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MODIFYING the GE Phoenix SX for 9600 baud.

By Buck Rogers K4ABT

This page covers the modification of the GE (ERICSSON) Phoenix SX *into a 40 to 50 watt 9600 baud radio.*

The Phoenix SX is easy to find on the surplus market (*we keep a few around as spares*) and just as easy to convert into a 9600 baud transceiver for PacketRadio use. This transceiver has some similarities to the DELTA that we modified on another of these PacketRadio pages. The Delta is also easy to convert and modify for Amateur band operation, and even easier to modify for use at 9600 bauds.

Like the Delta, the Phoenix SX becomes a very smooth operating 9600 baud radio that has a clean eye pattern. In fact, the two of them (The DELTA and PHOENIX SX), are two of the best 9600 baud radios that I have in service. The Delta "low-band," (42 to 50) MHz is also easy to move to 51 MHz and modify for 9600 baud use.

For the record, I used both the Kantronics KPC-9612 and the MFJ-1270CQ Turbo 9600 baud TNCees with the DELTA and Phoenix, and the results are the best that I've had with all my 9k6 systems.

The Kantronics KPC-9612 can be configured as a TheNET "look-alike" by exchanging the standard 9612 EPROM with the Kantronics KPC-9612 KNET option EPROM. The KNET option EPROM maintains the KPC-9612 standard features while adding the KNET/TheNET node functions.

This makes the KPC-9612 into a highly desirable network node, in that it now provides full gateway capabilities between two different frequencies…. AND/OR baud rates. Think about this for a moment. The KPC-9612 has it all in one package, therefore, no node-stacking, or umbilical connecting cables between the nodes.

LET'S BUILD THE 9600 BAUD TRANSCEIVER:

Make sure the Phoenix is in good working condition by making the connections as shown in ***Figure 1.*** Test it with the original EEPROM in the radio. This gives us the "Go/No Go" that the radio is (or is NOT), working. When we know the radio is working with the present frequency (EEPROM 2212) configuration. Once the radio is confirmed in good operating condition, we can then proceed to the next steps

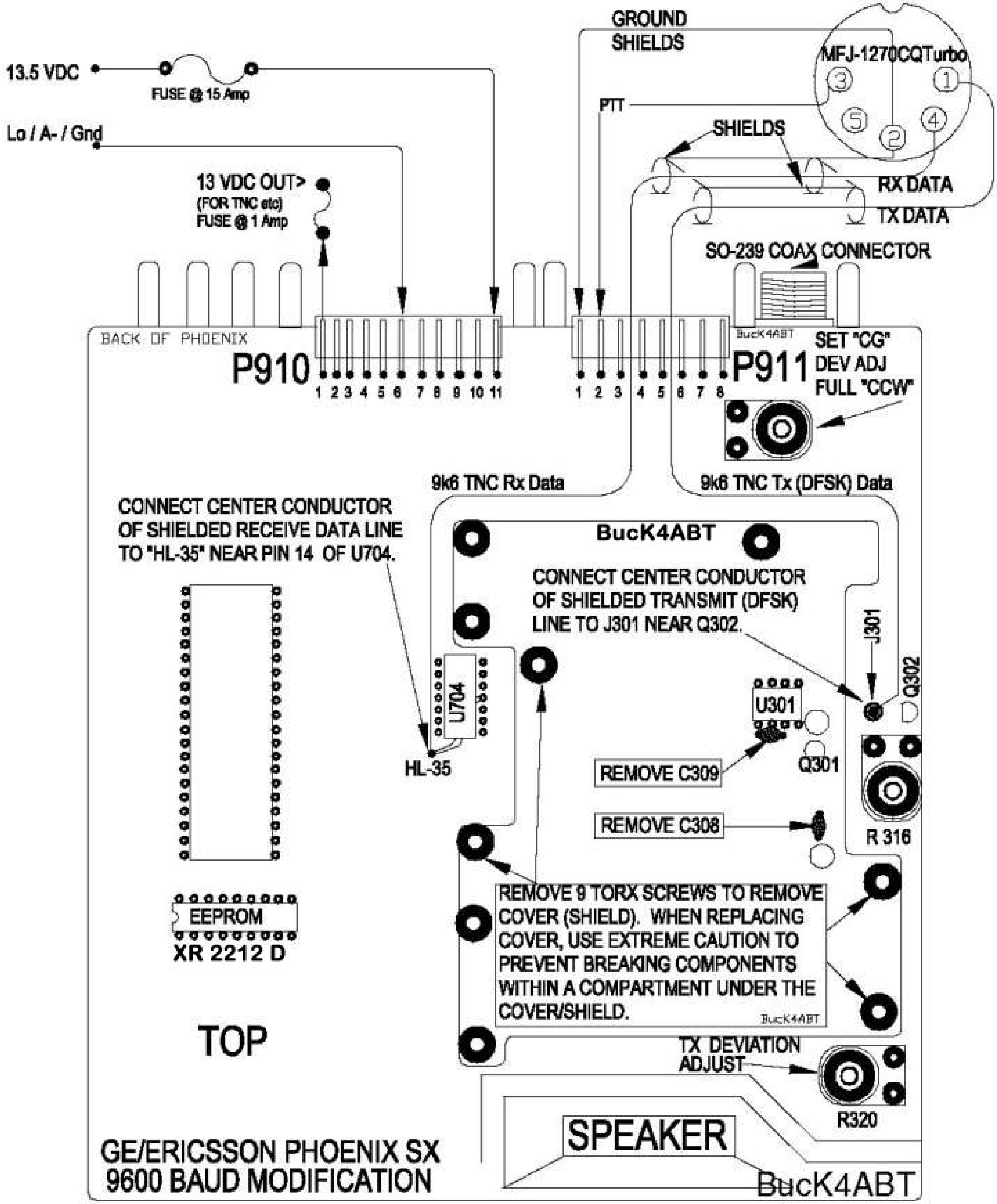


FIGURE 1

Make sure the Phoenix is in good working condition by making the connections at the back of the Phoenix SX as shown above. Test it with the EEPROM that is in the radio. This will let you know the radio is working with the present frequency (EEPROM) configuration. Also note the location of the channel guard deviation control at the rear of the Phoenix, and the location of the transmit (data) deviation control, R320 near the speaker opening at the front of the Phoenix. Observe the physical location of the two capacitors C308 and C309. Carefully remove these caps, or simply clip one end loose from the circuit board.

If the radio has added mods such as multi-channel piggyback PCBees or unit ID'ers that might be installed, remove these and toss into the spare parts box. In **figure one**, note the "channel guard" deviation control in the upper, right hand corner (see Figure 1). Turn it completely down, or counter-clockwise. The CG pot is located at the rear of the Phoenix near the SO-239, but inside the radio.

Program, or have someone program the 2212 EEPROM with a "suitcase" programmer. Program the 2212 EEPROM with your favorite 16 channels/frequency(s) that you plan to use (within the band the radio is designed for). Before removing the EEPROM from socket U805, ***observe the (notch) orientation of the IC (U805) 2212 before it is removed.*** After the EEPROM programming is complete, insert it into the socket at U805.

Now tune the Phoenix using an on-frequency signal, or your favorite IFR-1200 S, or equivalent test set/communications analyzer. Set the transmitter to frequency, and adjust the output power level in the shielded section on the bottom of the Phoenix.

Look at figure 1 and note the location of the channel guard deviation control at the rear of the Phoenix, and the location of the transmit (data) deviation control, R320 near the speaker opening at the front of the Phoenix. Remove the nine (9) TORX retaining screws that hold the exciter/vco/audio processor cover/shield in place.

Using the drawing at ***figure 1*** and/or the photo at figure three to locate the two capacitors designated as C308 and C309. Carefully remove these caps, or if you prefer, simply clip one end loose from the PCB. DO NOT allow the capacitor to be left in a position that will restrict the cover/shield from seating back flush with the area from which it was removed. Both these components are located near the inside edge of the shield housing, in the area of the pot labeled ***R318***.

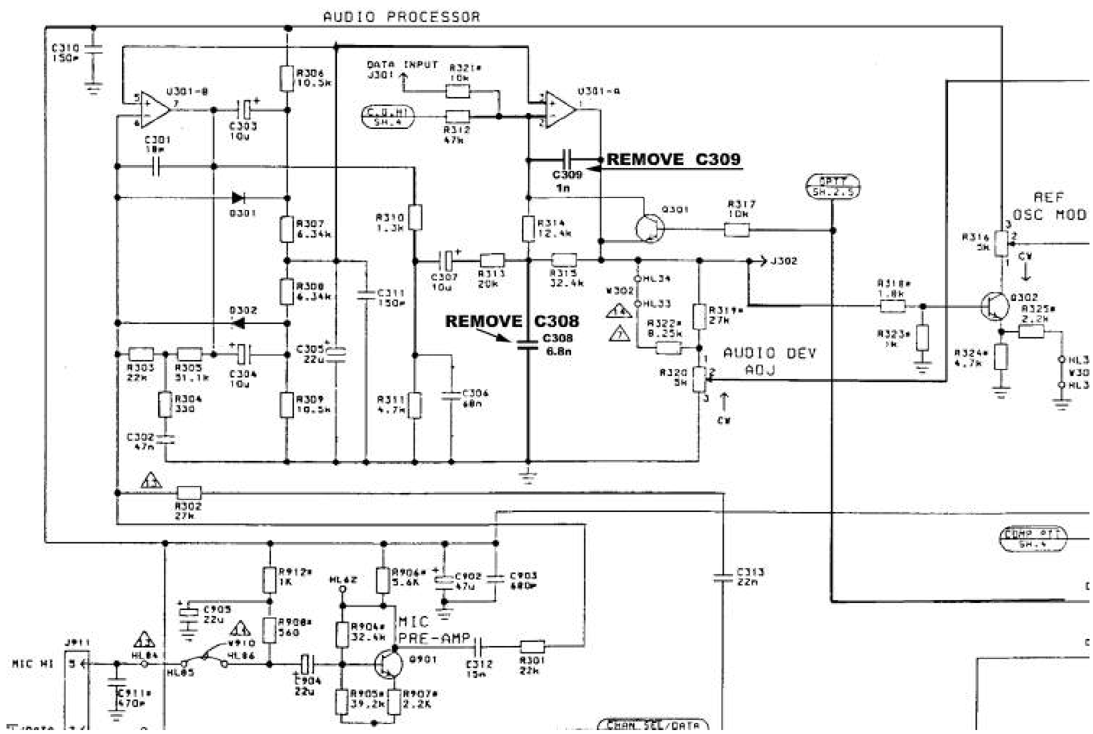


FIGURE 2

For those who wish to see what area the components are being removed from, or for a different perspective of component location, see the bold print lines and labels in the above drawing. Note the location of the two capacitors C308 and C309. Carefully remove these caps, or if you prefer, simply clip one end loose from the PCB.

To make sure the feed point at J301 is isolated, or there is no DC connection, I use a 1 to 4 uF, non-polarized (available at most *Radio Shacks and Tech-America stores*) capacitor to couple the DFSK signal into the Phoenix at J301, near R318 (see Figure 1 and Figure 3). On the same side of the radio, but just outside the over/housing/shield, is U704, and near pin 14 is a trace labeled *HL-35. This point (HL-35) is where we attach the receive audio that is fed to the 9600 baud TNC.*

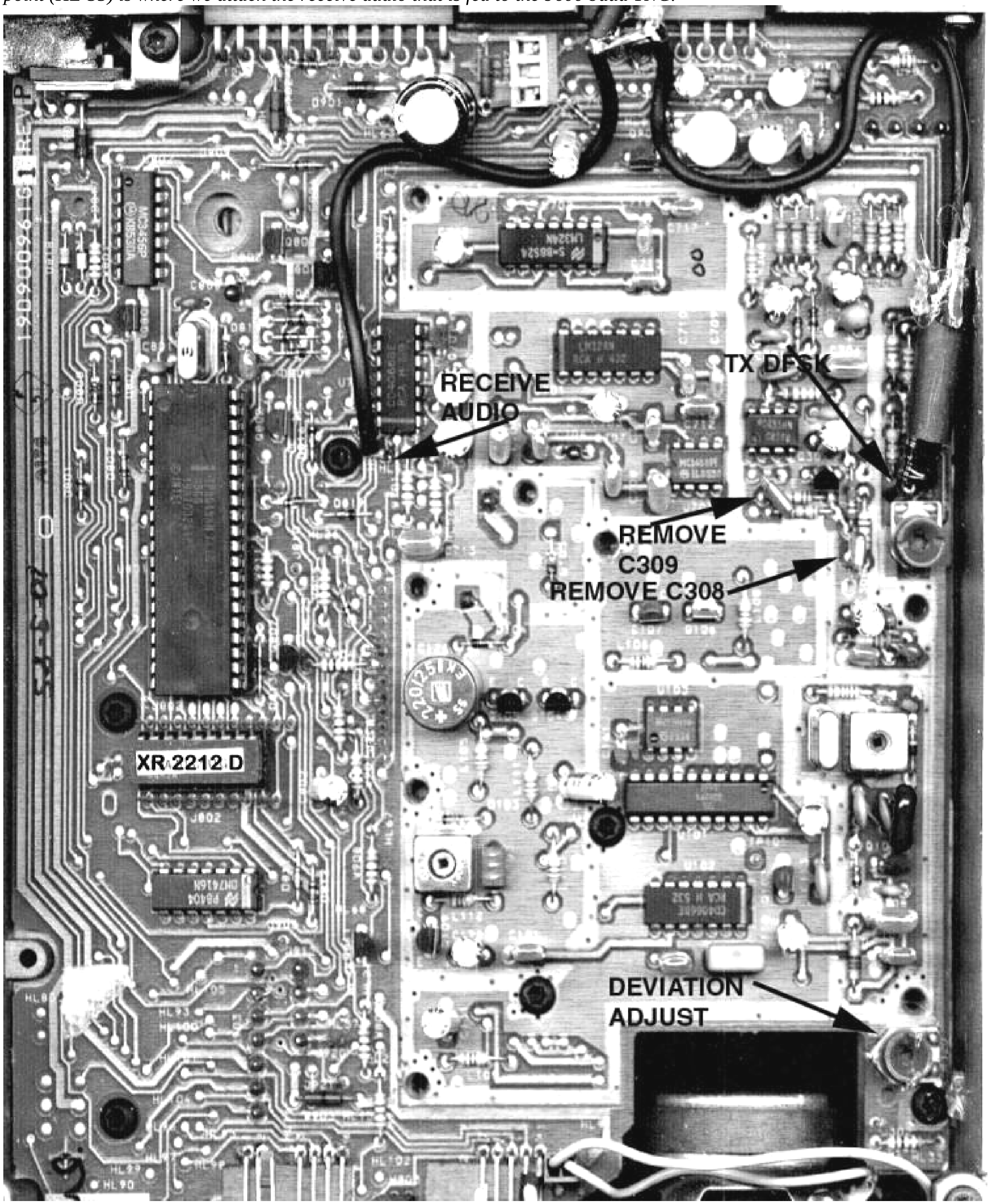


FIGURE 3

Locate the two capacitors designated as C308 and C309. Carefully remove these caps, or if you prefer, simply clip one end loose from the PCB. DO NOT allow the capacitor to be left in a position that will restrict the cover/shield from seating back flush with the area from which it was removed. Both these components are located near the inside edge of the shield housing, in the area of the pot labeled *R318*. Also near R318 is a staking pin (test point) labeled J301. *This test point (J-301) is now the 9600 baud transmit data input* terminal. To make sure the feed point at J301 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 Phoenix at J301. On the same side of the radio, but just outside the shield housing, is U704. Near pin 14 is a trace labeled *HL-35 ! This point (HL-35) is where we attach the receive audio that is fed to the 9600 baud TNC.*

For those who wish to see what area the components are being removed from, or for a different perspective of component location, see the bold print lines and labels in figure two.

Also near R318 is a staking pin (test point) labeled J301. *This test point (J-301) is now the 9600 baud transmit data input* terminal.

CAREFULLY INSPECT YOUR WORK:

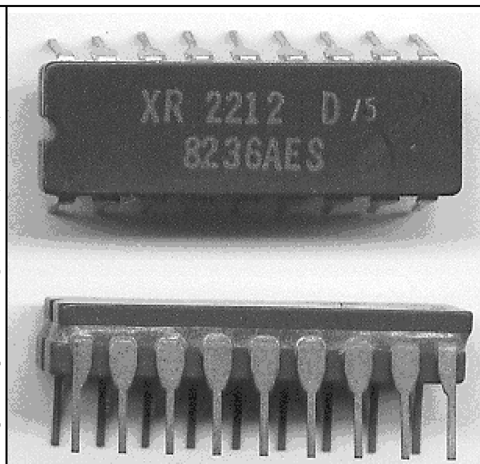
Carefully; Inspect your work, especially where you were doing the chopping and removal of C308 and C309. Insure there are no shorts, or unintended solder bridges between traces. For the record, I test the radio before I replace the multitude of torx screws into the shield/cover for the exciter/audio processor/VCO area…. as this is where my ***Black & Decker*** electric screw-driver saves a lot of wrist action.

There is plenty of 9600 baud DFSK output from the Kantronics KPC-9612 "Plus" and the MFJ-1270CQ Turbo that I've interfaced to these radios. The Phoenix can easily be driven to 3 KHz deviation (NO MORE, NO LESS!) with either of the TNCees I've mentioned in this column. Don't try to guess at it. If you don't have a communications test set or analyzer, have a friend who has a deviation meter insure that it is set to 3 KHz deviation.

The receive pick-off point at HL-35 provides plenty of 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. Use figure 1 to make the connections for the "Push-To-Talk" line. You will also use the same drawing to locate the ground connections to pin 1 of P911 and pin 6 of P910.

THE PROOF IS IN THE FINAL TESTS:

For more than 11 hours, I ran "roll'n eighties" at 9600 bauds without a glitch through the 9600 baud Delta and 9600 baud Phoenix radios. They were operating between my lab "test-bed" and one of the ***SEDAN*** node sites atop Smith Mountain; A distance of about 45 miles.

XR-2212 The XR-2212 is an ultra-stable monolithic phase-locked loop (PLL) system especially designed for commercial two-way and data communications and control system applications. Its on board reference and uncommitted operational amplifier, together with a typical temperature stability of better than 20ppm/°C, make it ideally suited for frequency synthesis, FM detection, and tracking filter applications. ***Primary use is 16 channel, frequency control in many GE, & Ericsson DELTA, RANGR, PHOENIX and similar two-way radios.***		**XR-2212 Prime, Tested, In stock, and ready to ship.**	**Order XR-2212** **29.97 each** **Order XR-2212X10** ***10 for $249***.00