

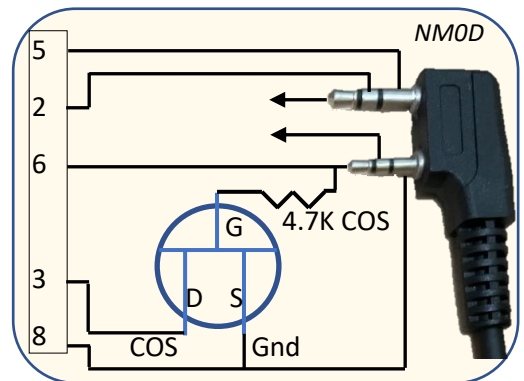
Ham 46B – ASL Radio: Link, No Solder

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1. Connection between a Raspberry Pi running the AllStarLink software and the radio world is via a USB interface. This is the only hardware required.
 - a. Since AllStarLink is a telephone system, it only has audio out (Tx) and audio in (Rx).
 - b. The program code expects the C-Media CM119A Digital Signal Processor (DSP) audio controller on the USB.
 - c. In addition to audio the interface must provide PTT to the radio and COS from the radio.
2. For a RADIO node, sound cards / radio adapters are available, such as RL-20 and RA-42 from Kevin Custer's www.MastersCommunications.com.
 - a. Add a very short USB-A male from the Pi to the USB-B male on the adapter. It starts working with green LED heartbeat flashing and blue comm ok.
3. Five connections are between the adapter and radio through a DB9 connector.
 - a. Receive audio in (Rx) - from the radio speaker jack. Level controlled by pot R9 /12.
 - b. Transmit audio out (Tx) - to the radio mic jack.
 - c. Ground.
 - d. Carrier Operated Switch - COS DC-level switched by receiver when hearing a signal.
 - e. Push-To-Talk - PTT is pulled to ground by switch to transmit.
4. The Baofeng UV5 & UV82 have a COS DC signal imposed on the speaker audio AC.
 - a. Make a cable to connect the Baofeng K-head jacks to the sound card DB9 female.
 - b. Acquire an inexpensive mic, remove the cord with connectors and dispose of the mic.
 - c. Connect to a DB9 male plug. Screw terminals require no soldering, but tinning is nice.
 - d. Add a 2N7000 FET and 4.7K resistor from radio COS to convert level and buffer.
 - e. The circuit is small enough to be built in the DB9 cover.



DB9	RL 20 Function	FET DB9	Radio Func	Bao Pin
1	Right audio out			
2	Left main audio out (Tx)		Mic+	3.5-r red
3	COS in (pull to gnd)	drain		
4	CTCSS in (pull to gnd)			
5	PTT out (switch to gnd)		PTT in, Rx data, mic-	3.5-s blk
6	audio in (Rx)	4.7K to gate	Speaker AC+COS DC	2.5-t grn
7				
8	Ground	source	Ground	2.5-s wht
9				
			Tx data, program	2.5-r
			V+	3.5-t



5. Test the buffer FET circuit using a DC voltmeter between ground and tip or COS.
 - a. Turn on another transmitter to cause radio to receive.
 - b. Tip to gnd, idle = 2.4 V, receive = 3.4 V. Tip also has AC sound.
 - c. FET Drain to gnd, idle = 3.2 V, receive = 0.1 V.
 - d. FET COS is about 0 V before plug-in. Gets a pull-up from sound card.
6. If card does not plug and play, check a few things.
 - a. Assure configuration software is adjusted.
 - b. If audio level is too high, adjust attenuator pot.
 - c. If tones do not work, check configuration and levels.
 - d. Three settings interact: simplex volume, software rx level, hardware pot.
7. PuTTY to Pi > Login > sudo /usr/sbin/asl-menu.
 - > 4) SimpleUsb Tune Menu.
 - > 6) ASL Configuration Edit > I) Edit simpleusb.conf
8. Connect to EchoLink on another device. Check operations.



State	Do	Board LED	Radio	Pot
Idle	nada	Comms = Blue		
Xmit	Press spacebar	PTT = Red	Transmits to remote	R14 & R16
Rcv	No spacebar	COS = Yellow	Hears remote	R9 or R12

9. Life is good. Enjoy!

