MODIFYING THE GE DELTA SX for 9600 baud operation

By
Buck Rogers K4ABT

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110 Watts of power in the DELTA...., and at 9600 Bauds!

On another page on this web site, I described an easy way to customize (convert) the GE (ERICSSON) 110 watt DELTA S/SX into a real PacketRadio, 9600 baud, power house.

Here then, are the drawings and detailed information I drew and wrote, describing how to modify the GE (ERICSSON) DELTA SX into a 9600 baud powerhouse radio for PacketRadio backbone operation.

The Delta was one of the first transceivers of its kind to implement 9600 baud digital "voice-guard." This feature alone makes it an easy candidate for use at 9600 baud Packet Radio use.

LET'S BUILD THE 9600 BAUD POWERHOUSE:

With the Delta ***S***, (narrow-band) and with the ***SX*** micro installed, this radio will pull (tune) down to 145 MHz, and still huff and puff the full 110 (plus) watts RF power output.

The modifications made to the Delta are similar to the mods we made for the 1200 baud version. With this in mind, it would be to your benefit to have both the June 1999 and the July 1999 issues of CQ Magazine handy when you begin this conversion.

THE GOOD NEWS IS; THERE IS NO BAD NEWS:

Although these modifications are similar, the I/O points are radically different. The good news is: Where we usually have to add parts to make a mod to a transceiver for 9600 baud, this time we will "remove" a couple of parts. That's correct, you don't have to go search and purchase specialized parts or filters for this modification. The Delta is a "natural" for 9600 baud operation.

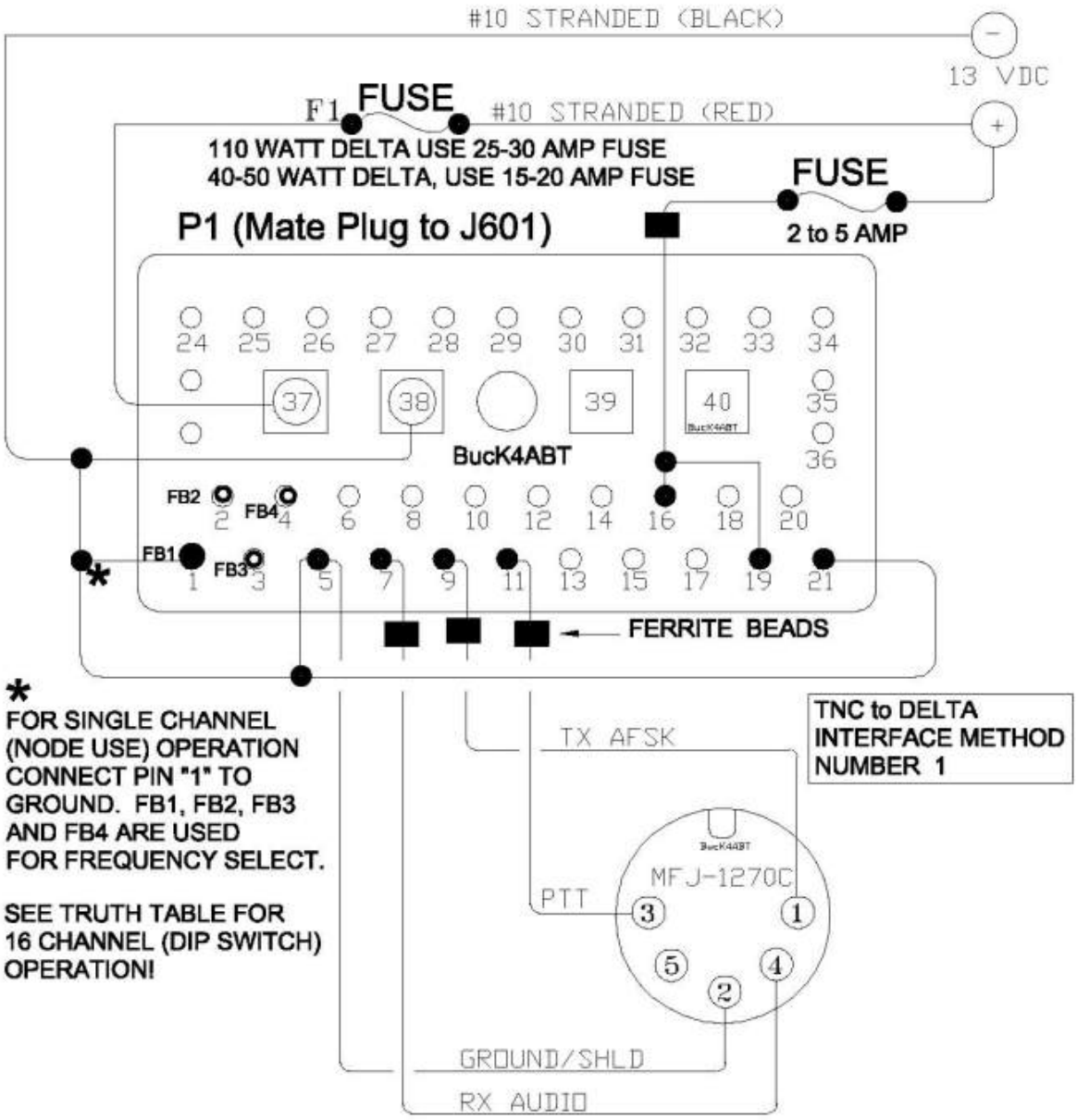
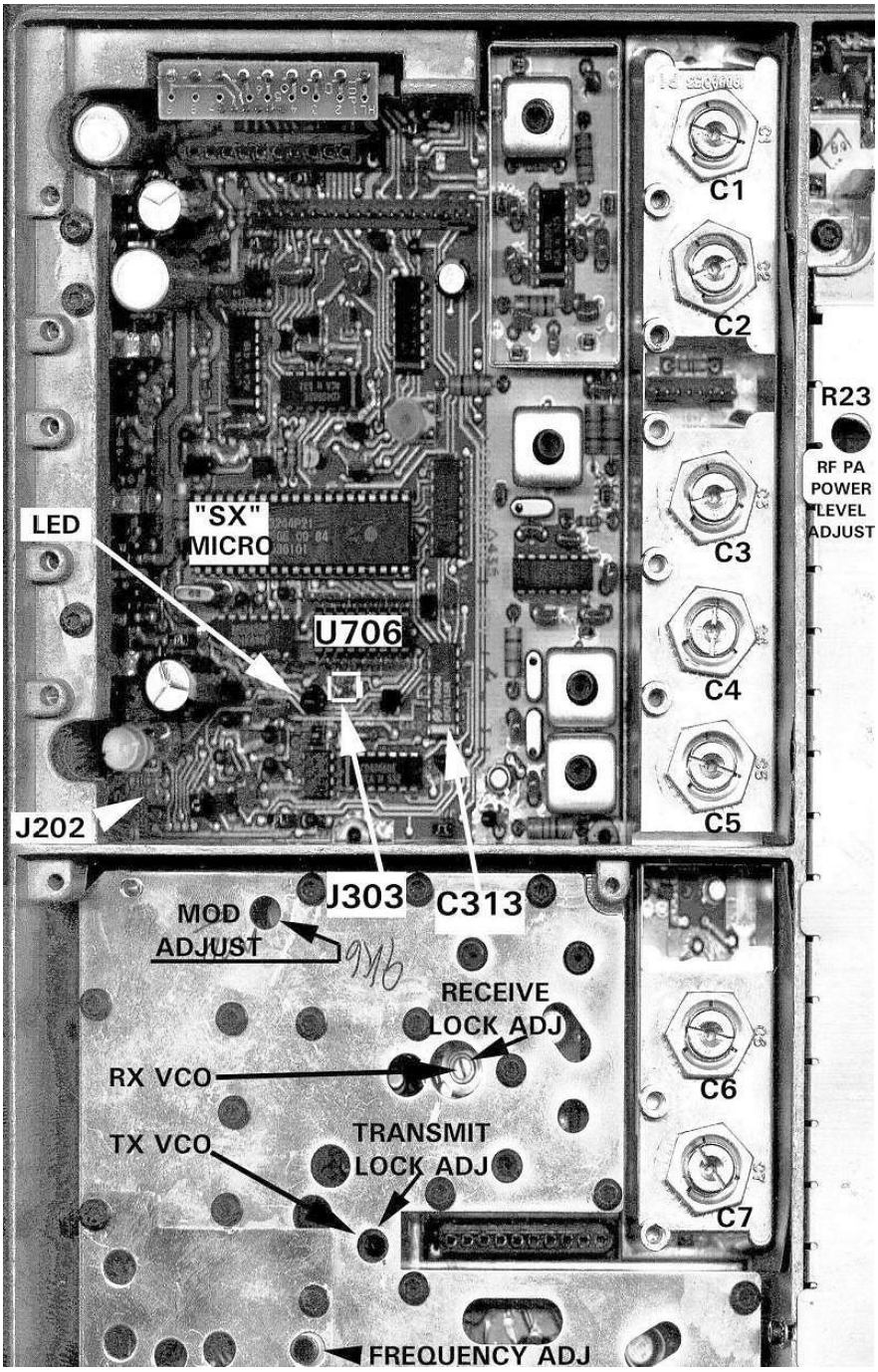


Figure 1

MUCH OF THE CONVERSION IS SIMILAR TO THE 1200 BAUD DELTA MOD:

Make sure the Delta is in good working condition (use the test cable connector shown above or ***See Figure 1 in the 1200 baud mod page at: "http://www.packetradio.com/0699snl.html"***), once we have tested it as described in the 1200 baud mod page, we can proceed.

Pluck out any channel guard (CG) PCB and dispose of it. The CG is located at the front of the DELTA on the right is a PC board with the solder traces exposed or facing up. Remove the four (4) TORX retaining screws, remove the CG PCB. Remove the "extender" PCB also.



Next.. using the drawing from "http://www.packetradio.com/0699snl.html", move the jumper (P609) at J609, to the left, or onto J608. The jumper then becomes P608. J608 is located directly below the Channel Guard™ PCB near the 10 pin inline receiver test socket, J602. All the jumpers and sockets should be clearly marked on top of the printed circuit board(s). If the radio was/is not equipped with Channel Guard, the jumper will already be in place on J608.

Program, or have someone 2212 EEPROM with a "suitcase" programmer. Program the 2212 EEPROM with your favorite 16 channels/frequency(s) you wish to use. If you plan to make it 9600 bauds only, then set channel one (1) as the priority frequency. Before removing the EEPROM from socket U706, observe the orientation of the IC 2212 before it is removed. Be sure the notch of the 2212 EEPROM is oriented correctly (the same) when you replace it into the socket at **U706**. After programming is complete, insert the EEPROM into the socket at *U706*.

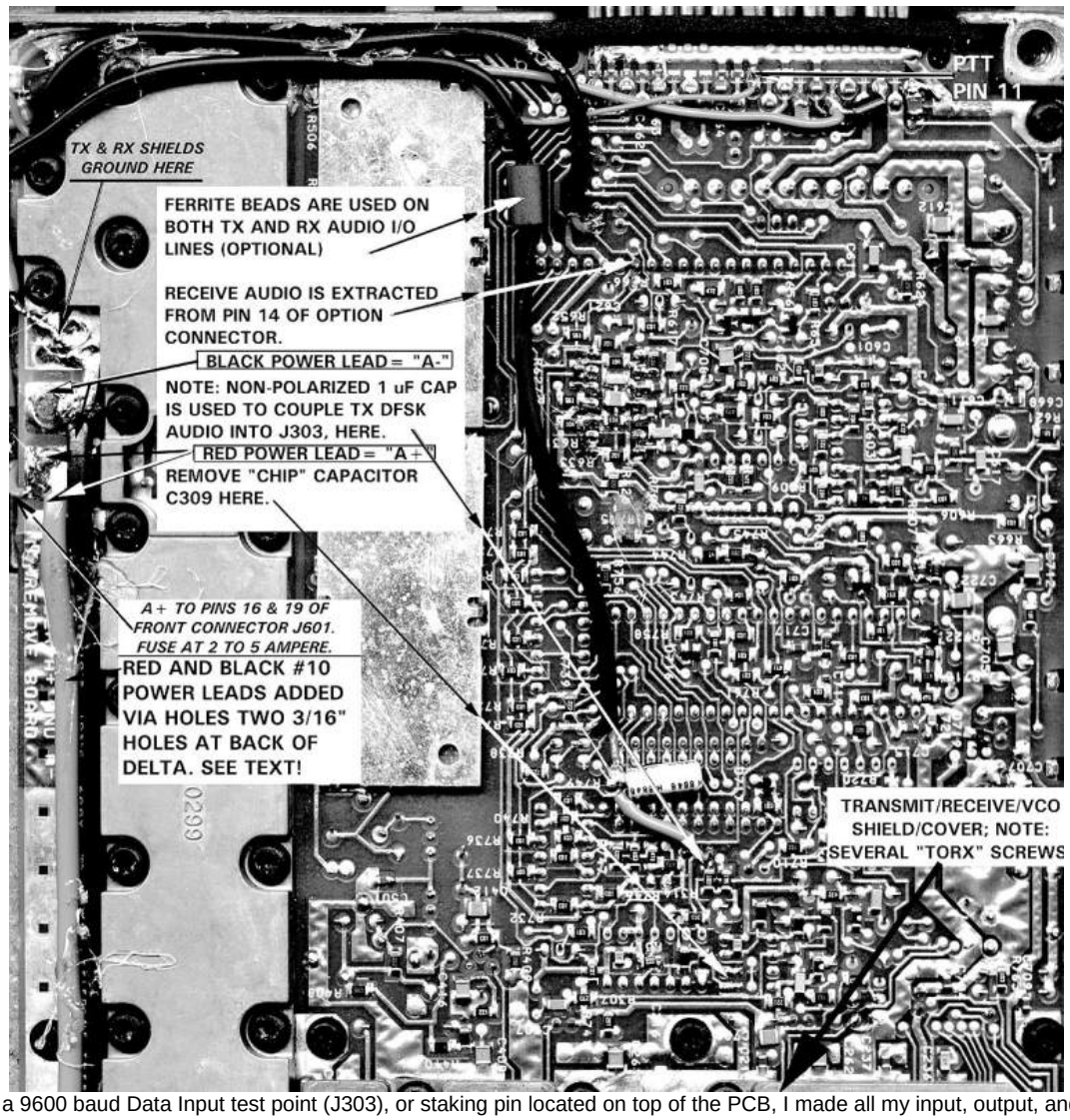
Now it becomes necessary to tune the DELTA as I described in last months **Packet Users Notebook**. Be sure the LED adjacent to J303 goes out in both transmit and receive. If the LED glows in either transmit or receive, this indicates that VCO "lock" has not happened. To lock the VCO in receive, it may be necessary to turn C220 in (CW) a few turns until it goes out.

If the LED is lit when the transmitter is keyed, adjust L209 (CW) a few turns. In either case, be sure you have the DVM connected to test point J202, (See figure 1). In both transmit and receive, the locked VCO voltage should be set between 2.7 and 5.5 volts. DO NOT allow the VCO locked voltage to exceed 6 volts.

In a few Deltas, I've converted for 1200 or 9600 baud Packet Radio use, I've come across a couple that would not VCO lock in transmit. If by some chance you encounter this situation, then it will be necessary to turn the radio over. Remove all.. umpteen torx screws that holds the transmit/receive/VCO system board cover/shield in place. Locate the bottom end of L209 and install a tiny 10 pf cap across the coil from the high side to ground. Keep the leads as short as possible. If you can locate one, use a "chip" (surface-mount) capacitor between 9 and 12 pf across L209.

INSPECT YOUR WORK, especially where you did the soldering around L209. Insure there are no shorts, or unintended solder bridges across any traces. For the record, I test the radio before I replace the multitude of torx screws into the bottom shield for the transmit/receive/VCO system board. as this is where my ***Black & Decker*** electric screw-driver gets its workout.

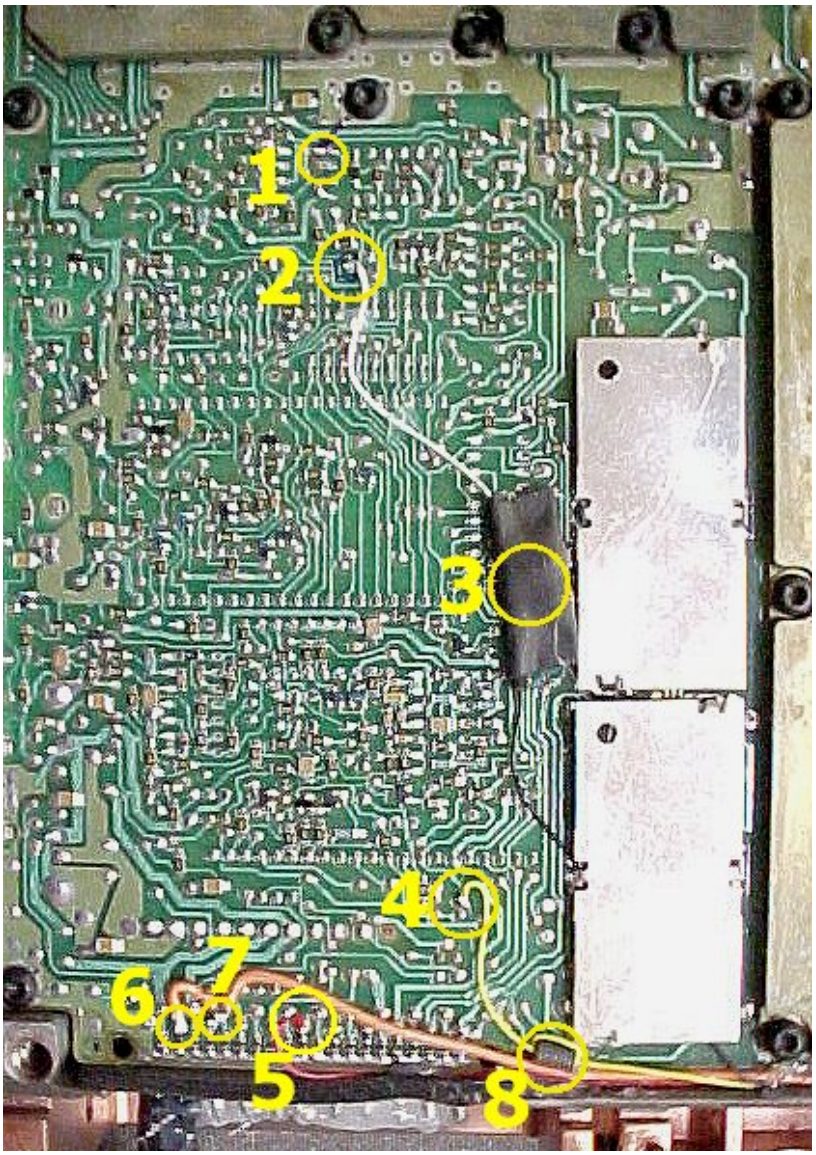
CHANNEL AND CHOP: No, we are not about to put "glass-packs" or lowering blocks on the Delta, but now that we have it "channeled," we're going to do a bit of chopping. Let's begin near the same place where we just installed the 2212 EEPROM. Look closely at the top of the printed circuit board for a capacitor labeled as C313. Lift one end or completely remove capacitor (6.8n) C313.



Although there is a 9600 baud Data Input test point (J303), or staking pin located on top of the PCB, I made all my input, output, and PTT connections below (See above photo) the circuit board. For the benefit of noting the location of J303, it is very close to C313, or just behind the EEPROM socket. J303 and J712 are located side beside. J303 is the pin nearest dual jumper pins J/P707 and nearest the edge of the PCB. Again, all these points should be clearly marked on top of the main PC board (**See Figure 1**).

While we are about the "chop'n" part of this exercise, let's go below (the PC board, bottom) and remove another capacitor. This will be the second, final, or ***last*** component that we will remove from our Delta for the 9600 baud mod. Look at **figure two (2)** and locate the "chip" capacitor C309. This capacitor may have an identifier printed on the printed circuit board identifying it as C309.

For this surgery, and if your eyes are as old as mine.. (over sixty) have your magnifier in hand, and CAREFULLY remove C309. This chip capacitor is so small, it may stick to the tip of your soldering iron, and you can lose it in the maze of traces on the PCB. Once again, I emphasize ***carefully remove C309!***



The above photo will provide an illustration for the "after" printed circuit board mods were made.

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1) = Location where C309 was removed.
2) = Bottom of TP J303 where transmit 9600 baud DFSK audio is inserted.
3) = Location of Non-Polarized 1 or 2 uFD audio input coupling capacitor.
        A ferrite bead same as shown at item 8, is added over this line.
4) = Bottom side of ''option connector'' J603, at pin 14. Pin 14 is the point
        where receive 9600 baud audio is extracted and fed to the 9600 baud TNC.
5) = Push-To-Talk line is connected to pin 11 of J601 solder pad, inside,
        bottom, PC Board.
6) = Pin 19 of J601 solder pad, +13 VDC.
7) = Pin 16 of J601 solder pad, +13 VDC.
8) = Ferrite Bead on receive audio line, ''Hot Glue'' in place.
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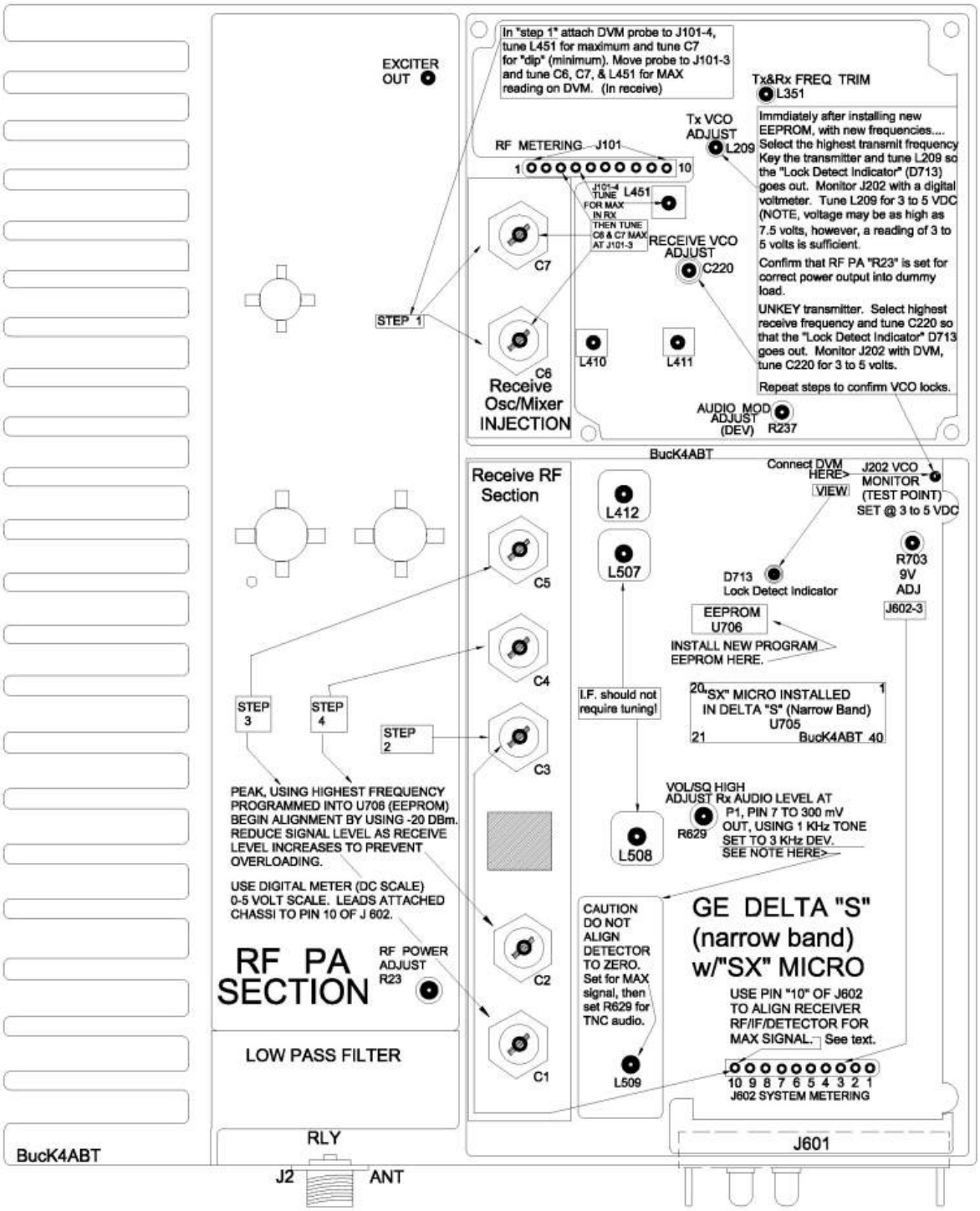
AND WHILE YOU ARE IN THE NEIGHBORHOOD:

While we are in the area where C309 was removed, identify the bottom of J303 that we mentioned earlier. This is the point where we will feed the 9600 baud DFSK into. If you are lucky enough to have an LBI-31505 (If you don't have the Manual around, maybe you can solicit a page or two from the Delta manual at your local ERICSSON dealer or service shop), then locate the TRANSMIT/RECEIVE/SYNTHESIZER drawing, sheet 5, Rev 1, or the page with the Audio Processor schematic and note the "Data Input" point that is marked as J303. The 9600 baud data is fed to pin 1 of the bi-directional switch U302A through a 10k resistor.



And while you are “still” in the neighborhood (on the drawing), you can also spot the two components that we have removed, C309 and C313. C309 is marked as "1n" and C313 is identified as a 6.8n capacitor. C313 is on top of the PCB, while C309 is the eye-strain, chip capacitor on the bottom (solder side) of the PC board.

To make sure the feed point is isolated, or there is no DC connection, I use a 1 to 4 uF, non-polarized capacitor to couple the DFSK signal into the Delta. Awe phooie  let's keep the value at 1 uF. The reason being; There is more than enough 9600 baud DFSK coming from every 9k6 baud TNC I've tried to drive the Delta to a full 3 KHz deviation. Mind you; I did say.. 3 KHz deviation, NO MORE, NO LESS! If you gotta guess at it, them make it "less." The I F's of the receiving radio will handle 2.5 KHz swing at 9600 bauds much easier than it will handle 3.5 KHz swing.

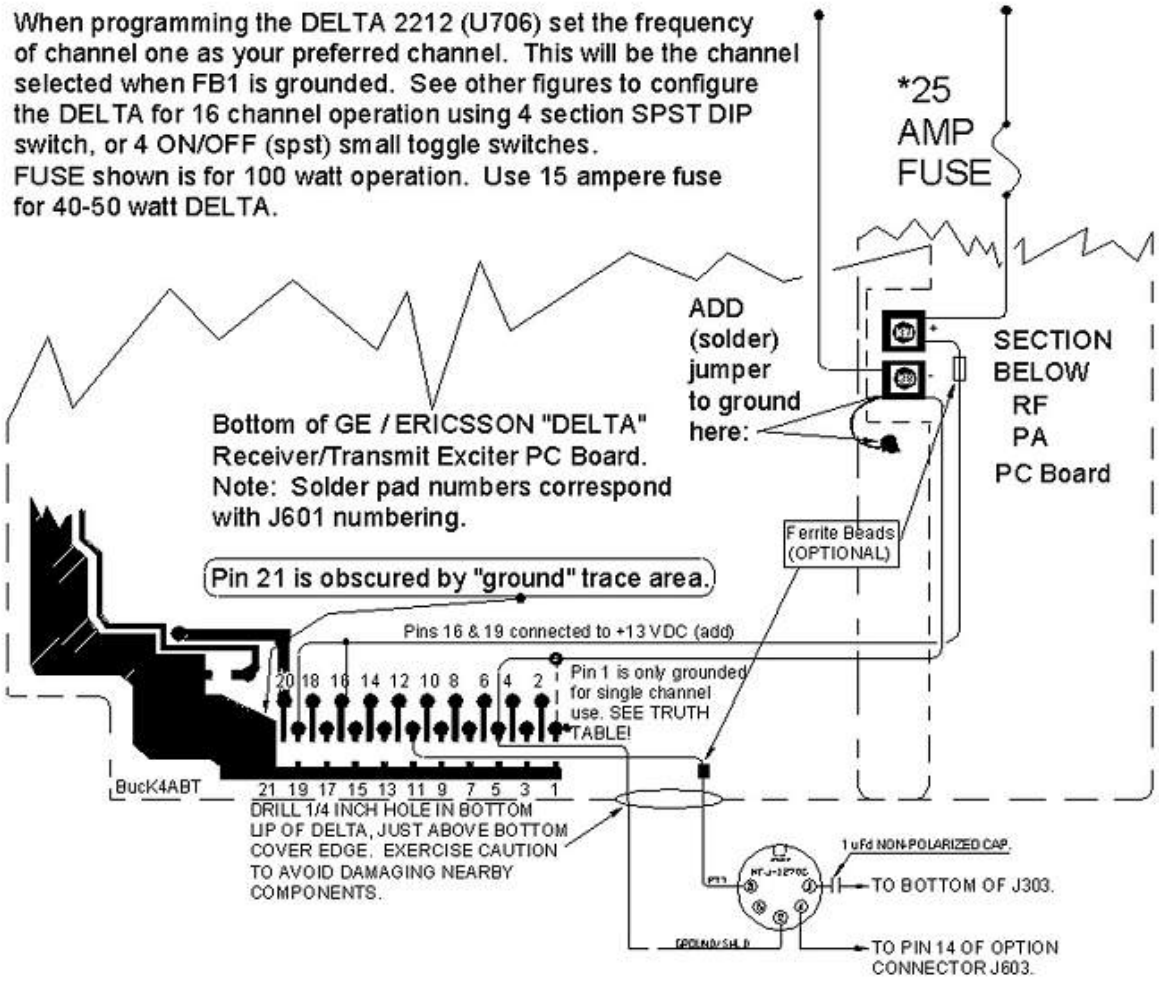


FIGURE 3

So far we have made the transmit data input and component mods. Now it's time to locate the point where we take the 9600 baud (receive) data out of the Delta. In the above figure, I've drawn the area around the "option connector" J603. This is the connector where the channel guard PCB was removed *from*. **Pin 14** of this connector is where we will extract the 9600 baud receive audio. Use figure one (1) to located the trace that leads to pin 14 of the "options connector" **J603**.

The Delta has ample 9600 baud audio to drive the receive portion of our 9600 baud TNC or node.

With (almost) all the TNCees I've worked with, the MFJ-1270CQ Turbo, the Kantronics KPC-9612, and the PacComm NB-96, the results have been exceptional. I'm no longer beta-testing the PK-96, so I cannot offer any help to the PK-96 user.

Use the drawing at figure 3 to make the connections for the "Push-To-Talk" line. You will also use the same drawing to make the ground connections for pins 5, and 21, of J601. If you are using the GE (ERICSSON) DELTA as a single channel node, you may also ground pin one (1) of J601.

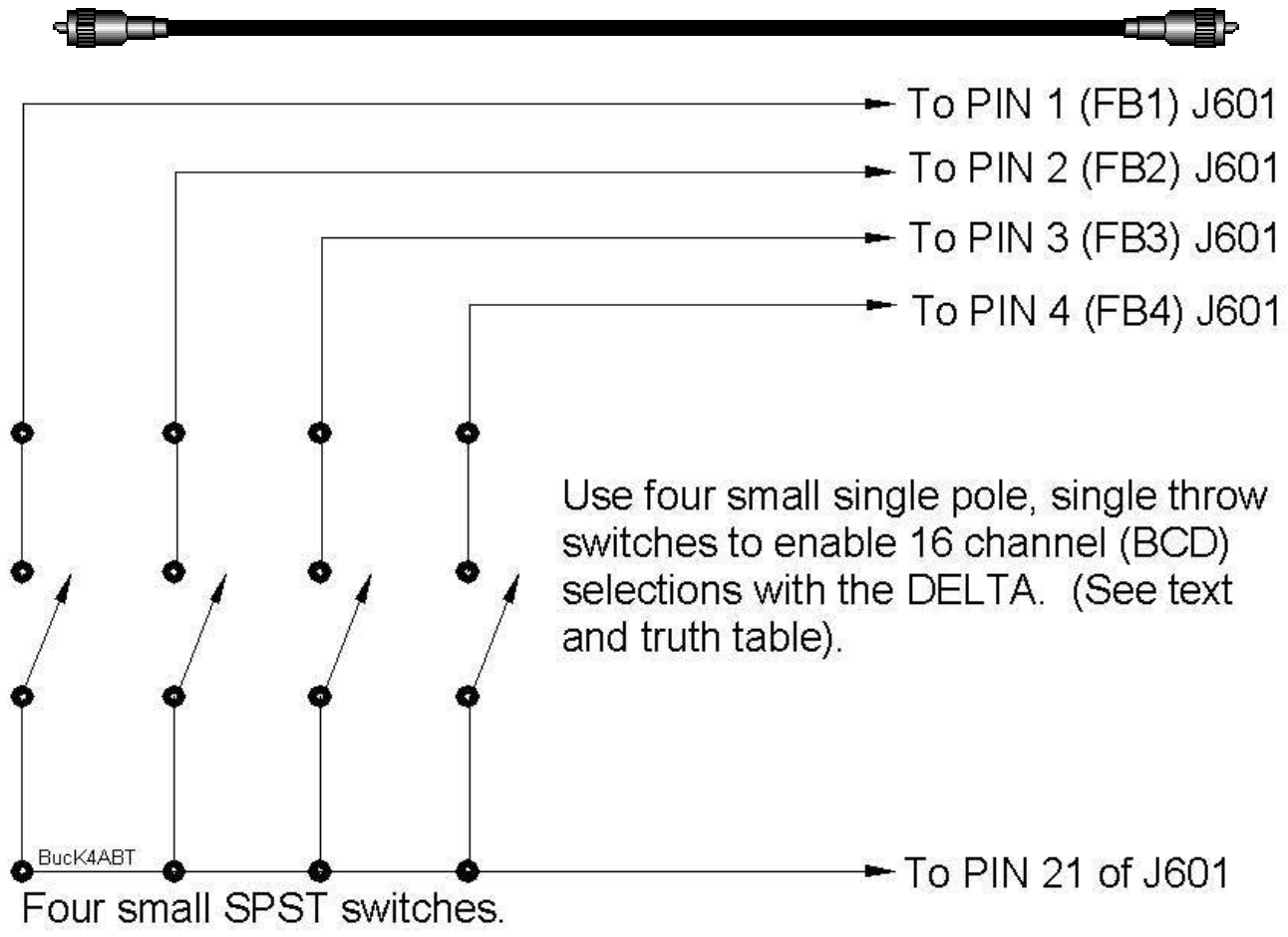


FIGURE 6

For multi-channel use, you can leave pin 1 ungrounded and use the DIP switch arrangement *at figure six (6)* ***above*** . Using the table below, this 4 switch configuration will enable selection of the 16 channels you have programmed into the 2212 IC at U706.

Channel	FB1	FB2	FB3	FB4
1	0	1	1	1
2	1	0	1	1
3	0	0	1	1
4	1	1	0	1
5	0	1	0	1
6	1	0	0	1
7	0	0	0	1
8	1	1	1	0
9	0	1	1	0
10	1	0	1	0
11	0	0	1	0
12	1	1	0	0
13	0	1	0	0
14	1	0	0	0
15	0	0	0	0
16	1	1	1	1
0 =	Closed	1 =	Open	

TABLE 1

This table will enable the user to select any one of the 16 channels programmed into the EEPROM (2212 at U706).