

## PACKING LIST

- 1 x Moxa UC-7112 embedded linux system (KT15 logger)
  - 1 x mains adapter for Moxa
  - 1 x serial terminal cable for Moxa
  - 1 x 4-way UK socket block with US plug
  
  - 2 x KT15 IR temperature sensors
  - 2 x power/comms cables for KT15s (9pin-D serial connector to Y-split power & comms cables)
  - 2 x extension cables to KT15 units (black, ~10m or so)
  - 2 x RS232 serial cables
  - 2 x mains-24V DC power supplies
  
  - 2 x mounting plates & rail clamps for KT15s.
  
  - 1 x Ring bound manual for KT15s
  - 1 x Ring bound manual for Moxa UC-7112
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## INSTRUCTIONS

**Power:** both the KT15 power supplies and the Moxa power adapter will take US and EU AC power. They've all got UK plugs on, so I've included a UK socket board with US plug on it.

### **Cabling KT15s:**

The 2 round plugs on the Y-split cables plug into the power supplies and either straight into KT15s or into the extension cables. Plugs are all difference – you can't get anything the wrong way round. The rs232 cables connect the 9-pin D connector on the KT15 cables to the Moxa (need the extensions because the split cables won't both plug in side by side)

When powered on the KT15s will hum quietly.

Both KT15s have machine screws and washers attached to the bottom to secure them to the mounting plates. I've included 2 different sizes of rail clamp for the plates and some rubber sheet to wrap the rail before clamping them on.

### **Moxa Logger:**

The Moxa UC-7112 is running a stripped down version of linux.

It has 2 network sockets:

- LAN1 has an IP address of 192.168.3.127 (printed on side of unit) - You can plug straight into this with a laptop set to the same address range (you might need a cross-over cable – or plug both laptop & moxa into a network switch)

- LAN2 is set to lookup an address via DHCP (MAX ADDRESS: 00:90:E8:13:38:0A). It will pick up an IP address at boot up if it finds a server – plug this into the ship's science network.

If all else fails and you can't get a network connection, there is a serial cable included with a tiny flat connector on one end – this will plug into the Moxa on right hand side (just under the label with the LAN1 IP address printed on it) and allow you to connect via a serial terminal (RS232, 115200 Baud) – you should get an immediate root login, you might need to hit return to get the prompt displayed (no password required).

On power up the Moxa will beep once. It may take a couple of minutes to boot fully if it is not connected to a network – it waits quite a while before the DHCP lookup times out. When fully up the green 'ready' light on front should come on. Once it's booted you can login via SSH – the only user is root and the password is 'root'. Once logged in an ASCII-art MOXA logo is displayed. You will initially be in directory '/root'.

Change directory to '/home' – all the logging code and commands are in here, along with a couple of other essential things.

NB. To run non-system programs or scripts you will need to give an explicit full or relative path – so in current directory precede them with './' – eg: './logger'

**TIME:** the system clock will be wrong on first boot up. There is a command script : /home/bin called 'set-time-ntp' which will poll a network time server for the current time. This script is run automatically at boot-up, and on the hour by a cron job (set in /etc/cron.d/crontab). The set-time-ntp script currently has the IP address of the timeserver in Leeds set. **You will need to edit this for timeserver on ship (or your own).**

**Logging:** The logging code is just called 'logger', and reads the logger.conf file to determine what the instrument details are. It is currently configured to log 2 KT15s at 1Hz.

For proper logging use the './run-logger' command – this runs the logger in the background and saves the process ID to the file logger.pid. Any messages from the logger that would usually be displayed on the terminal are redirected to '/home/data/logger.log'. Be careful not to start multiple instances of the logger – they will be looking at the same serial ports, and both get part of the data...which will get scrambled up.

You can safely log out and leave it logging.

To stop the logger use the 'stoplogger' command – this sends a kill message to the process ID listed in logger.pid – which is trapped and shuts down neatly. If the logger won't stop, use the 'killlogger' command...this forces the process to terminate (not neatly).

To check if the logger is running, './is-it-running' displays all processes with a name matching '\*ogger'.

For testing you can run ./logger directly at the command line, and the logger will display messages to the terminal – an initial summary of what it's configured for, and then filenames as each new file is created. CTRL-C to quit.

**DATA:** The data files are stored on an internal 1GB SD card mounted on /home/sdcard and linked from /home/data.

Filenames are **YYMMDD\_hhmmss.ss.KT15-n** where the main part of the name gives the start time of the file to 0.01 seconds, and n is '1' or '2'. The extension on the filename is actually obtained from the logger.conf file, and is set here so that KT15-1 is on port P1 (/dev/ttyM0) and KT15-2 is on port P2 (/dev/ttyM1)

In order to get both the measured temperature AND the internal ambient temperature, the KT15s are run in polled data mode, with requests sent from the logger for both measured and ambient temperature. The outputs alternate in the data files – the ambient temperature has 'AMB REF' before the value. Data files will look like:

```
2015 06 23 10 54 41.276 18.86 C
2015 06 23 10 54 41.286 AMB REF 26.75 C
... etc ...
```

The date and time is the Moxa system time at which the first character of the data message is received.

The SD card has been wiped, and should take months to fill up with the 1Hz data rate. If it DOES fill up, then probably something has screwed up, and the /home/data/logger.log file is full of error messages.

**Retrieving Data:** To get data off the moxa use 'scp' under linux, or something like winscp client under windows. For ACSE cruise I had a cron job running on the linux OS of the Synology RAID I used for data backup which just scp'd the previous day's data onto the RAID in the early hours of every morning. Public/private keys used to remove the need for giving a password.

**Editing scripts:** The Moxa only has a cut-down version of the 'vi' editor installed. It doesn't have all the options you'll find on a current standard linux implementation of 'vi' – notably the only way to delete a char is with the 'x' key. It's annoying to use, but you shouldn't need to do

much with it apart from change the IP address of the time server.

#### **Direct comms with KT15:**

If you need to change the KT15 settings, or need to test something, then you can either plug the serial line into a laptop (rs232 9600 baud), or there is a simple serial terminal programme on the moxa '/home/sercomm' -

Usage: ./sercomm port protocol baud line-term

Ctrl-C to quit

For KT15 on port P1:

```
./sercomm /dev/ttyM0 rs232 B9600 CRLF
```

There is a list of commands in the Universal protocol manual in the binder with KT15 manual. Eg: 'EMI ?' requests the current emissivity value – this is set to 0.98.

#### **Potential issues:**

- if there is no time server available, and the system clock is wrong, then the filenames will have erroneous dates/times. A potential problem is that the way the logger currently obtains the 2 digit year assumes that the system clock year is sensible...if it's not, the 2 digit year can go negative and result in an illegal filename. To get rid of these, you may need to use brute force and something like: 'rm /home/data/\*'.

### **QUICK SUMMARY OF DEFAULT USAGE**

Login

Check time with 'date' command to ensure system clock got set OK.

```
cd /home
```

```
./run-logger
```

Check /home/data to ensure data files created and are growing

Logout

### **SUMMARY OF LOGGER COMMANDS ETC:**

/home/run-logger	- run the logger
/home/stoplogger	- stop logger programme
/home/is-it-running	- check if logger is running in background
/home/killlogger	- forcibly stop logger
/home/sercomm	- serial terminal programme
/home/bin/set-time-ntp	- set time from network timeserver (edit to set IP address)
/home/logger.conf	- configuration file for logger
/home/logger	- the executable logger code
/home/data	- data directory (link to SD card)