

# Modifying Clansman Light Weight Military Headsets for use with Amateur Transceivers Yaesu FT-857 FT-897 Icom IC-7000

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I have experimented with many boom headsets whilst operating various transceivers. I started by modifying cheap PC headsets. Which I connected into the radio via small interface box. This broke out the headphone cables and provided somewhere to put a PTT switch.

These worked very well, and proved to be ideal for portable operation. Once I had used them for a while I decided to make further improvements.

The main changes were:-

- Making a neater interface between the cable and the radio
- Putting the PTT switch on the headset
- Tailoring the audio response to improve intelligibility

Recently a number of ex-military 'Clansman' lightweight headsets have become available at a reasonable price on the surplus market.



These have a modular construction and are designed to be field serviceable. They also incorporate high quality microphone and headphone inserts. Which are specially tailored for the purpose of speech communication under difficult operating conditions. So they are ideal for Amateur radio DX chasing. An additional advantage is that, if required, the right hand headset module can be unclipped and popped out. Making it easier to follow other conversations in the shack whilst operating the radio.

The modifications required to adapt this style of headset for use with Amateur radio transceivers, is relatively straightforward. A replacement cable has to be made with connectors to suit the specific transceiver. Switch(es) are also mounted on the edge of the earphone in order to facilitate easy Press To Talk (PTT) operation.

The headphones can be easily dismantled by removing the padded earmuffs, head band straps and plastic inserts from the headpieces

The original headphone cable has been removed and replaced with a length of pre-terminated CAT5 patch cord. I modified this by splicing the cable about 50mm away from the end with the RJ45 connector.

As most microphone circuit input impedances are fairly high, I added a low value termination resistor across the microphone insert. This ensures that the insert is presented with the correct value of terminating impedance in order to maintain the correct frequency response. It also helps to further reduce the level of hum pickup on the unshielded CAT5 cable.

I didn't want to use the Up, Down or Fast buttons, so I used these cable cores for the headphone audio. Make sure that the unused ends of the cable cores are cut at different lengths to avoid the possibility of them shorting together when the cable is joined. Use heat shrink to insulate the soldered cable connections.

The jacket of the CAT5 is quite loose, so it is possible to cut the outer sheath and pull the un-terminated end back.

Splice the cable and then slide the outer sheath back into place. If you slip some heat shrink sleeving over the cable before you splice it, and then add another length after the splice you can make quite a neat and robust joint in the cable. The pictures below show the cable for the FT-897. Note that the FT-857 and IC-7000 use 1/8<sup>th</sup> inch (3.5mm) stereo jack plugs.



I initially had problems finding a suitable ¼" headphone jack for use with the FT897. As most of them are quite long, and protrude too far from the radio.

In the end I bought a cheap plug with a soft plastic shell, and cut down the solder tags and outer case.

I then refitted the shell whilst applying hot melt glue and firm hand pressure.

Some heat shrink sleeving made the whole assembly much more robust.



And here is the end result – which looks quite neat.



Modifying the clansman headphones is quite straight forward. The main difficulties are finding some suitable switches for PTT operation. that will fit into the available space.

Clansman headsets were designed to be used with a separate PTT pressel box. However these are quite bulky and not particularly good for overs lasting longer than a few seconds. Mainly due to the pressure required to operate the rubber covered switch.

In this modification I chose to fit two different types of switches.

One was a momentary action push button for quick operation. The other was a latching toggle switch for longer QSO's.

These were mounted on opposite edges of the headset. In positions that felt 'natural' for the intended type of operation.

The toggle switch (CPC – SW02742) was fitted in place of the unused mic connector on the front facing side of the headset.



The momentary action switch (CPC – SW03311) was fitted on the rear facing underside of the headset.



These were my choices, but you may find better switches and mounting positions, which are more suited to your style of operation.

I had to use some large rubber grommets cut in half in order to space the front face of the switches slightly away from the edge of the headset as shown below. You can just about see the end result in the previous photos.



This modification allows the switches to fit more closely to the curved edge of the headset shell. It also provides slightly more space inside the headset shell. So that it was still possible to fit the earphone insert back into the case correctly.

**Advisory Note.**

If you do choose to fit a latching toggle switch, there is a slight danger of it being accidentally left in the transmit position.

I chose this particular type of toggle switch to minimise the risk of it catching on something and causing the radio to transmit continuously.

Here is a picture showing the rear of the toggle switch I used.



The mounting position of this switch was quite critical.

Notice how I have had to cut the terminals off, so that they will not foul against the headphone insert, when the head shell is reassembled.

The picture below shows the printed circuit interface board which sits in the bottom of the head shell, underneath the headphone insert. This is very useful and easy point to connect all the cables.



Green (MG) and Black (MBK) pins on the right hand side are for the boom microphone connection.

Red (R) & Green (G) pins on the left hand side are for the microphone connection to the radio.

White (W) is the common Ground or 0V headset connection.

Orange (O) is the Left headset connection.

Blue (B) is the Left headset connection.

The other pins and cables connect to the headphone inserts.

The next picture shows the PCB in place, with connections to the microphone and CAT5 cable. Note that in this modification I had decided to only fit one momentary PTT button in place of the unused additional microphone connector.

If you intend to use the headset with an Icom radio. It is possible that some models such as the IC-7000, being designed for use with its own electret mic. Does not have quite enough speech-amp mic gain to accommodate the Clansman mic insert.

Icom increased the overall speech-amplifier gain of all their "base" radios by 10 dB around 1999 – 2000, to accommodate the Heil dynamic microphones.



So, in some case it may be necessary to build a simple one transistor pre-amplifier. In order to boost the audio level, and make the dynamic (Magnetic) microphone insert compatible with the Electret microphone bias supply.

If you don't need a pre-amp stage. It is still a good idea to fit a 10uF capacitor in series with the mic cable. In order to prevent the DC bias supply from flowing through the magnetic microphone insert.

I was able to build the very simple circuit on the original PCB. With only a minor amount of extra work.

The circuits and connections for the ICOM IC7000 and Yaesu FT-857 / 897 series radios are shown at the end of this document.

Other radios may benefit from the addition of an audio compressor circuit. This can be built into the headset, if surface mount components are used.

A typical circuit can be found at this link.

<http://g8jnj.webs.com/compressor.gif>

Further information about the importance of tailored transmitter audio can be found here.

<http://g8jnj.webs.com/speechintelligibility.htm>

One final modification was to fit a foam cover over the microphone insert. This helps reduce 'popping' noises which may result from the wind, or your breath when close talking. I also think it helps to make the headset look a bit more professional.

I used a 21-26mm diameter windshield (CPC – MP33254)

You need to be very careful when fitting the windshield. As the foam material tears very easily. I made a tube of plastic sheet which I wrapped around the rubber microphone holder. Place the foam windshield over the end of the plastic tube. Then pull the sheet and windshield along the microphone boom towards the headset. The windshield should slip over the rubber microphone holder and the plastic sheet can then be removed.



I secured the windshield in place with a small tie wrap and some hot melt glue.

It was finished off with a short section of glue lined heat shrink sleeving.

Be careful not to apply too much heat to the foam as it can easily melt.

If you don't own one of the radios I have mentioned. It may still be possible to adapt these modifications to suit your favourite rig.

Most common microphone connector pinouts can be found on this great website

<http://homepage.ntlworld.com/rg4wpw/date.html>

I hope you find these notes helpful and that you are inspired to try these modifications for yourself.

It is perfectly possible to achieve high quality 'punchy' transmit audio for very little outlay, by taking advantage of these high quality military surplus headsets.

Further details of similar modifications can be found here:-

[http://www.ab4oj.com/icom/ic7200/sqb\\_em.pdf](http://www.ab4oj.com/icom/ic7200/sqb_em.pdf)

<http://www.ab4oj.com/icom/ic7200/mic.html>

[www.vmarsmanuals.co.uk/newsletter\\_articles/headset\\_tester.pdf](http://www.vmarsmanuals.co.uk/newsletter_articles/headset_tester.pdf)

The mic insert has NATO part number 5965-99-911-8230. Early versions made by Amplivox, later ones by Racal Acoustics. The only spec I could find is on this link.

[http://www.antennaproduct.com/product\\_006\\_01.htm](http://www.antennaproduct.com/product_006_01.htm)

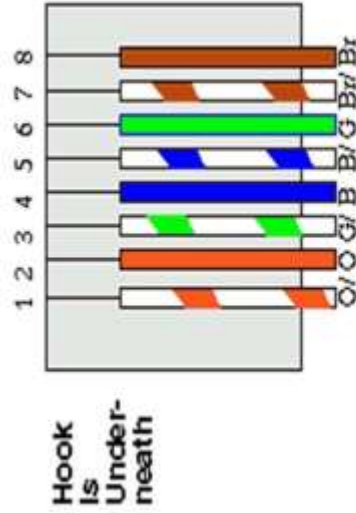
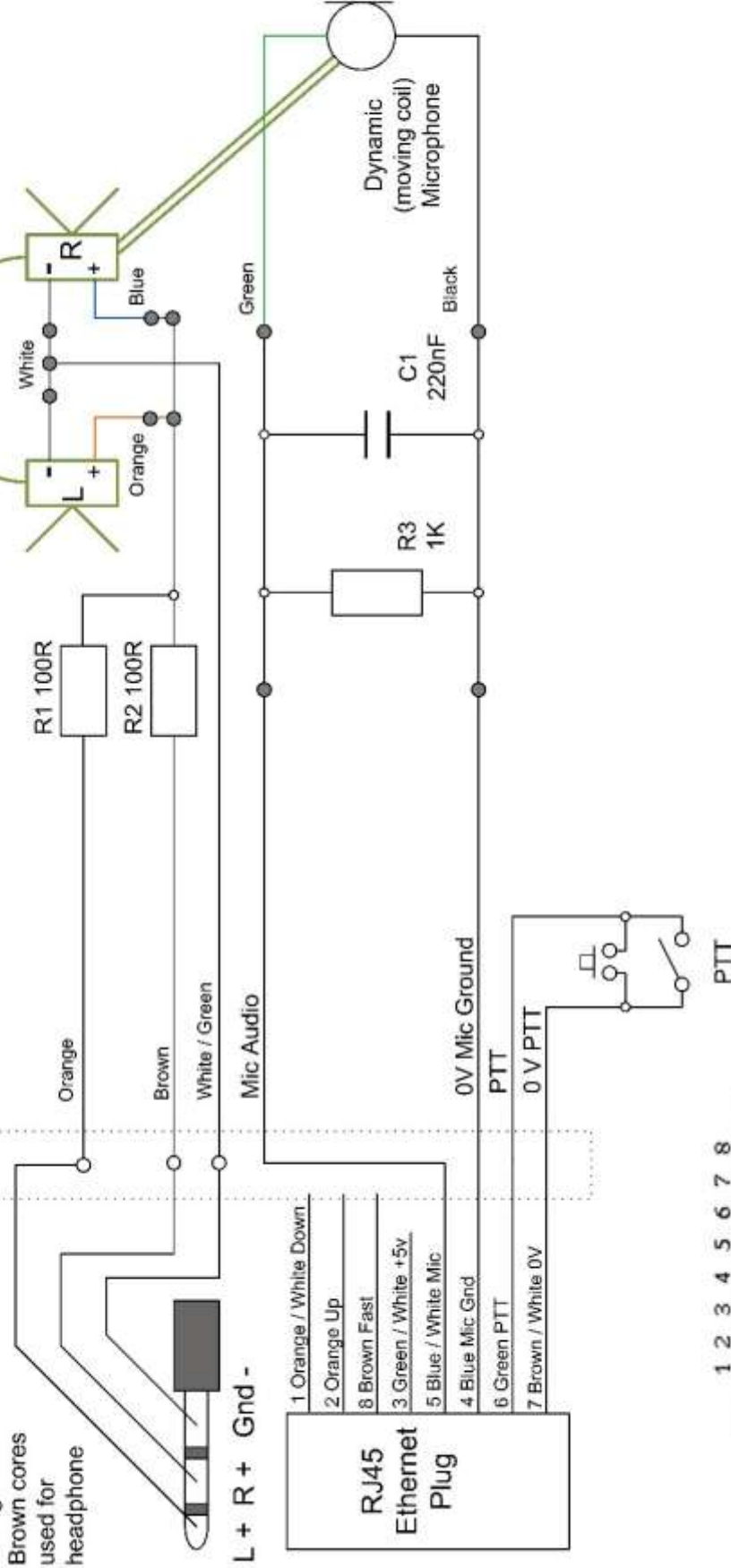
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<http://www.g8jnj.webs.com>

White / Green,  
Orange and  
Brown cores  
used for  
headphone

Join in cable (see notes)

All components inside headset

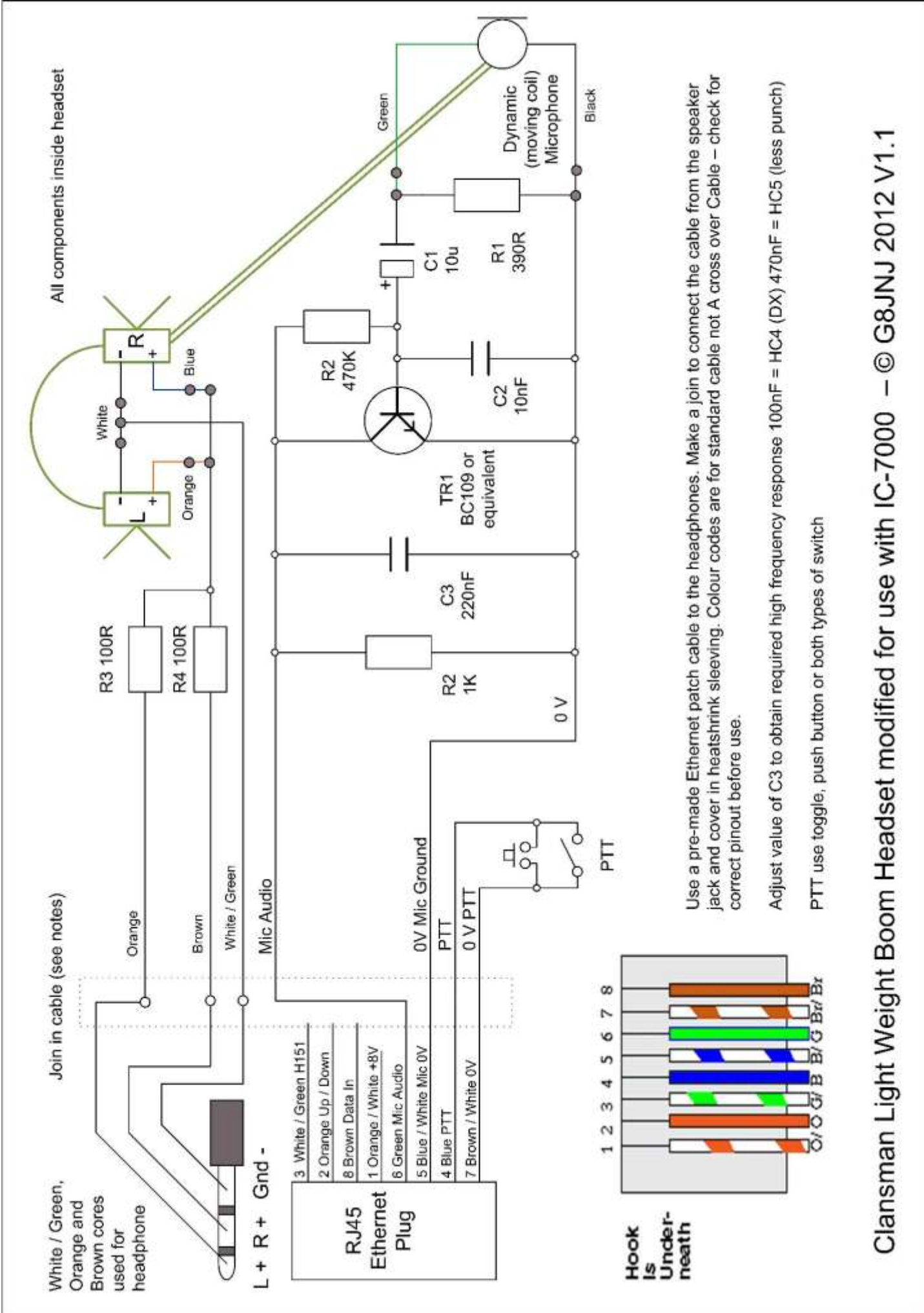


Use a pre-made Ethernet patch cable to the headphones. Make a join to connect the cable from the speaker jack and cover in heatshrink sleeving. Colour codes are for standard cable not a cross over Cable – check for correct pinout before use.

Adjust value of C1 to obtain required high frequency response 100nF = HC4 (DX) 470nF = HC5 (less punch)

PTT use toggle, push button or both types of switch





Use a pre-made Ethernet patch cable to the headphones. Make a join to connect the cable from the speaker jack and cover in heatshrink sleeving. Colour codes are for standard cable not A cross over Cable – check for correct pinout before use.

Adjust value of C3 to obtain required high frequency response 100nF = HC4 (DX) 470nF = HC5 (less punch)

PTT use toggle, push button or both types of switch

