Firmware update 20.12 addresses minor problems with the ISD1730 voice record IC used in RQX 7-Series models.

**IMPORTANT!**

Updating to firmware revision 20.12 enforces the FCC 2013 Narrowband Mandate. Radios with firmware 20.12 installed cannot operate wideband. Furthermore the process cannot be reversed, radios updated for narrowband compliance cannot be reverted back to a firmware revision that allows wideband operation.

**RQX firmware revision history:**

1. **9S102001** released 02/10/2006
   - Initial release updates RQX for 6.25 kHz UHF and 2.5 kHz VHF channel steps.

2. **9S102002** released 06/20/2006
   - This firmware revision fixes a problem with GateGuard Momentary switch operation that limited switch close time to 30 seconds maximum instead of the 255 seconds intended.

3. **9S102003** released 09/05/2006
   - Fix a problem that occurred when recording the Greeting voice message. If Greeting message was longer than 8 seconds and the automatic termination was applied, radio would subsequently not send a recorded Alert message after playing the Greeting message unless the Call Tone was enabled.
   - This firmware update applies to AP16 based callboxes, and only affects 7-Series recorded voice message operation.

4. **9S102007** released 01/21/2009
   - **Repeater Delay Timer** (EEProm $009B) *(added with beta revision 9s102004.s19, 11/01/2006)*
     With RQX 7-Series there was a problem with operation on repeaters. When the Callbox PTT was pressed it accessed the repeater, when released the repeater hang-time would make the Callbox think there had been a response and it would immediately begin normal 2-way operation, whether there had been a legitimate response or not. This would stop retry and automated voice messages. Programming a value into memory location $009B (Delay time = value $009B * 1/32 second) specifies how long the callbox waits after transmitting before it looks to see if there is a response. This value must be greater than the repeater hang time. Pending a programmer update, this value can only be entered via terminal mode programming as follows:
   a. Select Terminal Mode from the pull-down Radio menu
   b. Type a string of ????????????? to put the radio into program mode
   c. Convert the desired Repeater Delay Time to a hex value (ie. 1 second = “20”, 3 seconds = “60”)
   d. Enter the hex value into memory location $009B by typing:
      *02009b + hex value + CR (ie. For 1 second type ”02009b20 + CR”)*

   - **Support for ISD1730 Voice Recorder IC** *(added with beta revision 9s102005.s19, 5/31/2007)*
     Future pcb revisions of RQX 7-Series transceivers will utilize the ISD1730 Voice Recorder IC.
     a. This firmware revision supports ISD1420 and ISD1730 based 7-Series Callboxes. If Microcontroller U501 pin 18 (PS) is high at turn-on the RQX is set for ISD1420 operation, if low it is set for ISD1730 operation.

   - **Reset RQX Timer at Sensor turn ON** *(added with beta revision 9s102006.s19, 7/9/2007)*
     Any time the Sensor input goes from low to high the RQX Reset Timer is restarted, even if it’s not in Sensor Power-Up configuration. The RQX Timer will never timeout as long as the sensor is held low.

   - **“Switch On When Active with Turn-Off Code” modification** *(added with beta revision 9s102006.s19, 11/1/2008)*
     If the RQX is set for both “Switch On When Active with Turn-Off Code” AND “Automatic Turn-Off” then the RQX will immediately open the switch and turn off the radio when it receives the turn-off code.
     a. If the RQX turn-off code is set for transpond, the transpond tone will be transmitted before the automatic turn off.
     b. If the turn-off code is not received the RQX will automatically open the switch and turn off the radio after the programmed “Reset Time” has expired. Remember that any time the RQX receives or transmits the “Reset Time” is restarted, so a long programmed “Reset Time” requires long periods of inactivity on the radio channel before it can automatically turn off.
     c. Sensor Turn-On will not activate the switch, it will send the sensor message, then turn off once the sensor input is released.

   - **Slope calculations for Tone deviation pot and Voice deviation pot** *(added with released revision 9s102007.s19, 1/21/2009)*
     a. Voice and tone slope is applied to the voice and tone deviation pots relative to the channel frequency programming. This will be the exact same calculation that is currently used for the modulation balance pot.
     b. Slope values are stored in the EEPROM per the following chart. Autotest will store each value in both the Slope location used by the factory and the Factory Restore location used by the programmer for factory reset. Adjustment and factory restore of these values is not supported by the current Ritron RQX programmer 10.1.4.

     **Slope**
     | Factory Restore | Description                      |
     |-----------------|----------------------------------|
     | 033F            | 00AC Tone deviation pot slope - wide |
     | 0340            | 00AD Tone deviation pot slope – narrow |
     | 0341            | 00AE Voice deviation pot slope – wide |
     | 0342            | 00AF Voice deviation pot slope – narrow |

     \[ \text{Slope} = \text{ROUND}\left(\left(\frac{\text{pot2} - \text{pot1}}{\text{channelsteps}}\right) \times 4096\right) \]
     \[ \text{pot1} = \text{pot value at low band edge test frequency (reference frequency)} \]
     \[ \text{pot2} = \text{pot value at high band edge test frequency} \]
channelsteps = number of channel steps between the low band edge reference and high band edge frequency

c. Add a Tone deviation pot tail kicker for tones higher than 179.9Hz. If the QC code programmed is 29-38 or 45-51, add a decimal value 16 to the pot setting after slope. This is applied the same regardless of narrow/wide band. This is to offset attenuation due to the cutoff frequency of the MAX7410, a switched capacitor lowpass filter.

5. 9S102008 released 04/22/2009
Correct sensor turn-on problem in firmware update 20.07
With 20.07 or higher, any time the Sensor input goes from low to high the RQX Reset Timer is restarted, even if it’s not in Sensor Power-Up configuration. The RQX Timer will never timeout as long as the sensor is held low. As a result the 1-Series callboxes would not automatically turn-off when programmed to do so.

6. 9S102009 released 07/20/2009
Correct problem with receiver wideband / narrowband initialization
On power-up the wide/narrow RX is not initialized correctly, resulting in intermittent low audio on callboxes programmed for narrowband operation.

7. 9S1N2010 released 09/05/2012
Firmware revision 9S1N2010 updates the RQX Series callbox for FCC 2013 Narrowband compliance. Radios cannot be programmed for wideband operation.
   a. Narrowband compliant firmware revisions are identified by the letter “N” in the 4th character of the .s19 firmware file, and by setting the MSB of the firmware revision.
   b. Requires Ritron RQX PC Programmer 10.2.0 or later. Previous revision of the PC programmer will not be able to program narrowband compliant radios.
   c. Radios can be updated to narrowband compliant firmware, however, once updated the radio cannot be reverted back to a non-compliant firmware revision.
   d. Narrowband is not enforced on Canadian models, they can still be programmed for wideband. Canadian and BC models continue to have WB table frequencies.

8. 9S1N2011 released 05/06/2013
   a. Send ISD1730 (U310) a reset command immediately before shutdown (ISD1730 only). This is to overcome a problem where the ISD1730 voice record IC could send and/or play an incorrect voice message if the RQX 7-Series was turned back on (PTT) immediately after it had shut down. It could require up to 35 seconds of off time before the RQX could be turned back on and be assured the correct messages would be played. This only affects RQX 7-Series models with ISD1730 voice record IC.
   b. Initialize REC_LED (U501 p30) to an output of 0 until a message is played or recorded, at which time it is switched to an input and the speech chip sets it low to indicate an IRQ when voice playback is finished. This only affects RQX 7-Series models with ISD1730 voice record IC manufactured after May 2013.

9. 9S1N2012 released 05/31/2013
Corrects a problem with initial factory programming of the radio that was a result of firmware update 9S1N2011.