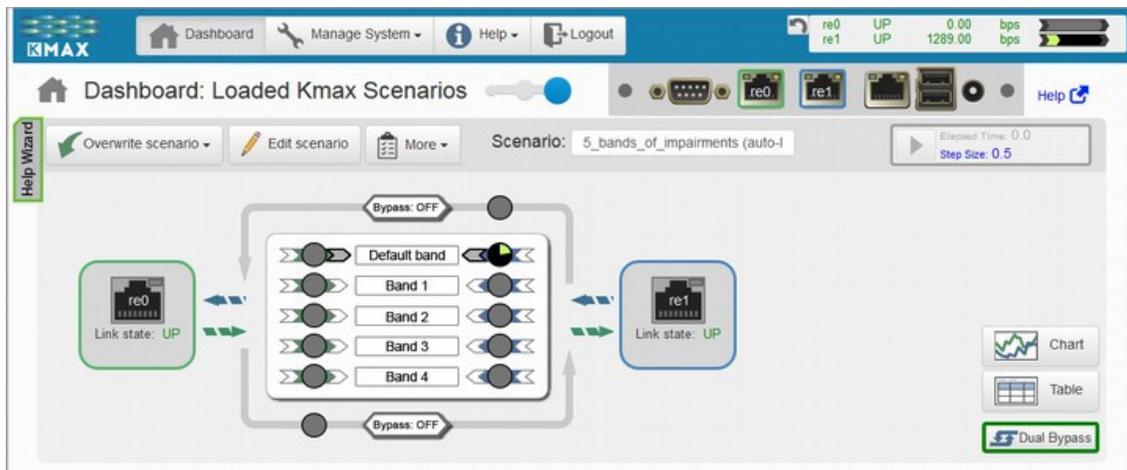
Bring up a web browser on a separate system and use the KMAX IP address as the URL. You will see the KMAX web checkbox login screen:



Login to the KMAX web GUI by enabling the checkbox and clicking on the button to accept the license.

7.2 Dashboard

After you login, you will see the dashboard page. At boot time, KMAX will launch the default scenario 5_bands_of_impairments, and this scenario will appear in a dashboard slot:



7.3 Management I/F Page

Once you have connected to KMAX-MM using a browser, select the Manage System > Management I/F menu item to bring up the interface management page:

The screenshot displays the KMAX Management I/F page. At the top, there is a navigation bar with the KMAX logo and menu items: Dashboard, Manage System, Help, and Logout. The main content is divided into two sections: Active Configuration and Proposed Configuration.

Active Configuration

Configuration mode:	dhcp	SNMP Trap Dest:	
Hostname+Domain Name:	kmax-scott.iwl.com	Read Community:	public
IPv4 Address:	10.0.0.8	Write Community:	
Prefix Length:	/24	Trap Community:	public
IPv4 Default Route:	10.0.0.1	SysContact:	No sysContact
MAC Address:	60:a4:4c:af:75:9a	SysLocation:	No sysLocation
DNS Server:	75.75.75.75		
DNS Server:	75.75.76.76		
DNS Server:			
NTP Server:	1.freebsd.pool.ntp.org		
NTP Server:	0.freebsd.pool.ntp.org		

Proposed Configuration

Configuration Mode: DHCP Static

Hostname+Domain Name:	<input type="text" value="kmax-scott.iwl.com"/>	SNMP Trap Dest:	<input type="text"/>
IPv4 Address:	<input type="text"/>	Read Community:	<input type="text" value="public"/>
IPv4 Prefix Length:	<input type="text"/>	Write Community:	<input type="text"/>
IPv4 Default route:	<input type="text"/>	Trap Community:	<input type="text" value="public"/>
DNS Server:	<input type="text"/>	SysContact:	<input type="text" value="No sysContact"/>
DNS Server:	<input type="text"/>	SysLocation:	<input type="text" value="No sysLocation"/>
DNS Server:	<input type="text"/>		
NTP Server:	<input type="text" value="1.freebsd.pool.ntp.org"/>		
NTP Server:	<input type="text" value="0.freebsd.pool.ntp.org"/>		

At the bottom of the Proposed Configuration section, there are three buttons: Apply & Reboot (red), Cancel (blue), and Reset (blue).

8 Help And Documentation

There are several resources for help documentation in the KMAX package.

- The online web help: accessible via Help > Online Help.
- PDF versions of the online help and this Quickstart are available from the KMAX unit itself via the URL http://<kmax_ip_address>/refdocs

9 Connecting To the Devices Under Test

Because KMAX operates at layer 2 there are no additional addressing or routing parameters to be configured in the devices being tested.

KMAX introduces a small store-and-forward delay – on the order of a few hundred

microseconds. This delay is insignificant for most IP and higher level protocol testing purposes because it is typically an order of magnitude (or more) smaller than the kinds of delays normally perceived at that level.

Some issues may arise when you connect devices to the two data interfaces; these are enumerated below:

9.1 Beware Of Forwarding Loops

A common error when wiring KMAX between devices is to directly (or indirectly) plug both of the data ports into the same switch. This configuration creates a packet forwarding loop. As soon as the first packet is sent by any device, the network will reach full capacity as the packet goes around and around in an infinite loop.

When wiring KMAX into the network, exercise care to assure that the two network segments, the one attached to LAN-A and the one attached to LAN-B, are isolated from one another without any routers, switches, or hubs connecting them together. KMAX should be the sole point of interconnection.

Note: KMAX may be used between two ports of the same switch if that switch is able to separate those ports onto separate untagged VLANs. However, some switches that emit Spanning Tree Protocol onto those untagged VLANs may do so incorrectly by using the same source MAC address. This can cause a switch to incorrectly believe that a loop has been created. KMAX can accommodate this situation through the use of an Ethernet filter that classifies those packets into a band that has been set to drop 100% of the packets on that band.

9.2 Link State

When you connect devices to the two data interfaces of a KMAX, you should always check that you are getting the link-state indicator at both KMAX as well as on the interfaces to the devices. Note, however, that the LEDs on the KMAX-MM do not always properly display link-state when connected to 1G devices. Instead, look at the link state indicators on the KMAX user interface.

9.3 Interface Speed

The interfaces on KMAX-MM operate at 10, 100, or 1000 megabits/second, full or half duplex.

Some routers, switches, and test equipment have interfaces that are locked and will not negotiate the speed or duplex setting.

If speed or duplex negotiation is not possible, the easiest cure is to insert an inexpensive, consumer-grade 10/100/1000 Ethernet switch into the path between the device and KMAX. These switches will usually solve negotiation issues.

10 Upgrading The KMAX-MM Software

Obtain an update file from the IWL web site, at <http://support.iwl.com/>

Once you have downloaded that update file use the KMAX "Update KMAX" item under the

“Manage System” tab on the user interface.

The update process will download the update file from your computer onto the KMAX, validate and apply the update, and then restart the KMAX-MM.

NOTE: *Before resuming use of KMAX-MM you must clear your browser cache and cookies.*

Appendix A: Using a USB Flash Drive To Configure The Management Interface

This method is fairly easy. You create a small text file on a USB flash drive, reboot the KMAX-MM, insert the flash drive, and then push a button when the front panel LEDs blink in a pattern indicating that your drive and file have been recognized.

When you turn on KMAX-MM by plugging in the power adapter, it will check to see if a USB flash drive is connected. If so, it will attempt to retrieve an IP address / mask / default gateway from a file on the drive.

Before you begin, obtain the following information from your system administrator:

- IPv4 address for the device to use.
- Subnet mask in IPv4 address format (e.g. 255.255.255.0).
- IPv4 address to use as a default route.

This procedure uses a small button on the KMAX-MM. That button is behind a small hole that will be found slightly to the right of center on the front of the KMAX-MM. A small thin object – such as a thin paperclip or a thumb tack – is used to reach through the hole to push the button. A slight click can be felt when the button is pushed.

To configure KMAX-MM using this method, follow these steps:

1. Format a flash drive using the FAT or FAT32 file system.
2. Create a text file at the root level of the drive with the file name *kmaxinit.ini* or *kmaxinit.txt*. (*kmaxinit.cfg* is also accepted for now, but that may change in the future.) The file name is case insensitive.

The file contents follow the familiar *.ini* form that is used on many Microsoft Windows systems.

Note that certain text editors, particularly on Microsoft Windows systems, may impose their own file name suffix convention. So check that the actual file name you create has one of the names, including the suffix, as shown above.

3. Add lines to the file in the following form. Use the values you obtained from your system administrator.

```
[network]
name=kmax-mm.example.tld
ip=192.168.1.5
plen=24
#mask=255.255.255.0
dflt=192.168.1.1
```

Where:

- **name** is the fully qualified domain name you wish to assign to the KMAX-MM. (This line is optional.)

- **ip** is the desired IP address of KMAX-MM.
- **plen** is subnet prefix length. This is an alternative to **mask**. If you use this option then do not use the **mask** specification.)
- **mask** is the subnet netmask. This is an alternative to **plen**. If you use this option then do not use the **plen** specification.
- **dfit** is the default gateway.

The lines shown above should be the only non-comment contents of the file.

Follow the upper/lower case forms shown above. A '#' character at the beginning of a line denotes a comment. The file can have either Unix line endings (LF) or MSDOS line endings (CRLF). Blank lines are ignored. Some editors (such as emacs) do not necessarily put a LF or CRLF after the last line, so to be safe you may add an additional blank line at the end.

4. Reboot KMAX-MM by unplugging, then plugging in the power adapter.
5. After plugging in the power adapter, wait about 10 seconds, then insert the USB flash drive into one of the USB ports on the back of c. KMAX-MM will turn on all three front LEDs after it completes the regular boot process, then a configuration process will launch to detect the flash drive. If no flash drive is detected after 2 minutes, the configuration process will terminate.
6. The configuration process will detect the USB flash drive. Once the USB flash drive is detected and validated the KMAX-MM will blink all three LEDs on the front panel in an all-on/all-off/all-on pattern:



It may take up to about 1 minute for the blinking to begin. If KMAX-MM is able to locate the file on the USB flash drive, but the file is invalid, the LEDs will blink in a left-right pattern:



If there is an error, the KMAX-MM will also sound a descending series of tones followed by a pause and a sequence of beeps. The number of beeps describes the reason why the file was rejected.

7. Then remove the USB flash drive.
8. Use a thin paper clip to push the button behind the small hole in the front of the case.

9. KMAX-MM will confirm the button-push by blinking the LEDs in an alternating pattern:



The KMAX-MM will also indicate success by sounding a rising series of tones. KMAX-MM will then apply the new settings and reboot.

10. After about 1 minute, KMAX-MM will finish the boot process. Use a web browser to connect to KMAX-MM using the new address, and use the KMAX-MM web GUI to configure all management interface parameters using the menu item Manage System > Management I/F.

Appendix B: Using The Offline Method To Configure The Management Interface

This method requires that you set up a computer (such as a laptop) with an IPv4 address that is consistent with the address that KMAX-MM self-assigns if it can not obtain a DHCP address. Depending on the operating system and hardware of your computer this could be an easy procedure or a hard one.

KMAX-MM is configured at the factory to request an address via DHCP at boot. If the DHCP request fails, KMAX-MM will use a default IP address of 192.168.0.5. You can access KMAX-MM using this IP address if you create a temporary isolated LAN subnet 192.168.0.xxx, and then configure your PC to use the subnet.

Before you begin, obtain the following information from your system administrator:

- IPv4 address for the device to use.
- Subnet mask in the form of prefix length.
- Hostname and domain name - These do not have to be in DNS.
- IPv4 address to use as a default route.
- IPv4 address of at least one DNS server.
- IPv4 address or domain name of NTP time servers (optional).

*It is important that **before** you make any changes that you write down your existing laptop/device configuration in case you make an error and need to restore the status quo ante.*

Attach the management interface to your network or, if your network administrator prefers, to an isolated network composed of nothing more than a simple Ethernet hub or switch. It is also possible to connect a standard Ethernet cable between your computer and the KMAX-MM management port, which is the rightmost Ethernet interface. You do not need a crossover cable: the Ethernet interfaces on KMAX-MM have MDI/MDIX crossover detection.

Configure the network interface on your PC to use the following IP address and subnet:

IP address	192.168.0.6
Subnet mask:	255.255.255.0
Default gateway (if required):	192.168.0.1

Then connect to KMAX-MM by accessing this URL on your computer: <http://192.168.0.5>. It might be very sluggish as a result of it not being able to perform DNS queries or reaching home pages.

Use the KMAX web GUI to configure all management interface parameters using the menu item Manage System > Management I/F. After setting net parameters, click the button Apply & Reboot.

You may now unplug the device and install it in its proper location on your network.

Appendix C: Using The Serial Port To Configure The Management Interface

This method is only for those who are familiar with serial port communications.

Connecting Via The Serial Port

The serial console is typically used only for initial configuration. Use a laptop or desktop computer to connect to the RS-232 interface on the back of KMAX-MM. You will need a female DB-9 to female DB-9 null-modem serial cable.

If your laptop/desktop lacks a serial DB-9 connector, use a USB serial adapter with drivers as appropriate for the operating system.

In RS-232 terminology, KMAX-MM is a DTE - Data Terminal Equipment. PC's and laptops are also RS-232 DTE's. This means that they must be connected using what is called a "Null Modem" cable. The cable to connect a PC to the device must have the following characteristics:

- Female DB-9 to Female DB-9
- Null Modem (crossover) wiring

Such cables are available through many electronics suppliers. Take care to find ones with DB-9 female connectors at **both** ends.

Note: Some suppliers now sell only null modem cables with a male DB-9 at one end and a female DB-9 connector at the other end. In these cases a female-female DB-9 "gender changer" will also be required.

Note: *Unless cables are well marked, there is no visual way to differentiate whether a given cable is a null modem or not. It is good practice to appropriately mark serial cables as soon as they are unwrapped from the vendor's packaging.*

Once the wiring is installed it is necessary to use a terminal emulator program on your desktop/laptop. Here are the settings that should be used. Because there are many terminal emulator programs and each is configured in its own way, the details of how these settings are named, expressed, and applied will vary:

- Asynchronous
- 115,200 bits/second
- 8 bits per character, no parity: A common designation is 8N1
- 1 stop bit
- Full duplex (i.e. remote echo)
- No modem controls
- No flow control (i.e. no RTS/CTS, no xon/xoff)

In order to use the terminal emulation program, you must identify the serial device to be used. Here is a list of common devices on different systems:

Windows	com1, com2, etc.
Linux: built-in serial interface	/dev/ttyS0
Linux: serial-to-USB adapter	/dev/ttyUSB0
FreeBSD: serial-to-USB adapter	/dev/ttyU0

Here is an example configuration file used by the [Kermit](#) terminal emulator:

```
; The following is typical for USB based serial ports on Linux machines
set line /dev/ttyUSB0
; The following is typical for built-in serial ports on Linux machines:
; set line /dev/ttyS0
; The following is typical for USB-based serial ports on FreeBSD:
; set line ttyU0
; The following is typical for serial ports on Windows:
; set line com1
set carrier-watch off
set speed 115200
set serial 8N1
set flow-control none
```

NOTE: The device does *not* use modem control signals; use the “Enter” key on the terminal emulator program to cause the device to issue a login prompt. If you receive gibberish then the communications settings, probably the bits-per-second-rate, are *incorrect*. If you do *not* get any response at all, then it is likely that either the communications settings of the terminal emulator are incorrect or the cable is *not a null-modem cable*.

The serial console is intended to be used only during initial system installation and configuration and for management purposes. Only the basic IP address information can be viewed/set through the serial console.

Once connected, follow the procedure described below.

Setting IP Configuration With The *ksetup* Account

Login to KMAX-MM using the *ksetup* user name; a script runs automatically that guides you through the IP setup process. Once the basic information is set, the web interface should be used to set all of the IP addressing information. Before starting, you should ascertain the addressing information you will need:

- Hostname (e.g. *kmax72*) and domain name (e.g. *example.com*)
- IPv4 address
- Subnet mask (in either address notation, e.g. *255.255.255.0*, or prefix notation, e.g. */24*)
- Default route
- IPv4 address of a DNS server
- IPv4 address of an NTP server (optional)

Perform the following steps:

1. Connect a personal computer running a terminal emulator program to the KMAX-MM RS-232 interface
2. Login:
Username: ksetup
Password: see the top of this document for the ksetup user password.
3. Follow the instructions. The script may ask you whether you want to reboot. If it is a good time to do so, then perform a reboot and bypass the next step below.
4. Logoff using Ctrl-D or the "exit" command, or reboot the device using the "reboot" command.

NOTE: *The address changes will take effect after the device is rebooted.*

After you set the basic IP address information you can use the web interface to extend or change that information.

Appendix D: Using DHCP To Configure The Management Interface

This procedure appears easy to use – but it may leave you wondering what address was assigned to the KMAX-MM. For that reason this method is useful only if you are familiar with DHCP servers.

KMAX-MM can obtain its network configuration using the Dynamic Host Configuration Protocol, DHCP. This is an easy way to operate but it comes with a drawback: It can be difficult to ascertain the IP address that the DHCP server assigned to KMAX-MM. For that reason it is often useful to create an explicit DHCP assignment entry into the DHCP server configuration so that KMAX-MM will obtain a known IP address from the DHCP server.

The attempt to use DHCP happens only when KMAX-MM is powered on or restarted. If there is no DHCP server available at that time the device will self-assign the following IP address and subnet mask:

- 192.168.0.5
- 255.255.255.0 (i.e. /24)

Only the management interface has an IP address: the data interfaces do not have IP addresses.

Ascertaining the IP Address Assigned by DHCP

In order to ask the DHCP server you need to ascertain which device on your network is providing the DHCP service.

Different DHCP servers note their assignments in different ways.

The ISC DHCP server, popular on Linux and Unix systems, sends reports of DHCP activity into the system's syslog. These messages are usually recorded into the file named `/var/log/messages`. This file is often protected and readable only by the system administrator.

The ISC DHCP server also records its assignments in its own file system in the file `/var/lib/dhcp/dhcpd.leases`

If you inspect these files you may find that you have several possible IP addresses. The easiest way to find which one is correct is to try to connect to each via a web browser until you get the device web pages.

If your DHCP server is within your router, then it may have a web page that displays its DHCP assignments.

You may also ask the KMAX-MM directly via the serial console, using the `kinfo` user account as described in the Quickstart document.