

EX-9486-2L-8 User Guide

Introduction:

EX-9486-2L-8 are ARM9-based Linux ready industrial computer. The keyfeatures are as follow:

1. ARM920T ARM Thumb Processor with 200MIPS at 180MHz,Memory Management Unit
2. 16-KByte Data Cache and 16-KByte Instruction Cache
3. 32MB SDRAM, 16MB Flash on board
4. Two 10/100 Mbps Ethernet
5. Two USB 2.0 full speed (12 Mbps) Host Ports
6. Multimedia Card Interface for SD memory card
7. Five 3-in-1 RS-232/422/485 ports and three RS-232 ports
8. 21 programmable Digital I/O port
9. LCM Display (2x18 character mode) with backlight (EX-9486-2L-8-LCM only)
10. Audio Output
11. 9 to 40VDC power input
12. Pre-installed Standard Linux 2.6 OS
13. GNU tool chain available in software CD
14. Optional DIN RAIL mounting adaptor

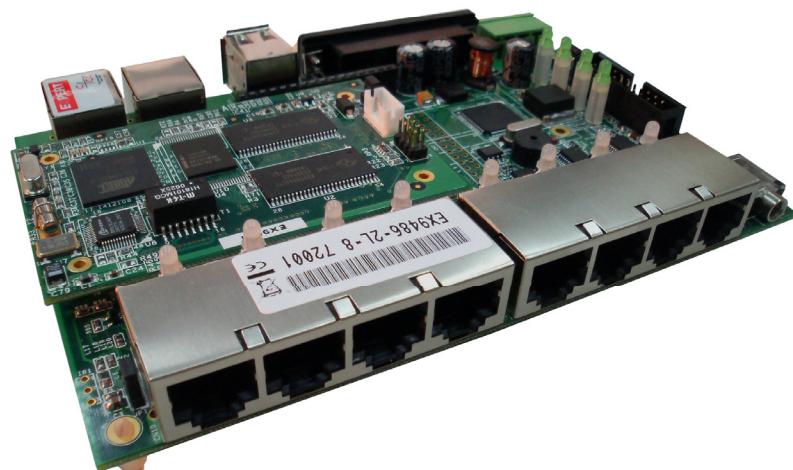
Packing List

1. EX-9486-2L-8 Box Computer
2. Wall mount bracket
3. Software CD

Optional Accessory:

1. CB-RJ45F9-150: RJ45 to DB9 Female Cable
2. CB-RJ2CON-100: Serial Console Cable
3. DK-35A: DIN RAIL Mounting Kit

EX-9486-2L-8 Layout



Reset Button

Press the “Reset” button to activate the hardware reset. You should only use this function if the software does not function properly.

Power LED

The Power LED will show solid green if power is properly applied

Ready LED

The Ready LED will show solid green if EX-9486-2L-8 complete system boot up. If Ready LED is off during system boot up, please check if power input is correct. Turn off the power and restart EX-9486-2L-8 again. If Ready LED is still off, please contact the manufacturer for technical support.

Link/Act

When Ethernet port are connected to the network, Link/Act will show solid green and if there is traffic is the Ethernet, this LED will flash.

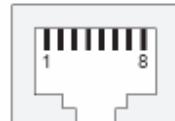
Serial Port LED

These eight dual color LEDs indicate the data traffic at the serial ports. When RXD line is high then Green light is ON and when TXD line is high, Yellow light is ON.

Pin Assignment and Definition

Ethernet Port

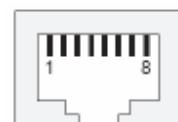
Pin	Signal
1	ETx+
2	ETx-
3	ERx+
6	ERx-



Serial Ports:

Port 1,5,6,7 and 8: 3-in-1 RS-232/422/485
Port 2: RS-232 with full modem control
Port 3, 4: RS-232 with hardware flow control
Note: RS-232/422/485 is software selection

Pin	RS-232	RS-422	RS-485
1	DSR		
2	RTS	TxD+	Data+
3	GND	GND	GND
4	TxD	TxD-	Data-
5	RxD	RxD+	

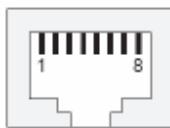


6	DCD	RxD-	
7	CTS		
8	DTR		

Serial Console Port:

Serial console port share the connector with Serial port 3 but the pin definition as shown as follow:

Pin	Signal
1	
2	TxD
3	GND
4	
5	
6	
7	RxD
8	



The serial console port is disabled as factory default setting. To enable the serial console, you need to use the serial console cable and connect it to port 3. Use any terminal software such as hyper terminal and setting as follow:

Baud Rate: 115200

Data bits: 8

Parity: N

Stop bit: 1

Terminal type: ANSI

Once system is power on, you will see “Starting EX-9486-2L”, Keep typing \$\$\$\$ to turn on the serial console function. If the serial console is enabled, you will see “Console (ttyS0)” as follow. Repeat this procedure will disable the serial console and Screen will show “Console (null)”

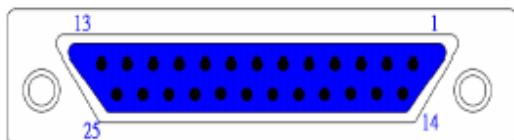
```

arp_tables: (C) 2002 David S. Miller
TCP bic registered
Netfilter messages via NETLINK v0.30.
DTR: Registered protocol family 1
RTS: Registered protocol family 17
RAMDISK: Compressed image found at block 0
VFS: Mounted root (ext2 filesystem).
Freeing init memory: 100K
Init System.....Please Wait......
eth0: Link now 100-FullDuplex
eth1: unknown interface: No such device
/etc/rc: lcdctl: command not found
dhcpcd[732]: dhcpcstart: ioctl SIOCGIFHWADDR: No such device
Welcome to
( _ _ ) / \ ( _ , \ _ ) / \ _ ) / \ _ )
) ( ( ) ) _ \ / _ \ ( ( _ ( ( _ (
_ ) \ _ / ( ) ( _ ) / \ _ ) \ _ ) \ _ )
For further information check:
http://www.topscc.com/
#

```

State:OPEN CTS DSR R1 DCD Got Break Signal

Digital I/O Port (DB25 Female)



Pin No	Function	Pin	Function
1	DIO 0	14	DIO 13
2	DIO 1	15	DIO 14
3	DIO 2	16	DIO 15
4	DIO 3	17	DIO 16
5	DIO 4	18	DIO 17
6	DIO 5	19	DIO 18
7	DIO 6	20	DIO 19
8	DIO 7	21	DIO 20
9	DIO 8	22	GND
10	DIO 9	23	GND
11	DIO 10	24	VCC 3
12	DIO 11	25	VCC 5
13	DIO 12		

Note:

1. VCC3: 3.3 VDC output
2. VCC5: 5 VDC output
3. GND: Digital Ground

Factory Default Settings

LAN 1 IP Address: 192.168.2.127

LAN 2 IP Address: DHCP

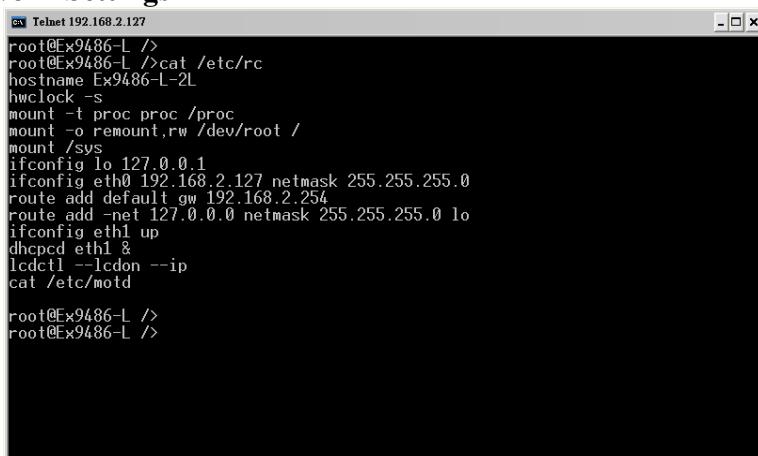
Login: guest

Password: guest

Supervisor: root (ssh supported)

Password: root

Network Settings



The screenshot shows a Telnet session window titled "Telnet 192.168.2.127". The terminal prompt is "root@Ex9486-L >". The user has run several commands to check and set network interfaces. The output includes:

```
root@Ex9486-L >
root@Ex9486-L >cat /etc/rc
hostname Ex9486-L-2L
hwclock -s
mount -t proc proc /proc
mount -o remount,rw /dev/root /
mount /sys
ifconfig lo 127.0.0.1
ifconfig eth0 192.168.2.127 netmask 255.255.255.0
route add default gw 192.168.2.254
route add -net 127.0.0.0 netmask 255.255.255.0 lo
ifconfig eth1 up
dhcpcd eth1 &
lcdctl --lcdon --ip
cat /etc/motd

root@Ex9486-L >
root@Ex9486-L >
```

To configure the IP address, Subnet mask and Gateway setting, please modify **/disk/etc/rc** as following:

ifconfig eth0 192.168.2.127 netmask 255.255.255.0

For DHCP setting:

dhcpcd eth1 &

Wireless LAN Configuration

EX-9486-2L-8 supports wireless LAN by using USB WLAN adaptor which uses Ralink RT2570 (rt2570) /2571 (rt73)controller. Please refer to the website <http://ralink.rapla.net> for the supporting list of the USB WLAN adaptor.

To configure the wireless LAN setting, please use command:

modprobe rt73 or modprobe rt2570

ifconfig wlan0 up

iwconfig wlan0 essid XXXX key YYYYYYYY mode MMMM

For infrastructure mode

XXXX is the access point name

YYYYYYYYY is the encryption key

MMMM should be ***managed***

For Ad-Hoc mode

XXXX is the EX-9486-2L-8 device name

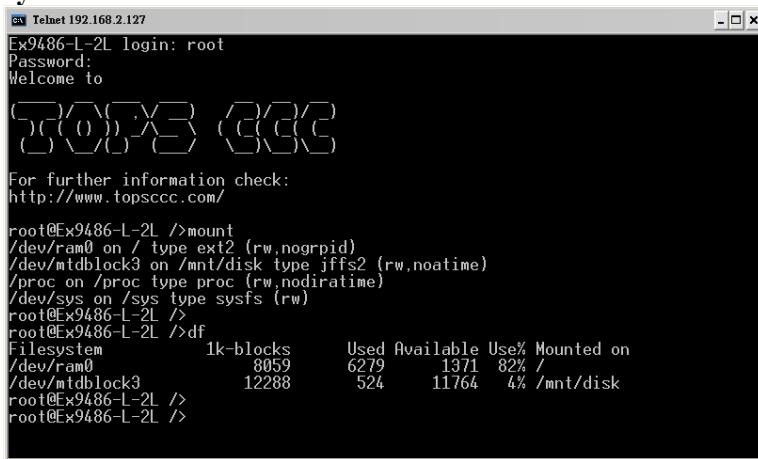
YYYYYYYYY is the encryption key

MMMM should be ***adhoc***.

To configure the IP address use command

***dhcpcd wlan0 & or ifconfig wlan0 192.168.2.127 netmask
255.255.255.0***

File System



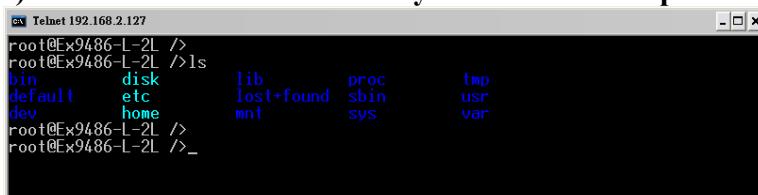
```
Ex9486-L-2L login: root
Password:
Welcome to

For further information check:
http://www.topsccc.com/

root@Ex9486-L-2L ~>/mount
/dev/ram0 on / type ext2 (rw,nogrpuid)
/dev/mtdblock3 on /mnt/disk type jffs2 (rw,noatime)
/proc on /proc type proc (rw,nodiratime)
/dev/sys on /sys type sysfs (rw)
root@Ex9486-L-2L ~>
root@Ex9486-L-2L ~>/df
Filesystem      1k-blocks    Used   Available  Use%  Mounted on
/dev/ram0        8059       6279     1971      82%   /
/dev/mtdblock3  12288       524     11764      4%   /mnt/disk
root@Ex9486-L-2L ~>
root@Ex9486-L-2L ~>
```

EX-9486-2L-8 configures the root file system as RAMDISK and the user disk (/disk) which includes /home and /etc directory are configured as Flash Disk. To find out the file system information, please use command /mount as show as above. In addition, use command /df to find out the disk space of the disk. The RAMDISK uses 8MB memory space to store the root file system and the user disk is about 11MB for user's program storage.

Therefore, user's program and utility software must be saved in the user disk space (/disk). Files saved to other directory will be loss after power off !!!



```
Ex9486-L-2L ~>
root@Ex9486-L-2L ~>/ls
bin      disk      lib      proc      tmp
default  etc       lost+found  sbin      usr
dev      home      mnt      sys       var
root@Ex9486-L-2L ~>
root@Ex9486-L-2L ~>_
```

Devices list

The supported devices are shown at /dev directory. Following list are most popular ones:

1. ttyS0: serial console port
2. ttyS1 to ttyS8: serial port 1 to port 8
3. mmc to mmc2: SD memory card
4. sda to sde: USB flash disk
5. ttyUSB0 to ttyUSB1: USB RS-232 adaptor (fdt_i_sio.ko)
6. rtc: Real Time Clock
7. gpio: General Purpose digital I/O
8. ttyACM0 and ttyACM1: USB Modem (CDC compliant)

```

ex Telnet 192.168.2.127
root@Ex9486-L-2L ~
root@Ex9486-L-2L ~
root@Ex9486-L-2L ~ >cd /dev
root@Ex9486-L-2L /dev>ls
console    log      mtdblock3  ptyp6    sda3      tty6      ttyp2
cua0      mem      mtdr0     ptyp7    sda4      tty7      ttyp3
cua1      mmc      mtdr1     ptyp8    sdb       tty8      ttyp4
flash     mmc0     mtdr2     ptyp9    sdc       tty9      ttyp5
gpio      mmc1     mtdr3     ram0     sdd       ttyS0     ttyp6
hda      mmc2     null      ram1     sde       ttyS1     ttyp7
hdal     mtd0     ppp       ram2     tty      ttyS2     ttyp8
hda2     mtd1     ptyp0     ram3     tty0     ttyS3     ttyp9
hda3     mtd2     ptyp1     random   tty1     ttyS4     urandom
hda4     mtd3     ptyp2     rtc      tty2     ttyUSB0   watchdog
ipsec    mtdblock0 ptyp3     sda      tty3     ttyUSB1   zero
kmem    mtdblock1 ptyp4     sda1    tty4     tty0      zero
ledman   mtdblock2 ptyp5     sda2    tty5     tty1      zero
root@Ex9486-L-2L /dev>
root@Ex9486-L-2L /dev>_

```

Utility Software:

EX-9486-2L-8 includes busybox utility collection and utility software as follow:

```

ex Telnet 192.168.2.127
root@Ex9486-L-2L ~
root@Ex9486-L-2L ~
root@Ex9486-L-2L ~ >/bin>ls
addgroup   echo      kill      sleep
adduser    egrep     ln        smbmount
amgrd     erase     login     smbmount
bash      false     ls        submount
boa       fgrep     mkdir    snmpd
busybox   ftop      mkfs.iff2  stty
cat       grep      mknod    su
chat     gunzip   mktemp   sync
chgrp    gzip      more     tar
chmod    hostname  mount    telnetd
chown   ineted    mv       tip
cp       init      netstat  touch
date     iptables  pidof    true
delgroup  iptables-restore ping    umount
deluser   iptables-save  pppd   update
df       iwconfig  ps       usleep
dhcpcd   iwgetid   pwd     version
dhrystone iwlwifi  iwlist   rm
discard   iwpriv   rmdir   zcat
dmmsg    iwspy    sh
root@Ex9486-L-2L /bin>
root@Ex9486-L-2L /bin>_

```

Utility Software:

The introduction of utility software as follow:

1. update :

```

ex Telnet 192.168.2.127
root@Ex9486-L-2L ~
root@Ex9486-L-2L ~ /bin>update --help
Usage: update [OPTION] filename
Write image to flash.

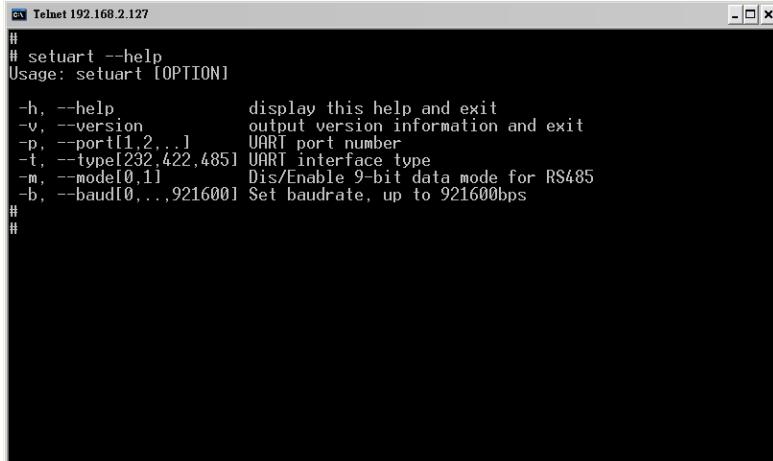
-q, --quiet    don't display progress messages
--silent     same as --quiet
--help       display this help and exit
--version    output version information and exit
--FORMAT     format userdisk
root@Ex9486-L-2L /bin>_

```

update loader, kernel or root file system image. Also use *update —FORMAT* to format

user disk. Type *update—help* to find the command usage Update can only operated under supervisor mode (password : root)

2. *setuart*:



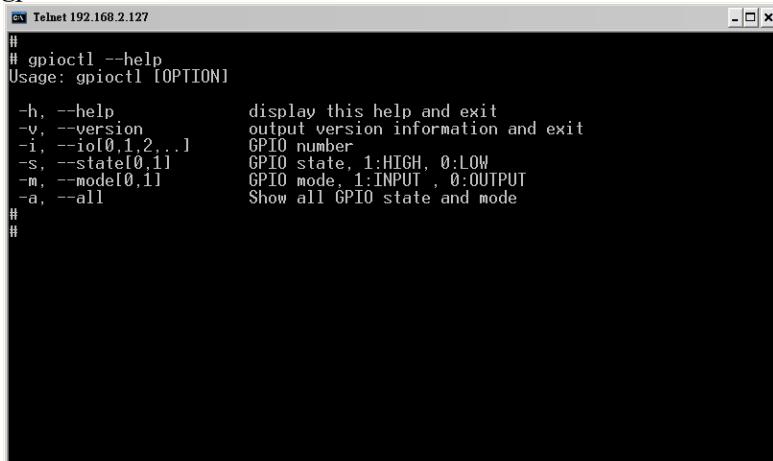
```
# Telnet 192.168.2.127
#
# setuart --help
Usage: setuart [OPTION]
-h, --help           display this help and exit
-v, --version        output version information and exit
-p, --port[1,2,...]   UART port number
-t, --type[232,422,485] UART interface type
-m, --mode[0,1]       Dis/Enable 9-bit data mode for RS485
-b, --baud[0,...921600] Set baudrate, up to 921600bps
#
#
```

configure serial port setting. An example show as followed to configure port 1 as RS-485 interface with baud rate 921600. Please note only port 1 support 9-bit data at RS-485

3. *lcdctl*:

lcdctl is used to control the LCD display. Use lcdctl to display user message, please prepare 2x18 text message and save it as a file. Then use lcdctl filename to display the message on the LCD screen. Use *lcdctl —ip 0* to display the ip address of the network setting on the LCD screen. The parameter *time* is the refresh rate in second and use *lcdctl —cpu 0* to display the system loading information

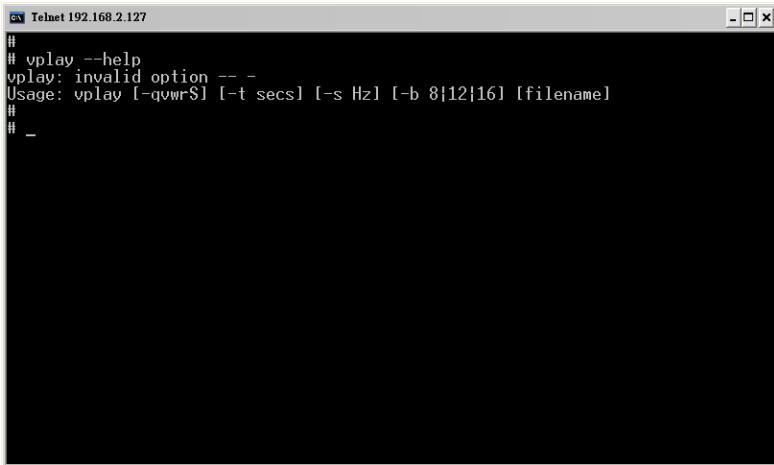
4. *gpiocntl*:



```
# Telnet 192.168.2.127
#
# gpiocntl --help
Usage: gpiocntl [OPTION]
-h, --help           display this help and exit
-v, --version        output version information and exit
-i, --io[0,1,2,...]  GPIO number
-s, --state[0,1]      GPIO state, 1:HIGH, 0:LOW
-m, --mode[0,1]       GPIO mode, 1:INPUT , 0:OUTPUT
-a, --all            Show all GPIO state and mode
#
#
```

gpiocntl is used to control the programmable digital I/O port located on the DB25 connector. Following example is to configure DIO1 as digital input and DIO2 as digital output with low output state.

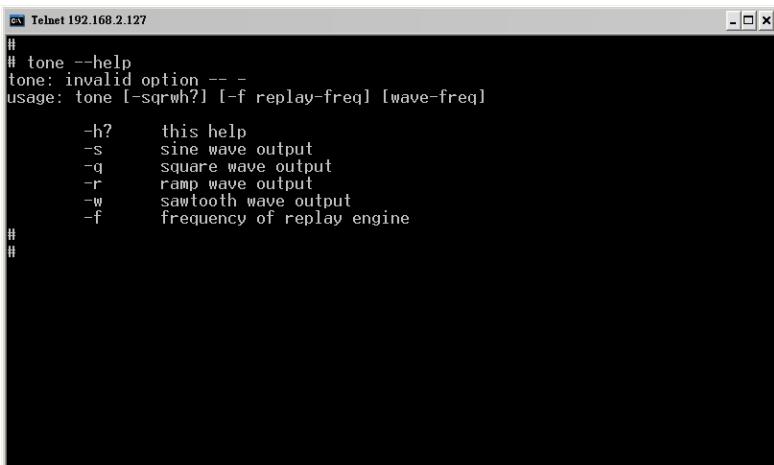
5. *vplay*:



```
# vplay --help
vplay: invalid option -- -
Usage: vplay [-qvwr$] [-t secs] [-b 8|12|16] [filename]
#
# -
```

vplay is used to play audio file in wave format.

6. Tone:

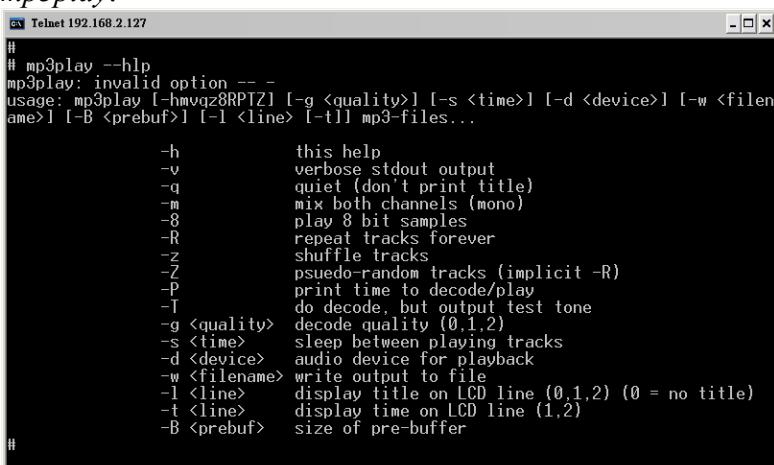


```
# 
# tone --help
tone: invalid option -- -
usage: tone [-sqrwh?] [-f replay-freq] [wave-freq]

    -h?      this help
    -s       sine wave output
    -q       square wave output
    -r       ramp wave output
    -w       sawtooth wave output
    -f       frequency of replay engine
#
#
```

Audio output test program

7. mp3play:



```
# 
# mp3play --hlp
mp3play: invalid option -- -
usage: mp3play [-hwvqz8RPTZ] [-g <quality>] [-s <time>] [-d <device>] [-w <filename>] [-B <prebuf>] [-l <line>] [-tll] mp3-files...

    -h      this help
    -v      verbose stdout output
    -q      quiet (don't print title)
    -m      mix both channels (mono)
    -8      play 8 bit samples
    -R      repeat tracks forever
    -z      shuffle tracks
    -Z      psuedo-random tracks (implicit -R)
    -P      print time to decode/play
    -T      do decode, but output test tone
    -g <quality> decode quality (0,1,2)
    -s <time>   sleep between playing tracks
    -d <device> audio device for playback
    -w <filename> write output to file
    -l <line>   display title on LCD line (0,1,2) (0 = no title)
    -t <line>   display time on LCD line (1,2)
    -B <prebuf> size of pre-buffer
#
```

mp3play is used to play MP3 format audio files

How to make more utility software

You might also find utility software available on software CD under /EX-9486-2L-8/utility such as *ntpclient*, *ssh*, *scp*, *bluez* and *ssh-keygen*. If you want, you can ftp or copy the utility software to EX-9486-2L-8 user disk (/disk). Also you can use find the source code and use the GNU Tool Chain to make the utility by yourself.

Mounting External Storage Memory

To find out the device name of the external memory device which plug into EX-9486-2L-8, you can use the command

/dmesg | grep sd

or

/dmesg | grep mmc

Type

mount /dev/sda1 to mount the USB disk and

mount /dev/mmc0 to mount SD card

Adjust the system time

To adjust the RTC time, you can follow the command

/date MMDhhmmYYYY

where

MM=Month (01~12)

DD=Date (01~31)

hh=Hour

mm=minutes

YYYY= Year

/hwclock -w

To write the date information to RTC User can also use NTP client utility in software CD to adjust the RTC time.

/ntpclient [time server ip]

SSH Console

EX-9486-2L-8 support SSH. If you use Linux computer, you can use SSH command to login EX-9486-2L-8. The configuration of SSH and key are located at

/etc/config/ssh

The key generation program is available at software CD

/EX-9486-2L-8/utility/ssh_keygen

User can copy this program to EX-9486-2L-8 to generate the key

Install GNU Tool Chain

Find a PC with Linux 2.6.X Kernel installed and login as a **root** user then copy the arm-linux-3.3.2.tar.gz to root directory of PC. Under root directory, type following command to install the EX-9486-2L-8 Tool Chain

#tar zxvf arm-linux-3.3.2.tar.gz

Welcome Message

To modify the welcome message, user can use text edit to modify the /etc/motd.

Web Page Directory

The web pages are placed at /home/httpd and the boa.conf contains the boa web server settings. The home page name should be ***index.html***

Getting started the Hello program

There are many example programs in software CD. To compile the sample you can use the Make file to and type

make

To compile and link the library. Once done, use ftp command

ftp 192.168.2.127

And bin command to set transfer mode to binary

ftp>bin

to transfer the execution file to EX-9486-2L-8 user disk (/disk) and use

chmod +x file.o

Change it to execution mode and

./file.o

to run the file