



# **UHF Radio Mic Equipment Operator's Manual**

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## Introduction.

The Audio Equipment used for Sound Reinforcement during U3A Lectures at Ludwick Family Centre WGC and William Morley Hall in Hatfield comprises the following items;-

- Box marked Mini Mixer contains the four-input Mixer unit, its Mains Power Module along with three cables. Cable 1 is a ¼" jack to ¼" jack to connect the output of the Receiver to one of the inputs of the Mixer. Cable 2 is a ¼" jack to phono socket for connecting the output of the Mixer to the Wall Socket in each of the Halls. Cable 3 is a ¼" jack to 3.5mm lead for connecting any external audio source to one of the inputs of the Mixer. The source could be the phones output socket on a Laptop PC or the output of a CD player.



Figure 1. This illustration shows the complete UHF equipment including the mains lead to connect power to the Powered Speakers mounted in the halls.

- Box marked Radio Mics containing a Dual UHF Receiver along with its Mains Power Module, Head Mounted Microphone, Belt Mounted Transmitter unit and two Hand Held Microphone Transmitters. There is a spare battery compartment that can house six AA size Alkaline batteries.

The picture adjacent shows the contents of each of these cases.

Coloured dots on the units, connection points and leads help when assembling the system.



Figure 2. View showing the contents of the two cases.

Always ensure that you have six fresh 1.5V AA Alkaline batteries in the spare compartment in the Radio Mic case in case a battery fails during a lecture. All three Transmitter units indicate the battery condition as follows. When you turn the unit on, the red LED will flash once if the battery is OK. If it doesn't flash then the battery is dead and should be replaced.

The red LED is not on normally but only comes on when there is around one hour of operation left in the battery as it discharges. If you see the red LED glowing steadily whilst it is in use, replace the batteries as soon as possible.

To replace the battery in the Head Mounted transmitter unit, press the knob downwards and open the flap. Replace both batteries and close the flap. The Hand Held transmitter unit has a similar replacement procedure but the door slides downwards instead of hinging.

**Be warned!** Because the LED does not normally illuminate to maximise the battery life, it is all too easy to leave the transmitter units on. If you forget and leave them on the batteries will soon be exhausted. They have about ten hours of life when turned on. **So, check that you have turned off all transmitter units before packing them away.**

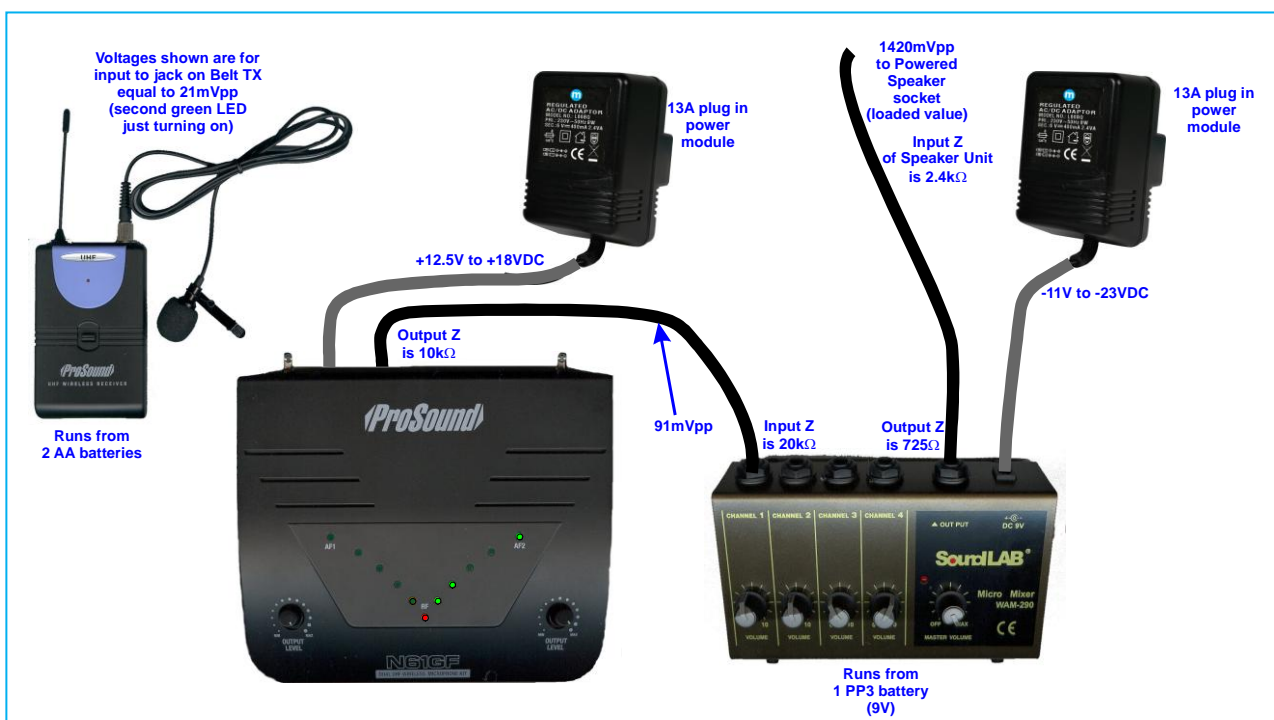
## Assembly

When setting up the system, remove the contents from the cases and connect as shown in the adjacent photograph.

Plug the two Mains Power Modules into convenient 13A mains sockets. Then plug the power jack on each module into the power input socket on both the Dual Receiver and



Figure 4. Photo showing connection between units.



the Mixer unit. They are marked with red and blue markers respectively. One DC supply is negative (the blue one) and the other is positive (red). You will not damage anything if you get them mixed up – the units will not operate until you have plugged them in correctly. When connected, the red LED on each unit should glow to show they are working.

Now connect the ¼" jack to ¼" jack lead from the mixed output of the Receiver Unit to any input socket on the rear of the Mixer unit. Plug in a ¼" jack to phono extension lead to connect the output of the Mixer to the phono socket fixed to the wall in the hall. Extend both rod aerials vertically.

Plug in any other audio device using the supplied 3.5mm jack to ¼" jack cable.

Finally, connect the mains extension lead from the 13A wall socket to the Powered Speaker half way down the hall.

## Operation

Turn all of the used controls on the Mixer fully clockwise. That means the one controlling the input from the Receiver and the one marked 'Master Volume'.

Lift the Hand Held Microphone with the yellow marker and turn it on with its slide switch. Note that the green LED on the left front of the Receiver Unit (marked AF1) illuminates. This shows that there is a satisfactory RF link between the Microphone Transmitter and the Receiver. It should be labelled RF1 but something got lost in the translation!

Now speak into the Hand Held Mic with your lips almost touching the grille cover. Some of the strip of four green LEDs on the left side of the Receiver should illuminate. Just the bottom one for quiet speaking and all four for loud speaking.

Adjust the Output Level control on the Receiver (under the yellow disc) for a satisfactory sound level in the hall.

If that is satisfactory, turn off the Hand Held Mic with its slider switch and repeat the tests with the Head Mounted Mic. This time adjust the volume control under the green disc marker until satisfactory sound volume is achieved. The Head Mounted Microphone should be positioned about 2" in front of the mouth and slightly to the left hand side of the centre of the mouth to avoid breath noises. This can be adjusted by bending the flexible microphone stem.



Figure 5. Front view of the Dual UHF Receiver.

If you have the Gain control set too high you will see the red Overload Light on the Mixer unit brighten when the output power of the two speakers exceeds 50W. Acoustic feedback may occur if the setting is too high.

## ***Fault Finding***

If there is a problem with the sound system check as follows:-

### **If neither microphone works**

- (a) If neither microphone works check that the red LEDs on each unit are lit and that all the leads are connected properly.
- (b) Check that the appropriate Mixer Volume Controls are set fully clockwise and that the Receiver Gain controls are turned up enough.
- (c) Check that the output from the Receiver is plugged into an input socket of the Mixer.
- (d) Check that the phono extension lead is connected between the Mixer output and the wall socket.
- (e) Check that the 13A extension lead is connecting the Powered Speaker to the 13A wall socket.

### **If only one microphone will work**

- (a) Check that the silent Radio Mic itself is turned on. Check that the green LED (labelled AF1 or 2) is glowing on the appropriate Receiver indicating that there is a satisfactory radio link between the Microphone and the Receiver.
- (b) Make sure the appropriate Volume control on the Receiver is set to maximum (fully clockwise).

## ***More Technical Details***

### **Dual UHF Receiver**

The red LED shows that it is powered on; the green LED (labelled AF1 or 2) shows that a radio link with the Microphone has been established. The strip of green LEDs show the level of audio being received.

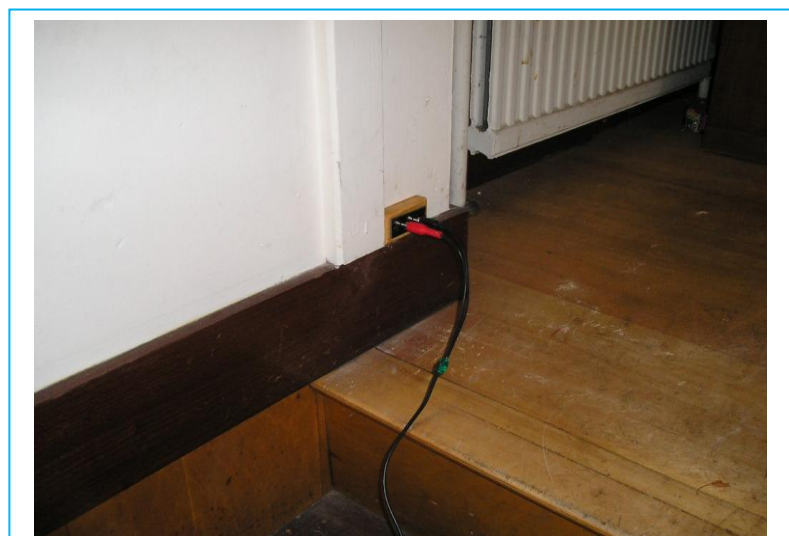
### **Mixer unit**

Recommended settings for the controls are;

Set the Gain Control on the channel that the Receiver is plugged into at Maximum. Master Volume to Maximum. Any other input set to suit that particular source of audio. If the output signal reaches the speaker overload level (2Vpp) the red LED will brighten.

### **Wall Mounted Powered Speaker system**

On the back of the Master Speaker mounted on the wall is an on/off switch, a green LED to show whether it is turned on or not and



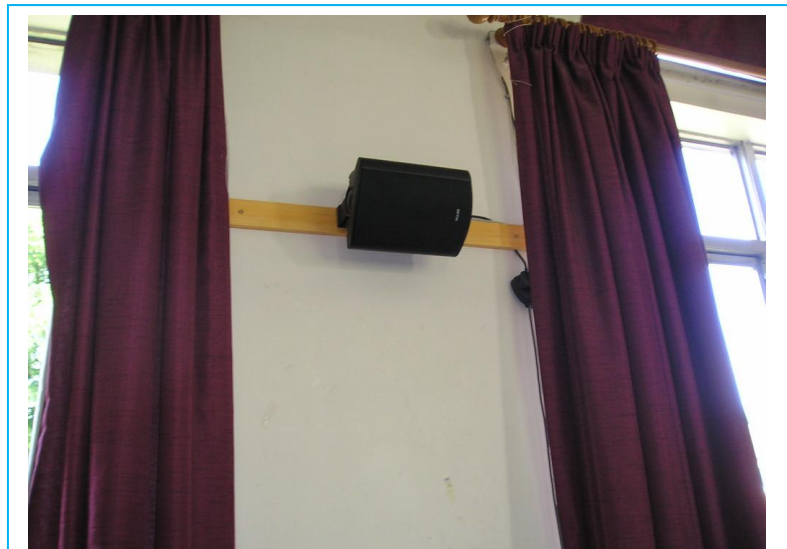
*Figure 7. Position of Phono Socket connection to Powered Speaker in the Hatfield Hall*

three rotary controls. The top one is the Volume which is set fully clockwise (maximum). Below it are treble and bass controls. These controls were set to give best intelligibility when fed from a speech MP3 file on a Laptop PC.

The finger operated tab clips at the back of each speaker have a custom made box taped around them to prevent the fingers opening when vibrated. This appears to be a design weakness in the equipment.

The audio signal is fed from the Mixer output via the long screened cable to the Master Speaker. The signal level in for 50W output (25W from each speaker) is 2V peak to peak. The output impedance from the Mixer is  $750\Omega$  at maximum Master Volume setting and the input resistance to the Powered Speaker is  $2.4k\Omega$ . The sending end of this screened cable must not be connected to earth because, if it is, the local Radio 5 signal from Brookmans Park medium wave transmitter will be demodulated and heard as background sound on the speakers.

The Phono socket for the Powered Speaker is mounted on the wall next to the left hand set of stairs to the stage at Hatfield as shown above. It is on the wall on the right hand side of the stage at Ludwick.

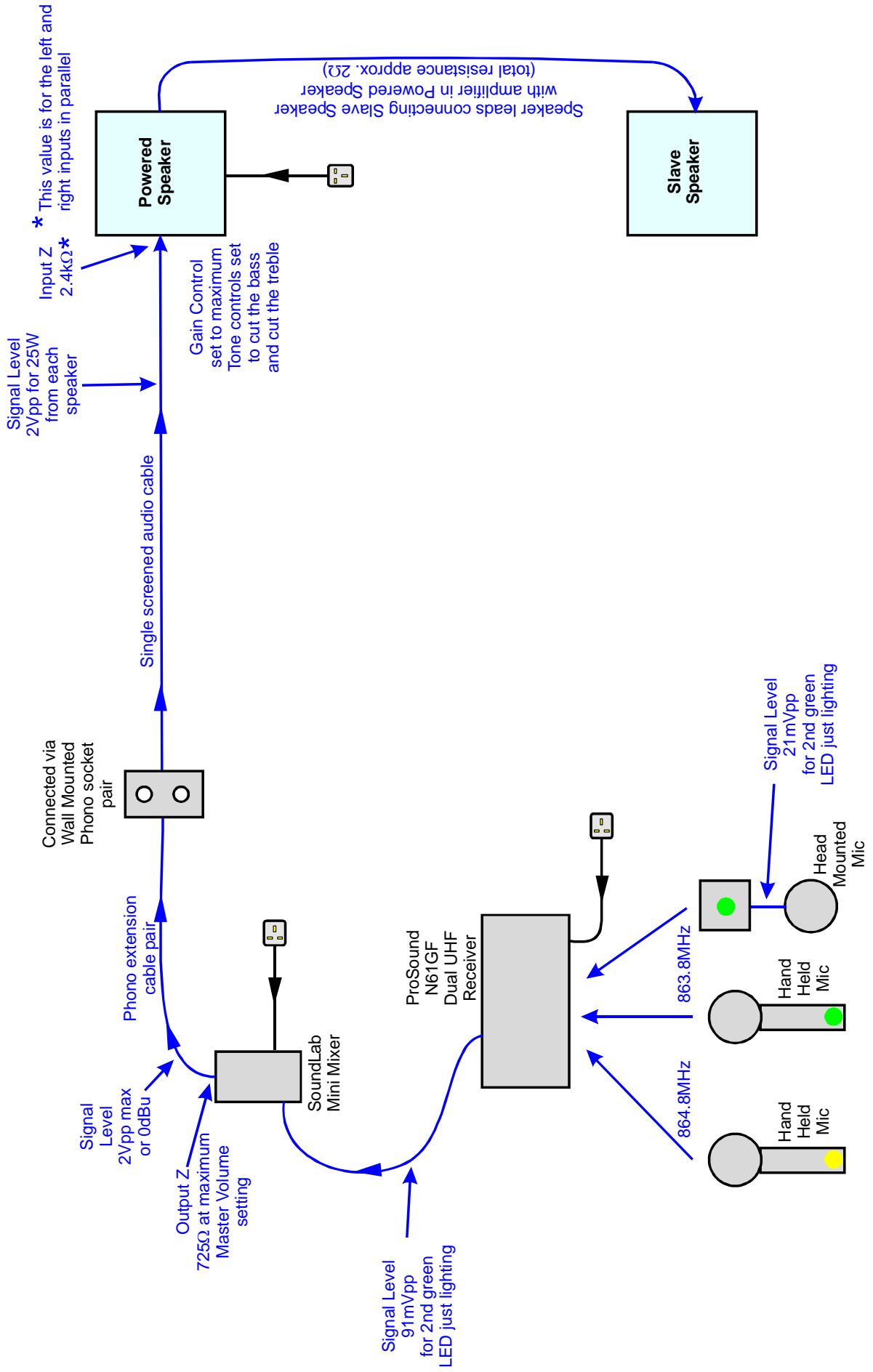


*Figure 8. Master Speaker on the side wall at our Hatfield venue.*

The Master Speaker on the wall is on the same side as the phono sockets at Hatfield but is on the opposite side at Ludwick. The one on the other wall is the slave speaker.

Before they can be used the mains extension lead has to be plugged from the dangling 13A plug to the wall mounted socket below it near the floor with the mains cable included in the kit.

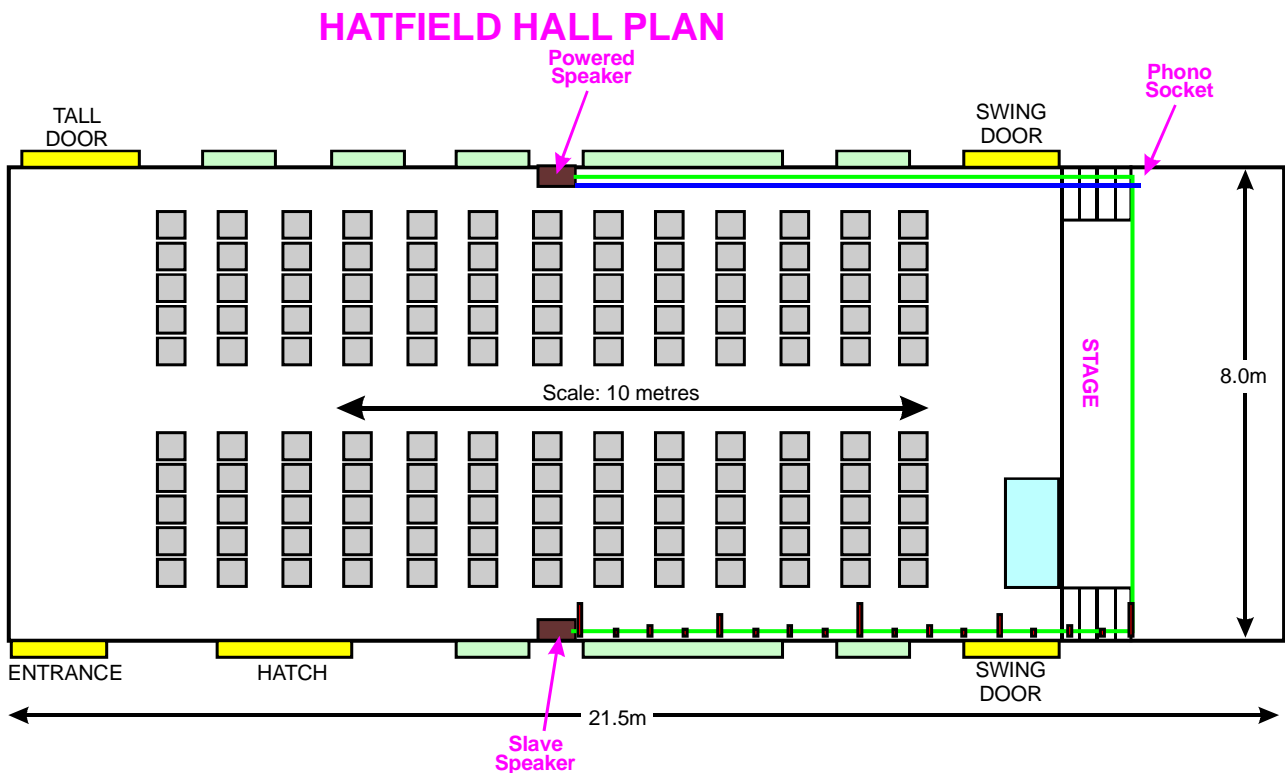
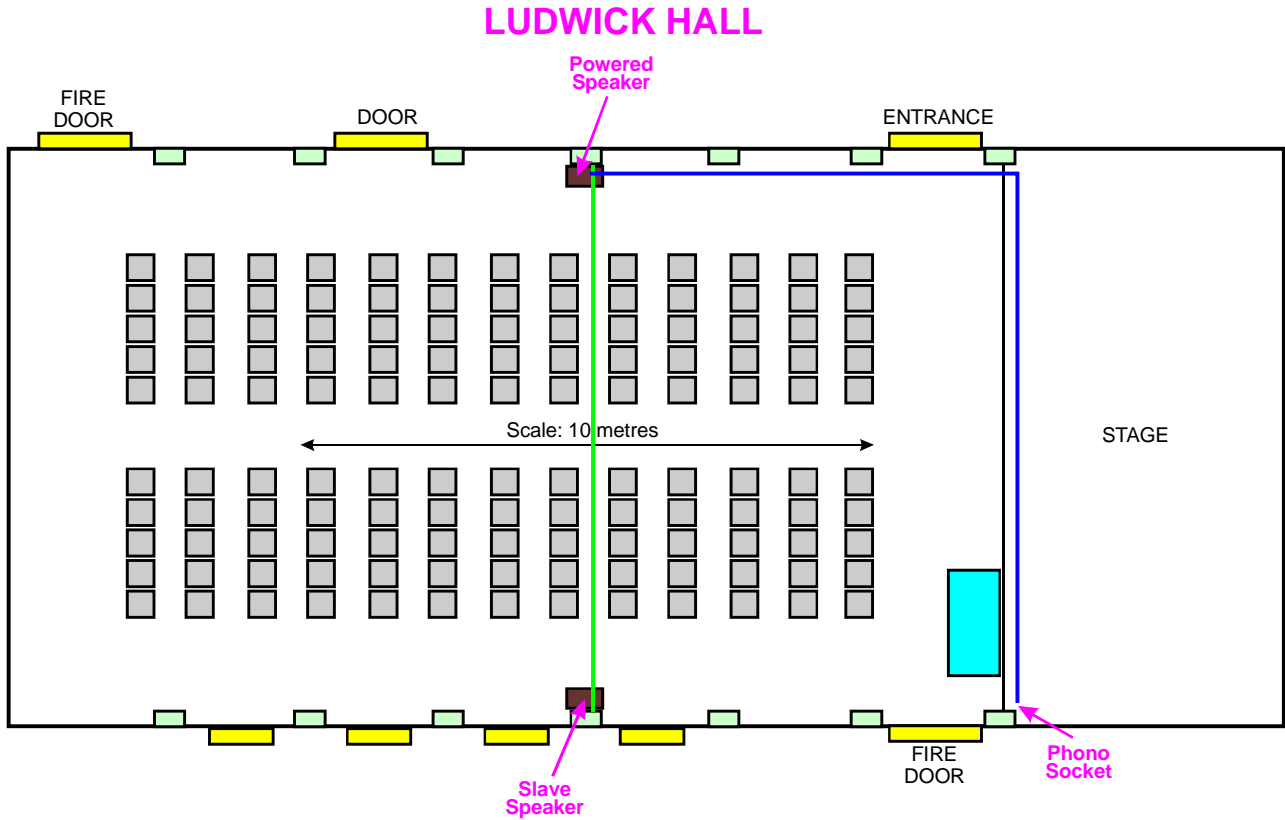
# CONNECTIONS AND SIGNAL LEVEL DIAGRAM FOR UHF AUDIO EQUIPMENT





## Powered Speaker wiring layout

The screened cable is shown in blue and the twin audio cable between the speakers is shown in green. In the Ludwick Hall, it was possible to place the speaker wiring over the ceiling whilst at Hatfield the speaker wiring had to be routed via the arch over the stage. Because of the long run at Hatfield, two pairs of speaker wires were used to keep the loop resistance at around  $2\Omega$ . A single twin wire was all that was needed for the shorter run at Ludwick which kept the loop resistance to around  $1\Omega$ .



## More on the Head Mounted Microphone

The datasheet on this microphone recommends wearing the microphone in the following manner;-

For minimum visibility the headband is worn on the back of the head. The self-positioning cushioned support pads normally rest just above the user's ears (see photo) and are adjustable to fit any head size. The headset is designed so that the microphone descends from the left support pad. The microphone is located at the end of a 2.64" flexible goose neck. This gooseneck is covered by a moisture proof protective tubing to prevent deterioration and to keep the goose neck from catching on facial hair. An open pore windscreen simply slips over the head of the microphone to reduce wind noise and "popping".

### ATM73cW

Back electret condenser

Cardioid

150Hz - 15,000Hz

-60.5±3dB (0dB = 1mW/Pa)

-76±3dB (0dB = 1V/0.1Pa)

700Ω±30%

134dB (at 1kHz 1% T.H.D.)

40dB (at 1kHz/0.1Pa)

500μA (at 1.5V)

1.5V - 9V

### ATM73cW

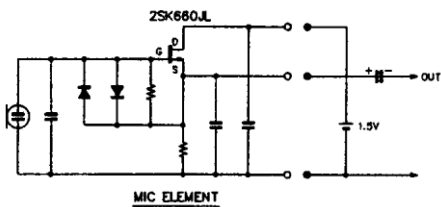
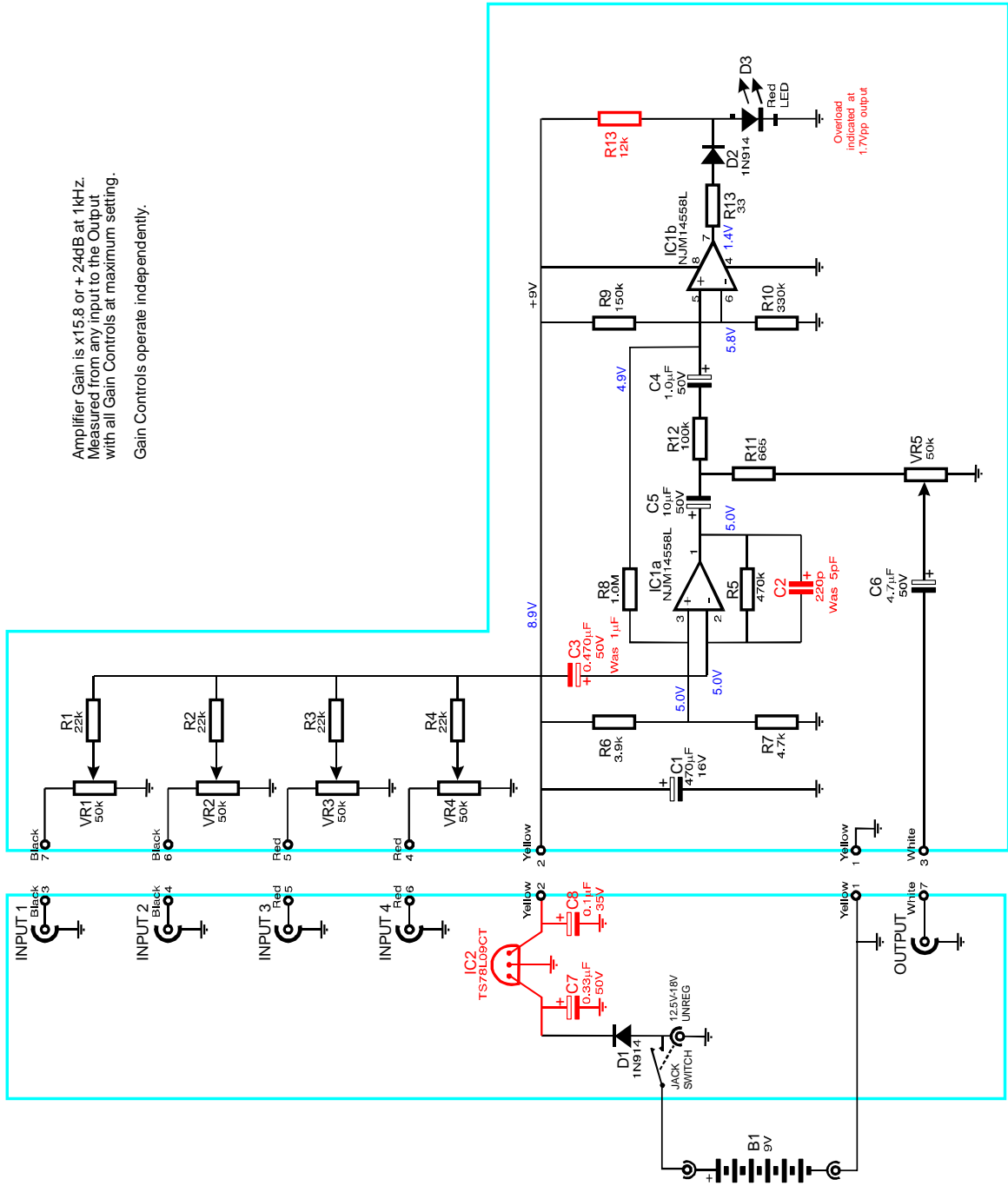


Figure 9. Recommended mounting position for Head Mounted Mic. This is what it looks like with the windscreen removed.

*Note:- This information was for the Microphone bought from Audio-Technica but the information and advice is relevant to the Head Mounted Mic we are currently using.*

# CIRCUIT DIAGRAM OF MODIFIED SoundLAB MIXER



The modified circuit diagram of the SoundLAB Mixer is shown above. Changes made by John Middleton are shown in red. IC2 was added to allow safe unregulated inputs of from -12.5V to -18V (or even -25V) to be used. It requires a negative supply to operate.

C3 was reduced from 1  $\mu$ F to 470nF to cut the bass to be like our original gear. Similarly C2 was raised from 5pF to 220pF to give the same top cut as we had on our original mixer.

R13 was added to make the red LED glow whilst a supply is connected. Previously, the LED only lit when an output overload occurred at 2Vpp. Now it glows all of the time it is switched on and brightens when there is an overload.

With the regulator mods discussed above, it does mean if it is ever run from a 9V battery, the internal line will be approx +7.5V. This is unlikely ever to be noticed.