

This document outlines some details to help you better understand the features of your new PiRLP node.

Your PiRLP node uses a heavily customized software build that is optimized for speed and reliability. However, it is still very compatible with most IRLP scripts and add-ons that are designed to work with Debian IRLP nodes.

The target audience of this manual is people who have ordered a pre-loaded SD card image from IRLP. It can be used for people that build their own Pi nodes, but be aware that some things will not be applicable.

Additional information can be found on the IRLP Wiki page at:

<http://wiki.irlp.net>

Please note – The wiki is a collaborative effort, and anyone can edit/add/remove content.

This document will live online as a PDF file. The version of the PDF will be updated as more things are added to the document. Please refer to the ChangeLog on the last page of this document for details on the updates.

David Cameron – VE7LTD
IRLP System Designer

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Technical Details

The Raspberry Pi motherboard specification can be found by visiting the FAQs at the Raspberry Pi Foundation website:

<http://www.raspberrypi.org/faqs>

The Raspberry Pi lacks a sound card, so we suggest you pair your PiRLP node with a USB sound fob that uses a CMedia CM108 or CM119 chipset. If you ordered a complete package, the USB sound fob is the best possible pairing to your node. A list of compatible sound cards is listed on the IRLP wiki.

Assembling your PiRLP Node

Your PiRLP node consists of the following parts:

- 1) **Pi computer motherboard**
Connect a network cable to the network port of the motherboard.
- 2) **4GB SD card**
The SD card is inserted on the underside of the Pi.
- 3) **Power supply**
The power supply needs to be attached to a 100-240V 50/60Hz outlet to provide regulated power to the Pi motherboard. **DO NOT apply power to the Pi before attaching any peripheral (including USB).**
- 4) **USB power cable**
The USB power cable routes between the power supply and the Pi motherboard. The large end of the cable plugs into the power supply and the small end plugs into the Pi motherboard.
- 5) **GPIO cable**
The GPIO cable connects the IRLP board to the Pi motherboard. Care must be taken to ensure that the RED wire of the connector is positioned to the edge of the Pi motherboard, next to the label "P1" on the Pi motherboard. The cable should be in place before attaching power to the Pi motherboard. The cable is secured to the IRLP board with two supplied screws and washers.
- 6) **USB sound fob**
The USB sound fob provides the audio input/output between your radio and the Pi motherboard. It may have been modified to carry audio from the IRLP DB-9 connector direct to itself.
- 7) **IRLP board**
- 8) **IRLP board DB-9 interface**
The IRLP board DB-9 interface provides the interface between the PiRLP node and the radio.

Wiring of IRLP DB-9 Interface

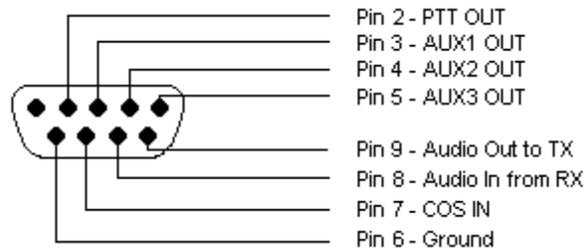
The DB-9 interface between the radio and the IRLP board is directly wired to the audio input and output on the Pi board. This removes the need to use the audio ports of the motherboard for input and output audio, providing a single DB9 connector for all inputs to and outputs from the node.

The wiring of the PiRLP node DB-9 connector is identical to the IRLP Version 3.0 interface board wiring, except that audio output is available on pin 9 of the DB-9 connector. This means that audio input (and the input to the DTMF decoder) is on pin 8 and the audio output is on pin 9. There is no need to use 1/8" stereo connectors to connect to the audio jacks on the motherboard.

IMPORTANT – Many scripts (including the morse ID) require that the AUX1 and PTT outputs be bridged. As a courtesy, a jumper has been soldered between pins 2 and 3 on the IRLP board shipped with your Pi node. This is **REQUIRED** for all controller installations and for many scripts developed for the PiRLP nodes.

IMPORTANT – Some microphone inputs have a biased voltage applied to them to power the microphone element. **THIS AUDIO OUTPUT IS NOT DC PROTECTED**, and a series capacitor should be added to remove any DC portion on the line. Failure to do so can damage the audio input on the USB sound card, or the microphone input on your radio. Most radio equipment is AC coupled, so this may not be an issue, but please consider this warning when wiring your radio.

The wiring is as follows:



SOLDER SIDE FEMALE DB9

Embedded DB9 Wiring

Pin 2 – PTT Output

This pin should be connected to the radio PTT. This lead is active LOW only (goes to ground for radio to transmit).

Pin 3 – AUX1 Output

This pin should be connected to any AUX source. For repeater operation and to use some scripts, this must be bridged to PTT (pin 2).

Pin 4 – AUX2 Output

This pin can be connected to any AUX source. This lead is active LOW only.

Pin 5 – AUX3 Output

This pin can be connected to any AUX source. This lead is active LOW only.

Pin 6 – Ground (common to radio and power source)

The ground should be common to the chassis of the radio, audio lines, and common to the power source ground.

Pin 7 – Carrier Operated Squelch (COS) Input from radio

COS is a digital ON/OFF signal from the receiver that changes with the presence of a received signal. The COS can be active high or active low. The COS jumper on the board switches between active HIGH and active LOW. All PiRLP nodes are shipped with the jumper in the COS active LOW position.

Pin 8 – Audio In (from receiver)

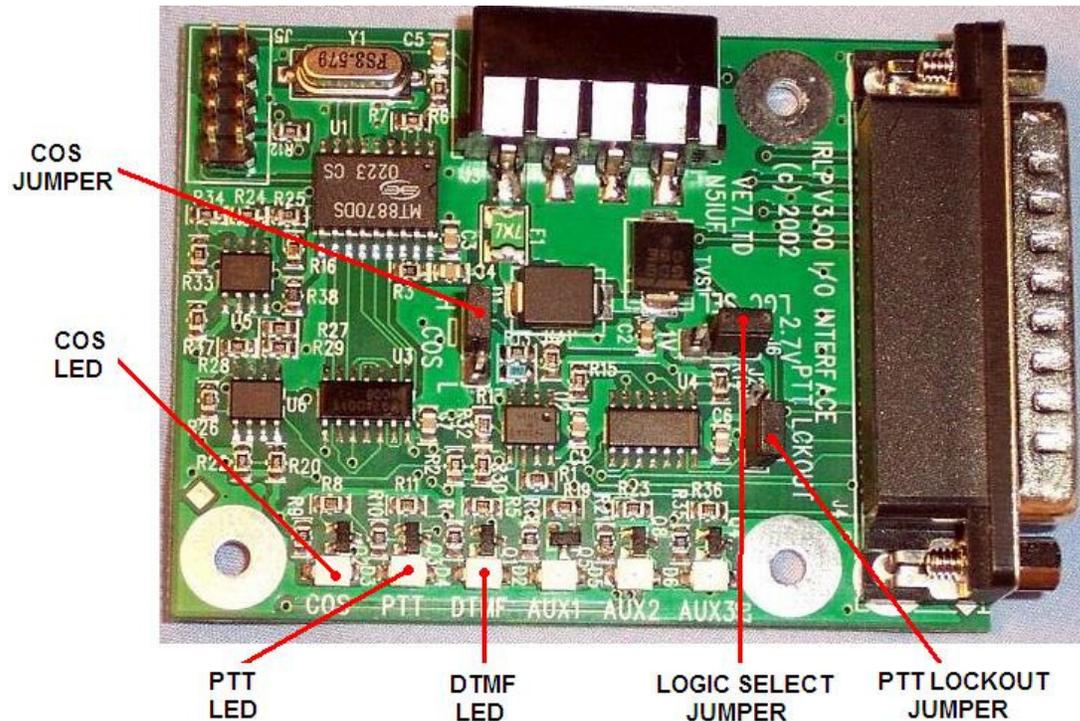
This pin should have the squelched audio from the receiver. This is the audio input to both the node and the DTMF decoder on the IRLP board. The input impedance is 10Kohms, expecting about 1V P-t-P audio.

Pin 9 – Audio Out (to transmitter)

This is the audio source for the transmitter. It should be tied to the audio input of the transmitter. The output impedance is 300 ohms, and produces a 1V P-t-P signal.

IRLP Board Jumper Adjustments

The IRLP board has three jumpers which can be adjusted to suit the needs of the connected radio. The jumpers are the COS HIGH/LOW jumper, the LOGIC SELECT jumper, and the PTT LOCKOUT jumper.



The COS HIGH/LOW jumper changes the logic required for the COS signal. If the COS signal is drawn to ground when the receiver is active, the jumper should be in the L (LOW) position (default when shipped). If the COS signal applies a positive voltage when the receiver is active, the jumper should be in the H (HIGH) position.

The LOGIC SELECT jumper changes the voltage threshold for the COS signal. When modified for PiRLP, the board is being run at 3.3V input, and the COS switch points change to 1.8V (in the 2.7V jumper position) and 0.7V (in the 1V jumper position). This is the threshold voltage that the COS must swing past to indicate a change in state. If you are having problems making the COS work, you should try changing this value.

The PTT LOCKOUT jumper is used to inhibit a COS signal when the radio PTT is being applied. By default the PTT LOCKOUT jumper is in the disabled position. If you have your node connected directly to a repeater or full duplex radio, this jumper must be in the disabled position. The jumper can operate with simplex radios in either position.

The First Boot via Monitor/Keyboard

For the first login, you will require a HDMI or Composite video capable monitor and a USB keyboard. However, because the USB sound card requires the USB port to run at slower USB 1.1 speeds, your keyboard may not work.

You can also access your node over the network using Secure Shell (SSH) software on another computer. If a suitable monitor/TV/keyboard are not available, or if the keyboard is not compatible with the Pi, please see the next section on logging into the node via Secure Shell (SSH).

If neither of these methods work, please reference the page at the IRLP wiki that describes changing the USB mode back to maximum speed to configure the system, then change the USB back to allow for optimal audio:

http://wiki.irlp.net/doku.php?id=problems_with_usb_keyboards_after_pirlp_install

Once the PiRLP computer has finished booting, you will be presented with a login prompt. The user you will log into your PiRLP node with is:

```
root
```

The default root password on every shipped PiRLP node is:

```
rootirlp
```

The system will force you to change this on first login. DO NOT forget your password, as we cannot recover it for you.

The repeater user password and IRLP Web Admin user (username=remote) passwords are also set on the first boot.

NOTE: All usernames, password, filenames, commands are CASE SENSITIVE. Be sure to look carefully at the directions when executing setting passwords and issuing commands.

Remote Access Using Secure Shell (SSH)

SSH is a secure and encrypted remote access protocol used to remotely communicate with your PiRLP node. If you are using Windows as your primary computer, you should download and install puTTY and WinSCP as two tools to assist you with controlling your node.

During the boot process, by default the software will key your radio and read out your PiRLP node's IP address.

The SSH port defaults to TCP 15426. You have to program port 15426 into any SSH or SCP program (such as PuTTY or WinSCP) you may use. Also, if you wish to have remote access to your IRLP node, you will need to forward port 15426/TCP as well.

In winSCP and puTTY you can set the port to 15426 where you set the IP.

In linux, you can use the format `ssh -p15426 IP_address`.

If you wish to change the SSH port to another port, you can edit the Port option in the `/etc/ssh/sshd_config` file.

NOTE: On the PiRLP nodes, I have installed a "public key" on your node which will allow me to login to the nodes with root access without a password when you require remote assistance. You can remove this feature by removing the files:

```
rm /root/.ssh/authorized_keys2
rm /home/irlp/.ssh/authorized_keys2
```

If you do require assistance, you can always provide the root and repeater passwords, but with these keys in place, the process is much easier.

IRLP Board Function Tests

Once the wiring is complete, and the jumpers are set in the correct position, and you have logged into your node via SSH or on a keyboard/monitor, you should perform a few tests. This is best done with the IRLP interface board in view, but can also be performed on the computer console. To monitor on the console, log into the system, change to the user repeater, and use the program by typing:

```
su - repeater  
readinput
```

To exit the readinput program, press CTRL+C.

1) COS Function Test

Transmit a signal into the radio connected to the node. The green COS LED should illuminate with a signal, and turn off with no signal. If monitoring on the console, the words "COS ACTIVE" should show on the screen with a signal and "COS INACTIVE" without. If the signals are opposite, change the position of the COS HIGH/LOW jumper. If no change is observed, check your wiring to pin 7 of the IRLP DB-9, and ensure the radio and node share a common ground.

2) DTMF Function Test

Transmit a signal with some DTMF tones. The green COS LED should illuminate with the signal, and the yellow DTMF LED should illuminate with each DTMF tone. If monitoring on the console, the words "COS ACTIVE" should show on the screen followed by DTMF X for each tone pressed, followed by "COS INACTIVE". If this is not observed, check your wiring to pin 8 of the IRLP DB-9, and ensure the radio and node share a common ground.

3) PTT Function Test

Note: If you are running the readinput program, press CTRL+C to exit.

Using the computer console, type the commands:

```
key  
unkey
```

The radio should key and unkey, and the red PTT LED should illuminate and go out. If this is not observed, check your wiring to pin 2 of the IRLP DB-9, and ensure the radio and node share a common ground.

Editing Configuration Files with pico

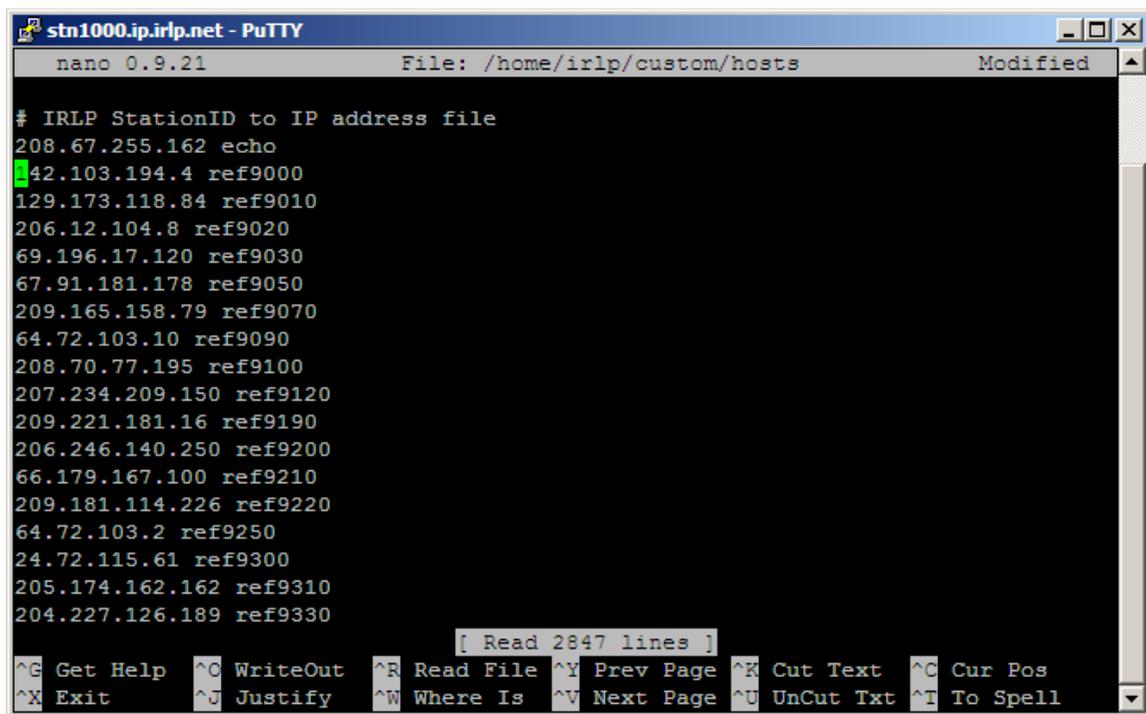
During the configuration of your PiRLP node, you may have to change some of the configuration files. The program `pico` is used to edit text configuration files on the PiRLP node. The correct syntax is

```
pico filename
```

Once you are complete with editing a file, you press CTRL-X to exit. If changes have been made, it will ask to press “Y” if you want to save those changes, and then prompt you for a filename to save it under.

There are a number of arguments you can use with `pico`, the most commonly used one is “-w”, which prevents the wrapping of long lines, which is the number one cause of corrupted configuration files in IRLP. More information on the `pico` editor can be found by reading the `pico` manual page at:

<http://linux.die.net/man/1/pico>



```
stn1000.ip.irlp.net - PuTTY
nano 0.9.21 File: /home/irlp/custom/hosts Modified
# IRLP StationID to IP address file
208.67.255.162 echo
42.103.194.4 ref9000
129.173.118.84 ref9010
206.12.104.8 ref9020
69.196.17.120 ref9030
67.91.181.178 ref9050
209.165.158.79 ref9070
64.72.103.10 ref9090
208.70.77.195 ref9100
207.234.209.150 ref9120
209.221.181.16 ref9190
206.246.140.250 ref9200
66.179.167.100 ref9210
209.181.114.226 ref9220
64.72.103.2 ref9250
24.72.115.61 ref9300
205.174.162.162 ref9310
204.227.126.189 ref9330
[ Read 2847 lines ]
^G Get Help ^O WriteOut ^R Read File ^Y Prev Page ^K Cut Text ^C Cur Pos
^X Exit ^J Justify ^W Where Is ^V Next Page ^U UnCut Txt ^I To Spell
```

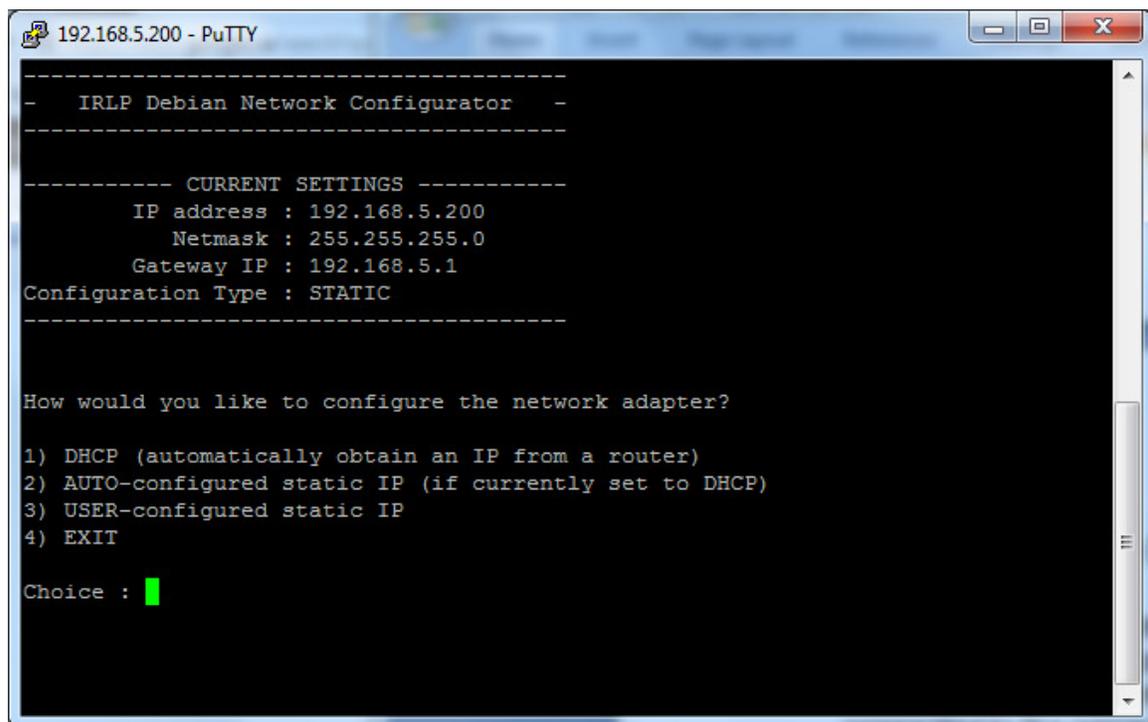
Sample screenshot of `pico` / `nano`

Configuring the Network Adapter

The network adapter driver is already preloaded into the system. The network adapter is initially set to automatically obtain an IP address using DHCP, unless otherwise specified during your order. The PiRLP nodes can be run directly connected to the internet, or behind a router or firewall. However, if you are operating your node behind a router, you will want to set your IP address statically. The script:

```
netconfig
```

is used to help you configure your IP address.



```
192.168.5.200 - PuTTY
-----
-   IRLP Debian Network Configurator   -
-----

----- CURRENT SETTINGS -----
      IP address : 192.168.5.200
      Netmask    : 255.255.255.0
      Gateway IP : 192.168.5.1
Configuration Type : STATIC
-----

How would you like to configure the network adapter?

1) DHCP (automatically obtain an IP from a router)
2) AUTO-configured static IP (if currently set to DHCP)
3) USER-configured static IP
4) EXIT

Choice : █
```

Sample netconfig window

Forwarding IRLP Ports Through a Router

As with any other IRLP node, if your PiRLP node is behind a router, you have to forward some TCP and UDP ports to the node.

The IP address of your node should have automatically been set static by the scripts in the section "Configuring the Network Adapter". You will need to forward the following ports through your router to the IRLP node:

```
15425 TCP
2074 to 2093 UDP
```

If you want to be able to access the remote web administrator or IRLPvCON from the outside, you will also need to forward:

```
80 TCP
```

If you are using Echolink (EchoIRLP) on the PiRLP node, you will also need to forward:

```
5198 and 5199 UDP
```

If you want to access your console remotely (through SSH), or would like help from the support crew remotely, you will have to forward:

```
15426 TCP
```

Alternately, if your router has a "DMZ" feature, you can put the IP address of the node into the DMZ, and all ports will be forwarded to the IRLP node.

More information of ways to perform the port forwarding or DMZ setting is available in the "**IRLP behind a Router or Firewall**" section at:

<http://www.irlp.net/new-install/>

The IRLP Troubleshooting Script

The software on the PiRLP node contains a script that will help you determine if there are any problems with your node. The script tests a number of conditions, and is used as the basis of diagnosis by the IRLP support team.

To run the troubleshooting script, log in and type:

```
su - repeater (su SPACE MINUS SPACE repeater)
troubleshoot-irlp
```

Details on each step of the script and possible causes and solutions can be found on the following webpage:

<http://www.irlp.net/ts.html>

IMPORTANT – As your PiRLP node contains entries to allow EchoIRLP and other features to work, it will fail Test 10 – Environment File Corruption Test. THIS CAN SAFELY BE IGNORED, as long as the errors it suggests are related to EchoIRLP or features.env entries.

Adjusting Audio Levels

The audio levels (both receive and transmit) are adjusted using the mixer program (as user root) :

```
alsamixer
```

You choose the view you want with the “TAB” key. It is best to show ALL by default (press TAB twice), as there are only a limited number of controls available. Alternately, you can view the Capture and Playback separately.

Since the PiRLP node uses a USB chipset, you have a very limited mixer available for use. This will contain adjustment sliders for output volume (Speaker), microphone feedback level/mute (1st Mic), capture device level (2nd Mic), and microphone gain amplifier (Auto Gain Control).

You choose the device you want to edit with the right/left arrow keys, and the level with the up/down arrows.

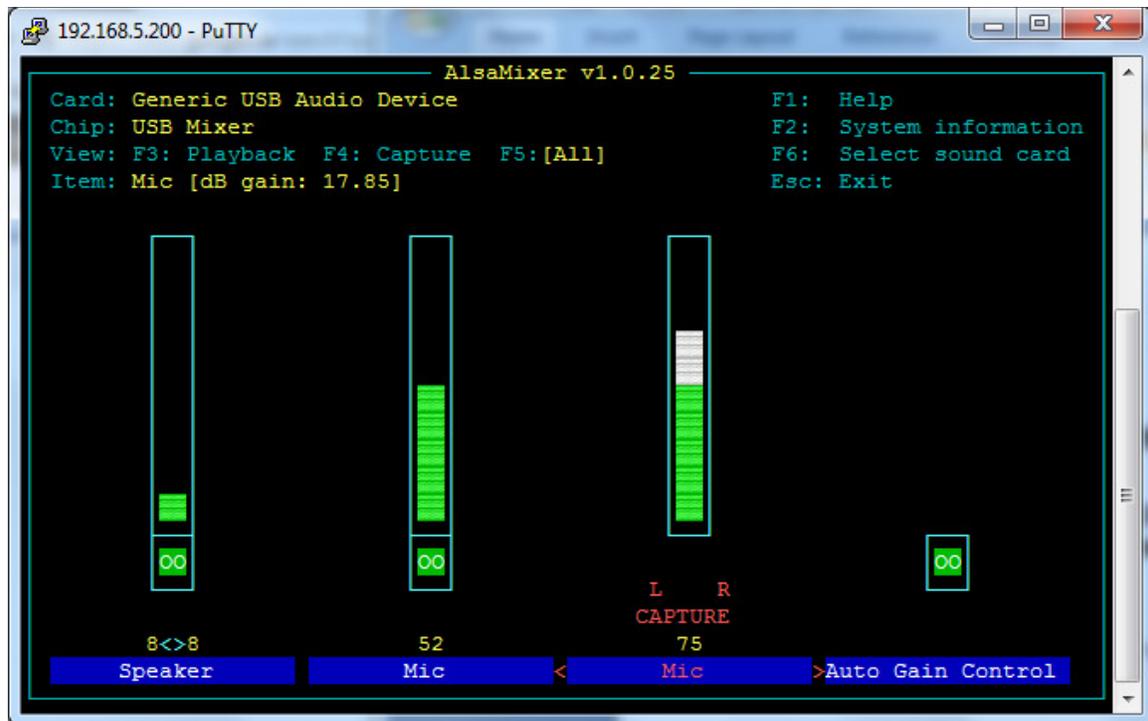
The MIC should be set as the capture device, as indicated by the red “Capture” under the second MIC adjustment slider. This is the default behaviour for all PiRLP nodes. If not, the capture device is set by selecting the proper device and pressing the SPACE bar.

The level of audio passed from INPUT to the IRLP encoder (IRLP input level) is adjusted with the 2nd Mic slider.

The level of audio passed from INPUT to OUTPUT (repeated audio) is adjusted with the 1st Mic slider. If you are not using the node as a repeater controller, this level should be set to zero. You can also mute this feedback setting by pressing the “M” key while the 1st Mic is selected.

If the level of the input is too high or too low, you can try activating or deactivating the microphone gain amplifier. To toggle the gain amplifier on/off, highlight the Auto Gain Control slider and press the “M” key.

The level of audio passed from the IRLP decoder to the OUTPUT (IRLP output level) is adjusted with the Speaker slider.



Sample alsamixer window

To quit alsamixer, use the “ESC” key.

To save, run (as user root) :

```
alsactl store
```

Setting your Local Transmit Audio

Every IRLP system is preloaded with an audio test script that is designed to help you adjust the level of audio from the IRLP node to your transmitter. The audio test consists of a 1000Hz tone that is set at the maximum usable threshold of your sound card, combined with some voice (of IRLP creator David Cameron – VE7LTD).

To run the script, log in as user root, and execute the following commands:

```
su - repeater    (su SPACE MINUS SPACE repeater)
audiotest
```

You can adjust the mixer levels live while the test is playing by opening up an additional SSH console session, or by opening up an additional virtual console if you are connected via keyboard directly to the node (ALT + F2). Then you can run the audiotest script with one console, and adjust the levels on the other.

You want to adjust the levels up right until the point of distortion, and then reduce them. You can also turn it up until it does not get any louder when the node is being received by another radio, and then back it off a bit.

Make sure that you save the modified audio level using the command:

```
alsactl store
```

This level can be fine tuned later, as ultimately this needs to be adjusted so remote users sound the same as local users.

Setting the Node Input Audio

A special script has been designed to assist with the initial setting of input audio levels. The script can be invoked using the "repeater" user from the console with the following commands:

```
su - repeater      (su SPACE MINUS SPACE repeater)
audio_level_test
```

It can also be invoked from the radio using the DTMF code:

AA33BB

The script will key up and prompt you "Audio level test ready". You must now send at least 8 seconds of audio, either voice audio or continuous tone audio. If using DTMF, use the "D" key. Once you unkey, it will process the audio file and report back:

"Audio Level 66 percent" (median level is 66 out of 100 - GOOD)
"Clipping 4 percent" (percentage of clipped samples is 4 - GOOD)

You want to adjust the input audio level so it is right on the brink of clipping with voice audio.

You would then adjust the 2nd Mic slider in the alsamixer program to raise or lower the input level. An audio level between 70-80 with 0 clipping on a continuous DTMF tone "D" is good. On a voice signal, an audio level greater than 50, with a clipping less than 5% is good.

If you are unable to get the audio high enough to pass the test,

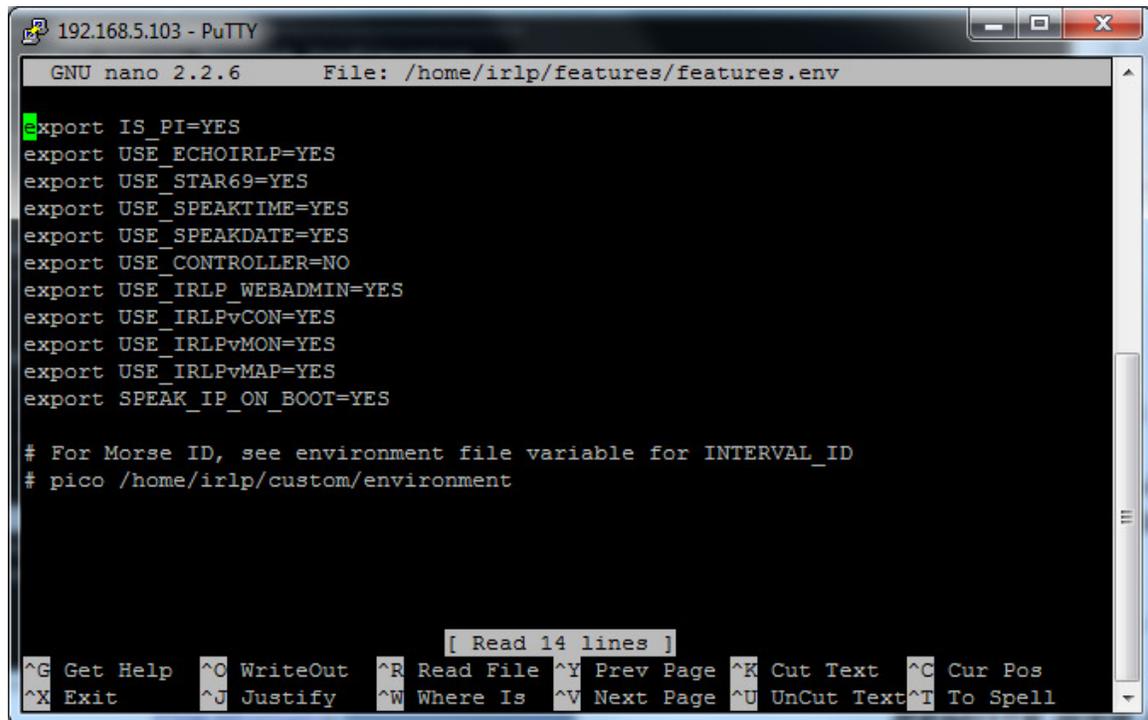
If you are unable to get the audio LOW enough to pass the test,

The numbers will vary between voices and tones, but as long as the clipping is not too high, and the level is not too low, you will be sending good audio.

Installed Features

The PiRLP nodes shipped by IRLP are pre-loaded with a series of commonly used add-on features. These features can be enabled or disabled by adjusting YES/NO flags in the file:

`/home/irlp/features/features.env`



```
192.168.5.103 - PuTTY
GNU nano 2.2.6 File: /home/irlp/features/features.env
export IS_PI=YES
export USE_ECHOIRLP=YES
export USE_STAR69=YES
export USE_SPEAKTIME=YES
export USE_SPEAKDATE=YES
export USE_CONTROLLER=NO
export USE_IRLP_WEBADMIN=YES
export USE_IRLPvCON=YES
export USE_IRLPvMON=YES
export USE_IRLPvMAP=YES
export SPEAK_IP_ON_BOOT=YES

# For Morse ID, see environment file variable for INTERVAL_ID
# pico /home/irlp/custom/environment

[ Read 14 lines ]
^G Get Help ^O WriteOut ^R Read File ^Y Prev Page ^K Cut Text ^C Cur Pos
^X Exit ^J Justify ^W Where Is ^V Next Page ^U UnCut Text ^T To Spell
```

Sample of features.env file

These features are only available on PiRLP images that are configured at the time of order from IRLP.net. If you wish to add similar features to a system you built and configured yourself, you will have to download and install the various custom scripts yourself.

Note: The morse/voice identifier is modified inside the IRLP environment file. Details on how to configure the ID is in the next section of this manual.

USE_ECHOIRLP

EchoIRLP allows you to run both an Echolink and an IRLP node from the same computer and radio hardware. The EchoIRLP system is installed on each embedded system, but disabled by default. You must configure your own EchoIRLP system, by editing a series of configuration files.

If provided at the time of order, the node will be preconfigured with your EchoIRLP settings. The configuration files for EchoIRLP are located in:

```
/home/irlp/features/EchoIRLP/custom/
```

The files you will need to customize are:

```
userdata.txt  
tbd.conf  
echo_environment
```

USE_STAR69

The star69 script is already pre-installed on the system. The DTMF code “*69” is used to invoke the star69 script.

USE_SPEAKTIME

The speaktime script is already pre-installed on the system. The DTMF code “C” is used to invoke the speaktime script.

USE_SPEAKDATE

The speakdate script is already pre-installed on the system. The DTMF code “CC” is used to invoke the speakdate script.

USE_CONTROLLER

The IRLP controller program is a simple controller that provides hangtime, DTMF muting, activity controller ID, and programmable courtesy tones.

The IRLP controller requires a pair of courtesy tone files to be setup. The controller requires files to be made that are RAW (no header), 8 bit, with a sample rate of 8000hz. The names are `ct1.raw` and `ct2.raw`. `ct1.raw` is played for local traffic, and `ct2.raw` is played for remote (IRLP and controller generated traffic). These can be made to whatever you like, using a program like Audacity. You can then use a program like WinSCP to transfer the files from a windows machine onto the PiRLP node.

The controller has an environment file at:

```
/home/irlp/features/controller/controller.env
```

which can adjust many of the features of the controller. You can adjust:

- The hangtime in milliseconds.
- The shortcut timer in milliseconds (COS time required for hangtime activation).
- The alligator timer in seconds (COS timeout).
- The DTMF mute on/off.
- The DTMF mute duration in milliseconds.
- The ID interval in seconds (time between IDs).
- The courtesy tone frequency.

After making any changes to the environment file, the controller must be restarted by running:

```
/home/irlp/custom/rc.irlp
```

The DTMF mute is accomplished by setting the LINE volume slider to zero. This is done in software. This only affects the audio being passed from the Line INPUT to the Line OUTPUT, and not the volume of your IRLP output audio.

USE_IRLP_WEBADMIN

The IRLP Remote Web Admin is installed by default on all PiRLP nodes. This allows you to perform some simple control features from any web enabled computer or smartphone. You can send DTMF to the decode script, enable/disable the node, drop the current connection, edit several files, view the messages file, and see the status of your node.

You access your remote admin at the following URL:

<http://stnxxxx.ip.irlp.net/>

NOTE: You must forward port 80/TCP through your router for this to work from outside your network. Some ISPs will block incoming data on port 80.

The default username and password are: remote/remote. These will be changed on first login. If you are using an SD card that was supplied by IRLP, the username and password may have been specified on your order form.

If you lose the remote user password for the remote web administrator, it can be easily reset by entering the following command as the root user:

```
htpasswd /etc/htpasswd.irlp USERNAME
```

(replace USERNAME with the username you want to add)

You can add as many users to the system as you like. They will all have the same permissions, and will be able to perform any commands available in the IRLP webadmin program.

USE_IRLPvCON – NOT YET FUNCTIONAL
USE_IRLPvMON – NOT YET FUNCTIONAL
USE_IRLPvMAP – NOT YET FUNCTIONAL

The IRLPvCON suite of products was added to the PiRLP nodes. At the time/version of this manual, it is not properly working. You can access IRLPvCON at the following URL:

<http://stnxxxx.ip.irlp.net/>

More information about the IRLPvCON suite can be found at the developer's website:

<http://k6ib.com/irlpvcon/>

SPEAK_IP_ON_BOOT

The `speak_ip_on_boot` option, as it suggests, speaks the IP address of the node during the boot process. This is very handy for PiRLP nodes that are not connected to a suitable monitor at the time of boot.

Configuring the Identifier (Morse/Voice)

All IRLP nodes are programmed with a morse code / voice ID system by default. The configuration of the ID (known as Interval_id) is contained within the node environment file. You can edit this file (as user root) by typing:

```
pico /home/irlp/custom/environment
```

You can also edit this file from the IRLP Remote Admin system.

The variables which can be edited include:

USE_INTERVAL_ID

- Turns the ID system ON or OFF (YES or NO)

VOICE_ID_FILE

- Voice ID wav file that is played if it exists. To make the system play the voice ID file, just place the selected file onto the node.

ID_PTT

- Selects whether the PTT or AUX1 is used as a keying pin. For PiRLP this should be kept as AUX1.

ID_INTERVAL

- Required ID interval in seconds (10 min = 600)

ID_MIX

- Mixes the ID with regular node audio. For PiRLP nodes this should be set to YES.

MORSE_TEXT

- The morse text that is played for the ID. By default this is set to the callsign defined earlier in the file. Be sure to enclose the text you want played in quotes.

MORSE_SPEED

- Options are SLOW (5wpm), MEDIUM (8wpm), FAST (15wpm), FASTEST (30wpm)

MORSE_PITCH

- Frequency in Hz that the morse is played at (300-3000)

MORSE_VOLUME

- % volume that the morse is played at (1-100)

Next Steps

Once the router has been configured, your node passed the troubleshooting script, and the audio levels have been set, you are ready to start enjoying your new PiRLP node. There are few more steps you should perform in order to advertise your node, and become more informed about the IRLP network.

Please review the “What to do After the Install” document at:

<http://www.irlp.net/new-install/afterinstallv2.pdf>

Using this document, you can complete the following steps:

- 1) Publish your node on the IRLP Status Page (<http://status.irlp.net>)
- 2) Join the IRLP and Embedded-IRLP Yahoo Groups
- 3) Record and upload your connect/disconnect audio files
- 4) Test your node for a PULSEBACK and adjust the timing file
- 5) Learn a few operating guidelines.

Change Log

| Date | By | Rev | Change |
|--------------|-----------|------------|--|
| Jan 22, 2013 | VE7LTD | 0 | Initial release. |
| Jan 24, 2013 | VE7LTD | 1 | Fixed "alsactl", and added info on Interval_ID settings. |
| Mar 14, 2013 | VE7LTD | 2 | Added information on the USB keyboard problems. Added note about features.env file only being available on IRLP ordered SD card images. |
| Mar 17, 2013 | VE7LTD | 3 | Replaced/fixed information about setting the password for IRLP Webadmin. |
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